



Princetonlaan 6  
P.O. Box 80015  
3508 TA Utrecht  
The Netherlands

[www.tno.nl/milieu](http://www.tno.nl/milieu)

P +31 30 256 42 56  
F +31 30 256 42 75

**TNO report**

**2008-U-R0486/B**

**Priority Action Substances in the South Eastern  
River Basin District Project: Summary report no 2**

Date	August 2007
Author(s)	M.M.G. Houtzager, B.Sc. Dr. L.A. van de Kuil
Project number	004.36302
Dossier number	52005008
Key words	- Water Framework Directive - hazardous substances - priority substances - relevant pollutants - monitoring
Assignor	Mr Ray Spain Project Coordinator SERBD project Carlow County Council County Buildings Athy Road BA-County Carlow Carlow Ireland

All rights reserved. No part of this report may be reproduced and/or published in any form by print, photoprint, microfilm or any other means without the previous written permission from TNO.

All information which is classified according to Dutch regulations shall be treated by the recipient in the same way as classified information of corresponding value in his own country. No part of this information will be disclosed to any third party.

In case this report was drafted on instructions, the rights and obligations of contracting parties are subject to either the Standard Conditions for Research Instructions given to TNO, or the relevant agreement concluded between the contracting parties. Submitting the report for inspection to parties who have a direct interest is permitted.

© 2008 TNO



## Summary

Nowadays a large number of man-made chemicals are being used while other chemicals are released to the environment due to industrial, agricultural and other human activities. As a consequence their widespread presence in the environment is becoming increasingly well documented. The increasing demand by citizens and environmental organisations for cleaner rivers and lakes, groundwater and coastal beaches has been evident for considerable time. For this reason the European Commission has made water protection one of the priorities of its work. This resulted in the European Water Framework Directive 2000/60/EC (WFD) as an operational tool for setting the objectives for water protection in the future. In Ireland a National Dangerous Substances Expert Group was established to design a substances screening monitoring programme as part of the implementation of the WFD and to assist with developing lists of priority action pollutants, candidate relevant pollutants and candidate general components for surface waters.

The South Eastern River Basin District Project (SERBD) was carried out by the Carlow County Council as part of a National Programme to test for relevance of all the candidate parameters and to provide data towards the further requirements to establish Environmental Quality Standards (EQS) levels for Irish waters. SERBD was an 18 month monitoring programme which incorporated sites downstream of major towns, sites associated with agriculture, mining and forestry activities and rural households, groundwater sites and two discharge effluent sites. Phase 1 of this programme was executed during the second half of 2005 and the analytical results were reported in TNO report B&O-A R 2005/378, "Priority Action Substances in the South Eastern River Basin District Project: Report on Phase 1".

Phase 2 of this programme was executed during the first half of 2006 and the analytical results were reported in TNO report B&O-A R 2006/231, "Priority Action Substances in the South Eastern River Basin District Project: Report on Phase 2".

Phase 3 of this programme was executed during the second half of 2006 and the analytical results were reported in TNO report B&O-A R 1140/B, "Priority Action Substances in the South Eastern River Basin District Project: Report on Phase 3".

In this summary report no 2 the results from the target sites are reported. This consists of the results of water, sediment and biota samples from phase 3 plus the forestry and sheep dipping target sites.

The results for the Priority Action Substances in aqueous samples show that 35 of the 51 compounds are found in one or more of the samples, 8 compounds are found in 25% of the samples and only 2 compounds were found in more than 50% of the samples. The latter are nickel and fluoranthene. The median concentration of fluoranthene was 0.011 µg/l, and for nickel was 1.1 mg/kg dw.

In the water samples of the forestry and sheep dipping target sites only in one occasion the presence of atrazine was demonstrated.

In the 7 sediment samples 27 of the 51 Priority Action Substances are found while 13 of these are found in more than 50% of the samples. These are mainly the polycyclic aromatic hydrocarbons, volatiles and metals.

In the bioato samples 14 of the 51 Priority Action Substances are found while 12 of these are found in more than 50% of the samples. These are mainly the polycyclic aromatic hydrocarbons, pesticides and metals. Most metals are found in every sample.

The concentrations found in the aqueous samples and the sediment samples don't differ substantially from concentrations that may be found in other non-suspected locations.

Based on the results of Phase 1, the analysis of dioxins and furans and typical Industry chemicals was omitted in the latter phases. Of the remaining 132 Relevant Pollutants in water 39 parameters were found in one or more of the aqueous samples, 16 compounds are found in 25% of the samples and 11 compounds are found in more than 50% of the samples. The most observed 11 parameters are the metals, hormone disturbing compounds, volatiles, polycyclic aromatic hydrocarbons en pesticides. Most results are very comparable to the results earlier test periods. In general, no extraordinary concentrations are found for the Relevant Pollutants in water or sediment and biota.

# Contents

<b>Summary .....</b>	<b>3</b>
<b>1 Introduction.....</b>	<b>7</b>
<b>2 Samples and Chemical Parameters.....</b>	<b>9</b>
2.1 Sampling and samples .....	9
2.2 Chemical parameters.....	11
<b>3 Materials and methods .....</b>	<b>19</b>
3.1 Sample preparation .....	19
3.2 Methods for the General Components .....	19
3.3 Methods for the Priority Action Substances .....	21
3.4 Additional Methods for the Relevant Pollutants.....	26
3.5 Identification, limits of detection, calculation and expression of results .....	31
<b>4 Results.....</b>	<b>32</b>
4.1 Priority Action Substances.....	32
4.2 Relevant Pollutants .....	46
4.3 General Components.....	75
4.4 Results of QA/QC measures and samples .....	77
<b>5 Conclusions.....</b>	<b>94</b>
<b>6 QA/QC Statement.....</b>	<b>96</b>
<b>7 Signature.....</b>	<b>97</b>

## Appendices:

- 1 Procedure ORG-220, “Guidelines for sampling Surface water, sediment and tissue”
- 2 Procedure CC-SERBD, “Sample requirements for Carlow County SERBD Project”
- 3 Full results of all water, sediment samples and samples from the forestry and sheep dipping sites.



# 1 Introduction

Nowadays a large number of man-made chemicals are being used while other chemicals are released to the environment due to industrial, agricultural and other human activities. As a consequence their widespread presence in the environment is becoming increasingly well documented. The increasing demand by citizens and environmental organisations for cleaner rivers and lakes, groundwater and coastal beaches has been evident for considerable time. For this reason the European Commission has made water protection one of the priorities of its work. This resulted in the European Water Framework Directive 2000/60/EC (WFD) as an operational tool for setting the objectives for water protection in the future.

The intention of the WFD is to get polluted waters clean again, and ensure clean waters are kept clean. A key objective of the WFD is that all waters achieve a “good status” by 2015. The best model for a single system of water management is management by river basin - the natural geographical and hydrological unit - instead of according to administrative or political boundaries. Initiatives of Member States concerned for the Maas, Schelde and Rhine river basins have served as positive examples of this approach, with their cooperation and joint objective-setting across Member State borders, or in the case of the Rhine even beyond the EU territory. Within the WFD for each river basin district a "river basin management plan" will need to be established and updated every six years.

While Ireland largely enjoys cleaner waters than much of the rest of Europe, due, at least in part, to its less industrialised history, the usage of chemicals throughout all sectors of society has become increasingly widespread during the past century. A National Dangerous Substances Expert Group was established to design a substances screening monitoring programme as part of the implementation of the WFD and to assist with developing lists of priority action pollutants, candidate relevant pollutants and candidate general components for surface waters. The South Eastern River Basin District Project is carried out by the Carlow County Council as part of the National Programme, and is a 18 month monitoring programme which incorporates sites downstream of major towns, sites associated with agriculture, mining and forestry activities and rural households and some groundwater sites and two discharge effluent sites, a total of 23 sites. The laboratory of TNO Environment and Geosciences in The Netherlands has been selected by the Carlow County Council to provide the laboratory services in support of this monitoring programme while the sampling and the field analysis are carried out by the South Eastern River Basin District Laboratory in Kilkenny. Within the programme about 223 parameters, including metals, pesticides, organics and inorganics are determined and the following groups can be distinguished:

- Priority Action : 41 parameters
- Relevant Pollutants : 156 parameters
- General Components : 20 parameters for water, 2 for biota and 4 for sediments

In the duration of the project 3 phases of each 6 month can be distinguished:

- **Phase 1:** During the first 6 months water samples are collected from 23 sites. While the initial intention was to do the sampling on a monthly basis, the maximum holding periods of samples and the sampling logistics made it necessary to do this on a bi-weekly basis. The samples are analysed for the Priority Action, Relevant Pollutants and General Components parameters. Apart from water samples, one sediment sample was collected from 17 of the 23 sampling sites and analysed for all parameters. No biota samples were collected during this phase. The results of chemical analysis during Phase 1 were reported in TNO report B&O-A R 2005/378, "Priority Action Substances in the South Eastern River Basin District Project: Report on Phase 1".
- **Phase 2:** During the second 6 months water samples will continue to be collected and analysed for the Priority Action and General Components parameters. Based on the results collected during phase 1, the Relevant Pollutant groups "dioxins", "industrial chemicals" and "estrogens" were omitted for further analysis in phase 2. Additional new target sites were included during this phase and biota samples were collected and analysed for the Priority Action and General Components parameters, and the Relevant Pollutants parameters originally analysed during phase 1, e.g. including the "dioxins" and "industrial chemicals".
- **Phase 3:** During the 6 months of phase 3 water and sediment samples from target sites were collected and analysed for the Priority Action and General Components parameters. Similar to phase 2 the Relevant Pollutant groups "dioxins", "industrial chemicals" and "estrogens" were omitted for further analysis in phase 3.

This summary report describes the results of samples that were taken at the target sites, water samples series 21 to 29, sediment samples series 9, biota samples series 3 to 4 and the water samples from the forestry and sheep dipping sites series 1 to 7. It includes the results itself, summary listings as well as the full results, a brief description of the methods used for the determination of the parameters, a discussion about the findings in phase 3 and the results of the QA/QC samples.



## 2 Samples and Chemical Parameters

### 2.1 Sampling and samples

All samples were collected by the South Eastern River Basin District Laboratory in Kilkenny. Procedures for sampling and conservation of samples, sampling equipment, sample containers and some equipment for on-site analysis were provided by the TNO laboratory. It should be mentioned that the TNO samplers did not function satisfactory and were replaced by SERBD samplers. The procedures used and supplied for this project are a general TNO procedure for sampling:

- Procedure ORG-220, “Guidelines for sampling surface water, sediment and tissue”, version 1, date 2004/08/01, TNO Environment, Energy and Process Innovation, Department of Environmental Quality (see appendix 1)

and a dedicated procedure for sample requirements within this project:

- Procedure CC-SERBD, “Sample requirements for Carlow County SERBD Project”, version 1, date 2005/02/10, TNO Environment, Energy and Process Innovation, Department of Environmental Quality (see appendix 2)

Each water sample consisted of the following sub-samples:

- W-A: 3 samples in 1-l green glass bottles, refrigerated at 4°C
- W-B: 1 sample in 100-ml brown glass bottle, without headspace and refrigerated at 4°C
- W-C: 1 sample in 100-ml PE bottle, filtered over 0.45 µm, pH<2 using ultra-pure HNO<sub>3</sub> and refrigerated at 4°C or frozen
- W-D: 1 sample in 1-l green glass bottle, addition of 1 ml of glacial acetic acid, refrigerated at 4°C
- W-E: 1 sample in 250-ml PE bottle, refrigerated at 4°C
- W-F: 1 sample in 500-ml PE bottle, refrigerated at 4°C
- W-G: 1 sample in 100-ml PE bottle, pH<2 using H<sub>2</sub>SO<sub>4</sub>, refrigerated at 4°C
- W-H: 1 sample in 100-ml PE bottle, pH>8 using NaOH, refrigerated at 4°C

Each sediment sample consisted of the following sub-samples:

- S-A: 1 sample appr. 500 g in a white glass jar, frozen
- S-B: 1 sample appr. 100 g in a brown glass jar, no headspace or as small as possible, frozen
- S-C: 1 sample appr. 100 g in a PE jar, frozen

The laboratory in Kilkenny was instructed to store the collected samples at 4°C until transport. For transportation to The Netherlands the cooled samples were packed in boxes, suitable for the transportation of samples, and additional cooling elements were added to the boxes. A TNO representative was present during the packing of the samples and the shipment to The Netherlands. To maintain a chain of custody a filled out Sample Registration Form was included with each shipment of samples. The sample transport from the laboratory in Kilkenny, Ireland to the TNO laboratory in The

Netherlands was carried out by Streng International Logistic Services, Apeldoorn, The Netherlands..

The results in this summary report no 2 are from total 61 water samples of which 21 are from the forestry and sheep dipping target sites, 7 sediment samples and 4 biota-samples. Table 1, 2 and 3 provide an overview of the relevant shipments that took place.

Table 1 Overview of shipments of water samples during Phase 3 from Ireland to The Netherlands.

shipment no.	SERBD sample code 0697-x-	date sent from Ireland	date received by TNO	TNO sample code 52005008-	condition shipment °C
21	2052	4/11/2006	4/13/2006	268	4.9
22	2072; 2074; 2075	4/25/2006	4/27/2006	285;287;288	8.0
23	2084; 2085	5/22/2006	5/24/2006	297; 298	6.6
24	2100; 2101; 2111	5/30/2006	6/1/2006	313; 314; 321	7.6
25	2119 -2121; 2125 - 2127	6/27/2006	6/29/2006	328 - 333	7.1
26	2136 - 2141	7/25/2006	7/28/2006	337 - 342	7.0
27	2153; 2154; 2158 - 2161	8/29/2006	8/31/2006	355 - 360	7.0
28	2192 - 2197	9/19/2006	9/21/2006	364 - 369	7.7
29	2237 - 2239; 2244 - 2247	10/24/2006	10/26/2006	379 - 385	8.1

Table 2 Overview of shipments of sediment samples during Phase 3 from Ireland to The Netherlands.

shipment no.	SERBD sample code 0697-x-	date sent from Ireland	date received by TNO	TNO sample code 52005008-	condition shipment °C
9	2189-2194; 2238	9/19/2006	21/09/2006	373 - 378; 391	frozen

Table 4 Overview of shipments of biota samples during Phase 3 from Ireland to The Netherlands.

shipment no.	SERBD sample code 0957-x-	date sent from Ireland	date received by TNO	TNO sample code 52005008-	condition shipment °C
3	2243; 2248	24/10/2006	26-10-206	389 - 390	frozen
4	2258; 2262	21/11/2006	23/11/2006	393 - 394	frozen

Table 4 Overview of shipments of the samples from the forestry and sheep dipping target sites from Ireland to the Netherlands.

shipment no.	SERBD sample code 0697-x-	date sent from Ireland	date received by TNO	TNO sample code 52005008-	condition shipment °C
1	2061 - 2063	4/11/2006	4/13/2006	279 - 281	4.9
2	2108 - 2110	5/30/2006	6/1/2006	325 - 327	7.6
3	2122 - 2124	6/27/2006	6/29/2006	334 - 366	7.1
4	2133 - 2135	7/25/2006	7/28/2006	343 - 345	7.0
5	2155 - 2157	8/29/2006	8/31/2006	361 - 363	7.0
6	2189 - 2191	9/19/2006	9/21/2006	370 - 372	7.7
7	2240 - 2242	10/24/2006	10/26/2006	386 - 388	8.1

## 2.2 Chemical parameters

About 221 parameters are determined in the samples in this report. These parameters are divided in three groups:

- Priority Action : 41 parameters
- Relevant Pollutants : 156 parameters
- General Components : 20 parameters for water and 4 for sediment

A alphabetic listing of these parameters is given in tables 5 to 7. Apart from the name of the parameter the tables also list the CAS number, the target Environmental Quality Standard (EQS, if determined by Carlow County) and the method that was used in this study to determine the parameter. Please note most General Components in water (table 7) should be determined in the field or in the laboratory shortly after sampling. With a few exception most of the parameters (17 of 21) were therefore determined by the SERBD laboratory in Kilkenny, in some cases using equipment supplied by the TNO laboratory.

All Priority Action Substances are determined in water as well as in sediment. For the Relevant Pollutants there are a few differences. A number of parameters like typical industry chemicals and dioxines and furans are not determined in water samples in the series 25 to 29. In sediment samples parameters like glyphosate, chlormequat and paraquat are not determined.

Table 5 Overview of the 41 Priority Action Substances determined in this study.

No.	Parameter	CAS Number	Target EQS Water µg/l	Analysis technique <sup>A</sup>
1	Alachlor	15972-60-8	0.035	P1
2	Anthracene	120-12-7	0.01	P2
3	Atrazine	1912-24-9	0.1	P1
4	Benzene	71-43-2	1	P3
5	Brominated diphenylethers	n.a.		P4
	Bis(pentabromo-phenyl)ether	1163-19-5		
	Diphenyl ether, octabromo derivate	323536-52-0		
	Diphenyl ether, pentabromo derivate	32534-81-9	0.53	
6	Cadmium and it's compounds	7440-43-9	0.4	P5
7	Carbon Tetrachloride	56-23-5		P3
8	C10-13-Chloralkanes	85535-84-8	0.1	P4
9	Chlorfenvinphos	470-90-6	0.1	P1
10	Chlorpyrifos	2921-88-2	0.1	P1
11	DDT			
	4,4'-isomer	50-29-3	0.01	P1
	2,4'-isomer	789-02-6	0.01	P1
12	1,2-Dichloroethane	107-06-2	2	P3
13	Dichloromethane	75-09-2	10	P3
14	Di (2-ethylhexyl) phthalat (DEHP)	117-81-7	0.5	P2
15	Diuron	330-54-1	0.05	P6
	Drins	n.a		
16	Aldrin	309-00-2	0.01	P1
17	Endrin	60-57-1	0.005	P1
18	Dieldrin	72-20-8	0.005	P1
19	Isodrin	465-73-6	0.005	P1
20	Endosulfan	115-29-7	0.1	P1

<sup>A</sup>: code refers to method descriptions in section 3

Table 5 Overview of the 41 Priority Action Substances (continued).

No.	Parameter	CAS Number	Target EQS Water µg/l	Analysis technique <sup>A</sup>
21	Fluoranthene	206-44-0	0.025	P2
22	Hexachlorobenzene	118-74-1	0.01	P1
23	Hexachlorobutadiene	87-68-3	0.1	P1
24	Hexachlorocyclohexane (Lindane)	608-73-1 (58-89-9)	0.01	P1
25	Isoproturon	34123-59-6	0.1	P6
26	Lead and it's compounds	7439-92-1	2	P5
27	Mercury and it's compounds	7439-97-6	0.2	P5
28	Naphthalene	91-20-3	1	P2
29	Nickel and it's compounds	7440-02-0	1.8	P5
30	Nonylphenols	25154-52-3	0.3	P7
	4-(para)-nonylphenol (4-nonylphenol, branched)	104-40-5 (84852-15-3)	0.3	P7
31	Octylphenols (para-tert-octylphenol)	1806-26-4 (140-66-9)	1	P7
32	Pentachloro-benzene	608-93-5	1	P1
33	Pentachlorophenol	87-86-5	0.1	P1
34	Perchloroethylene	127-18-4		P3
35	Polyaromatic Hydrocarbon (PAH)	n.a		
	(benzo-a-pyrene)	(50-32-8)	0.01	P2
	(benzo-b-fluoranthene)	(205-99-2)		P2
	(benzo-g,h,i-perylene)	(191-24-2)	0.03	P2
	(benzo-k-fluoranthene)	(207-08-9)	0.04	P2
	(indeno(1,2,3-cd)pyrene)	(193-39-5)	0.04	P2
36	Simazine	122-34-9	0.02	P1
37	Tributyltin compounds (TBT-ion)	688-73-3 (36643-28-4)	0.014	P8
38	Trichlorobenzene	12002-48-1		
	(1,2,3-trichlorobenzene)	87-61-6	0.1	P3
	(1,2,4-trichlorobenzene)	120-82-1	0.1	P3
	(1,3,5-trichlorobenzene)	108-70-3	0.1	P3
39	Trichloroethylene	79-01-6		P3
40	Trichloromethane (Chloroform)	67-66-3	1	P3
41	Trifluarin	1582-09-8	0.037	P1

<sup>A</sup>: code refers to method descriptions in section 3

Table 6 Overview of the Relevant Pollutants determined in this study.

No.	Parameter	CAS Number	Target EQS water (µg/l)	Analysis technique <sup>A</sup>
1	Antimony	7440-36-0	0,4	P5
2	Amitraz	33089-61-1		P1
3	Arsenic and its mineral compounds	7440-38-2	1	P5
4	Barium	7440-39-3	75	P5
5	Bentazone	25057-89-0	0,1	P1
6	Benzidine	92-87-5	0,1	R1
7	Benzylchloride (Alpha-chlorotoluene)	100-44-7	10	R1
8	Benzylidenechloride (Alpha, alpha-dichlorotoluene)	98-87-3	10	R1
9	Beryllium	7440-41-7	0,2	P5
10	Biphenyl	92-52-4	1	R1
11	Bisphenol-A (4,4'-isopropylidenediphenol)	80-05-7		P7
12	Boron	7440-42-8	6,5	P5
13	Bromoxynil	1689-84-5	100	P1
14	Butylbenzylphthalate	85-68-7		P2
15	Captan	133-06-2	0,1	P1
16	Carbendazim	10605-21-7	0,11	P6
17	Carbofuran	1563-66-2	0,1	P6
18	Carbon Disulphide	75-15-0		P3
19	Chloridazon (Pyrazon)	1698-60-8	0,1	P1
20	Chloride	16887-00-6	250000	R5
21	Chlormequat	7003-89-6		R8
22	2-Chloroaniline	95-51-2	3	R1
23	1-Chloro-2,4-dinitrobenzene	97-00-7	5	R1
24	4-Chloro-3-methylphenol	59-50-7	10	R2
25	1-Chloronaphthalene	90-13-1	0,77	R1
26	Chloronaphthalenes (technical mixture)	n/a	0,77	R1
27	4-Chloro-2-nitroaniline	89-63-4	3	R1
	<u>Chloro-Nitrobenzene</u>			
28	1-Chloro-2-nitrobenzene	89-21-4	10	R1
29	1-Chloro-3-nitrobenzene	88-73-3	1	R1
30	1-Chloro-4-nitrobenzene	121-73-3	10	R1
31	4-Chloro-2-nitrotoluene	89-59-8	4	R1
32	nitrotoluene)	25567-68-4	1	R1
	nitrotoluene)			
33	Chloroprene (2-Chloro-1,3-butadiene)	126-99-8	10	P3
34	3-Chloropropene (Allyl chloride)	107-05-1	10	P3
	<u>Chlorotoluene</u>			
35	2-Chlorotoluene	95-49-8	1	P3
36	3-Chlorotoluene	108-41-8	1	P3
37	4-Chlorotoluene	106-43-4	1	P3
38	Chlorotoluron	15545-48-9	0,4	P6
39	Chlorpropham	101-21-3	10	P1
40	Chromium	7440-47-3	0,3	P5
41	Cobalt	7440-48-4	0,2	P5
42	Copper	7440-50-8	0,5	P5
43	Cyanide	57-12-5	1	
44	Cyanuric chloride (2,4,6-Trichloro-1,3,5-triazine)	108-77-0	0,1	P1
45	Cyfluthrin	68359-37-5		P1
46	Cypermethrin	52315-07-8/ 66841-24-5	0,1	P1
47	2,4-D (including 2,4-D-salts and 2,4-D-esters)	94-75-7	0,1	P1
48	Deltamethrin	52918-63-5		P1

<sup>A</sup>: code refers to method description in section 3

Table 6 Overview of the Relevant Pollutants determined in this study (continued).

No.	Parameter	CAS Number	Target EQS water (µg/l)	Analysis technique <sup>A</sup>
49	Diazinon	333-41-5		P1
50	1,2-Dibromoethane	106-93-4	2	P3
51	Di-2-ethylhexyl adipate	103-23-1		P2
52	Dibutyltin (DBT)	n/a	0,01	P8
53	Dichlobenil	1194-65-6		P1
54	Dichloroanilines	n/a	0,5	R1
55	Dichlorobenzene	n/a	10	P3
56	Dichlorobenzidines	1331-47-1	10	R1
57	Dichloro-di-isopropyl ether	108-60-1	10	P3
58	Dichloronitrobenzenes	27900-75-0	1,4	R1
59	1,1-Dichloroethane	75-34-3	10	P3
60	1,1-Dichloroethylene (Vinylidene chloride)	75-35-4	10	P3
61	1,2-Dichloroethylene	540-59-0	10	P3
62	2,4-Dichlorophenol	120-83-2	10	R2
63	Dichlorprop	120-36-5	0,4	P1
64	1,2-Dichloropropane	78-87-5	0,1	P3
65	1,3-Dichloropropene	542-75-6	0,1	P3
66	2,3-Dichloropropene	78-88-6	10	P3
67	Diethylamine	109-89-7	10	R3
68	Diiflubenzuron	35367-38-5	0,015	P6
69	Di-isononyl phthalate (DINP)	28533-12-0		P2
70	Dimethoate	60-51-5	0,1	P1
71	Dimethylamine	124-40-3	7,5	R3
72	Di-n-butylphthalate (DBP)	84-74-2	0,1	P2
73	Epichlorohydrin	106-89-8	0,1	P3
74	Epoxiconazole	135319-73-2	0,1	P1
75	Ethinyl Oestradiol	57-63-6		R9
76	Ethofumesate	26225-79-6	0,1	P1
77	Ethoprophos	13194-48-4		P1
78	Ethylbenzene	100-41-4	10	P3
79	Fenitrothion	122-14-5	0,01	P1
80	Fenpropimorph	67306-03-0/ 67564-91-4	0,1	P1
81	Fluoride	16984-48-8	1	R5
82	Glyphosate	1071-83-6	1	R6
83	Glyphosate trimesium	81591-81-3	0,1	see R6
84	HBCD (hexabromocyclododecane)	25637-99-4		P4
85	Hexachloroethane	118-74-1	10	P3
86	Ioxynil	1689-83-4	10	P1
87	Isopropyl benzene	87-68-3	4,2	P3
88	Kresoxim methyl	143390-89-0	0,1	P1
89	Linuron	330-55-2	0,1	P6
90	Malathion	121-75-5	0,01	P1
91	Mancozeb	8018-01-7		R7
92	Maneb	124727-38-2		R7
93	MCPA	94-74-6	0,1	P1
94	Mecoprop	93-65-2, 7085-19-0	0,02	P1
95	Metamitron	41394-05-2	0,1	P6
96	Metazachlor	67129-08-2	0,34	P6
97	Methiocarb	2032-65-7	0,01	P6
98	Methylbromide (bromomethane)	74-83-9	0,1	P3

<sup>A</sup>: code refers to method description in section 3

Table 6 Overview of the Relevant Pollutants determined in this study (continued).

No.	Parameter	CAS Number	Target EQS water (µg/l)	Analysis technique <sup>A</sup>
99	Methyl-t-butyl ether (MTBE)	1634-04-4		P3
100	Molybdenum	7439-98-7	4,3	P5
101	Mono-Chlorobenzene	108-90-7	1	P3
102	Mono-Chlorophenol	n/a	10	R2
103	Mono-Chlorotoluidines	n/a	10	R1
104	Monolinuron	1746-81-2	0,1	P6
105	Nitrobenzene	98-95-3	0,1	R1
106	4-Nitrotoluene	99-99-0		R1
107	Nonyl-Phenol Ethoxylate	37340-60-6	0,1	P7
108	4-tert-Octylphenol	140-66-9		P7
109	Oestradiol	50-28-2		R9
110	Oestrone	53-16-7		R9
111	Oxamyl	23135-22-0	1,8	P6
112	Oxydemeton-methyl	301-12-2	0,5	P1
113	Paraquat	1910-42-5	0,1	R8
114	PCB (including PCT)	n/a	0,5	R4
115	PCDD	n/a		R4
116	PCDF	n/a		R4
117	Pendimethalin	40487-42-1	1,5	P1
118	Permethrin	52645-53-1	0,01	P1
119	Phenols	n/a	30	R2
120	Pirimicarb	23103-98-2	0,09	P1
121	Pirimiphos-methyl	29232-93-7	0,05	P1
122	Prochloraz	67747-09-5	4	P1
123	Progesterone	n/a		R9
124	Propachlor	1918-16-7	1,3	P1
125	Propyzamide	23950-58-5	100	P1
126	Selenium	7782-49-2	5,3	P5
127	Silver	7440-22-4	1,2	P5
128	Styrene	100-42-5	50	P3
129	Tellurium	1349-80-9	100	P5
130	Tetrabromobisphenol A (TBBP-A)	79-94-7		P4
131	Terabutyltin	1461-25-2	0,016	P8
132	Thallium	7440-28-0	1,6	P5
133	Thiabendazole	148-79-8	5	P1
134	Thiram	137-26-8	0,032	P6
135	Tin	7440-31-5	0,2	P5
136	Titanium	7440-32-6	20	P5
137	Tolclofos-methyl	57018-04-9	0,8	P1
138	Toluene	108-88-3	10	P3
139	Tri-allate	2303-17-5	0,019	P1
140	Tribenuron-methyl	101200-48-0	0,1	P1
141	Trichlorfon	52-68-6		P1
142	1,2,4,5-Tetrachlorobenzene	95-94-3	1	P3
143	1,1,2,2-Tetrachloroethane	79-34-5	10	P3
144	1,1,1-Trichloroethane	71-55-6	10	P3
145	1,1,2-Trichloroethane	79-00-5	10	P3
146	1,1,2-Tri-chloro-tri-fluoro-ethane	76-13-1	3,7	P3
147	Trichlorophenols	95-95-4	1	R2

<sup>A</sup>: code refers to method description in section 3



Table 6 Overview of the Relevant Pollutants determined in this study (continued).

No.	Parameter	CAS Number	Target EQS water (µg/l)	Analysis technique <sup>A</sup>
148	Triclopyr	55335-06-3		P1
149	Tri-n-propyltin (TPrT)	2279-76-7		P8
150	Triphenyltin	n/a	0,005	P8
151	Uranium	7440-61-1	0,1	P5
152	Vanadium	7440-62-2	0,9	P5
153	Vinyl chloride (Chloroethylene)	75-01-4	0,5	P3
154	Xylenes (technical mixture of isomers)	1330-20-7	10	P3
155	Zinc	7440-66-6	2,3	P5
156	Zineb	12122-67-7	0,1	R7

<sup>A</sup>: code refers to method description in section 3

Table 7 Overview of the General Components determined in this study.

No.	Parameters in water	Analysis technique	Determined by
2	Temperature (°C)	field measurement	SERBD
3	Dissolved oxygen (% sat.)	field measurement	SERBD
4	Salinity (‰)	field measurement	SERBD
5	Electrical conductivity (µS/cm at 25°C)	field measurement	SERBD
6	pH	field measurement	SERBD
7	Alkalinity (mg/l CaCO <sub>3</sub> )	spectrophotometry	SERBD
8	Total Hardness (mg/l CaCO <sub>3</sub> )	spectrophotometry	SERBD
9	Soluble reactive phosphorus (mg/l P)	filtration and spectrophotometry	SERBD
10a	Nitrate (mg/l N)	spectrophotometry	SERBD
10b	Nitrate in saline samples (mg/l N)	ISO 13395	TNO
11	Nitrite (mg/l N)	spectrophotometry	SERBD
12	Ammonia (mg/l N)	spectrophotometry	SERBD
13	Sulphate (mg/l SO <sub>4</sub> )	spectrophotometry	SERBD
14	Suspended solids (mg/l)	filtration and gravimetrically	SERBD
15	Turbidity (NTU)	nephelometry	SERBD
16	Biochemical oxygen demand (mg/l O <sub>2</sub> )	5-day incubation at 20°C	SERBD
17	Chemical oxygen demand (mg/l O <sub>2</sub> )	digestion at 150°C and spectrophotometry	SERBD
18	Colour (Hazen)	colorimetry	SERBD
19	Total nitrogen (mg/l N)	ISO 5663	TNO
20	Total organic carbon (mg/l TOC)	NEN-EN 1484	TNO
21	Total phosphorus (mg/l P)	AA + UV-destr.	TNO

No.	Parameters in biota	Analysis technique	Determined by
1	Lipid content	extraction and gravimetrically	TNO
2	Moisture content	drying and gravimetrically	TNO

No.	Parameters in sediment	Analysis technique	Determined by
1	Aluminium	ICP/MS (P5)	TNO
2	Moisture Content	gravimetrically	TNO
3	Particle Size Distribution	laser diffraction	TNO
	%>2		
	%<2		
	%>63µm		
	%<63µm		
4	Total Organic Carbon	gravimetrically	TNO

## 3 Materials and methods

The chemical parameters determined in this study are, where if possible, combined in groups. The method used for each parameter is indicated in the tables in paragraph 2.2 with a letter and number, for instance P1. In this section a brief description of each method is given.

### 3.1 Sample preparation

Upon receipt the samples are checked for integrity and their condition. For water samples (including the ones from the forestry and sheep dipping target sites) the temperature of a number of samples is measured.

The sub-samples of each water sample are divided for the individual analysis and are spiked with internal standards prior to analysis. For a number of determinations these are isotopic labelled standards, for instance dioxins, PCBs and PAHs, while for other parameters such as the volatiles and the pesticides surrogate internal standards are used. All samples are stored at 4°C until analysis.

Biota samples were allowed to thaw before collection of a sub-sample for the determination of the volatiles. The biota samples for the determination of the non-volatile organic compounds and metals were freeze-dried before further sub-sampling took place. The freeze dried samples were grinded and sub-samples were prepared. As with the water samples these were spiked with isotopic labelled and surrogate internal standards before further analysis.

Sediment samples were allowed to thaw and after homogenization sub-samples were collected for the determination of volatiles, metals and particle size determination. The sediment sample for the determination of the non-volatile organic compounds was freeze-dried before further sub-sampling took place. After homogenization these samples were sieved over a 2 mm sieve and sub-samples were prepared. As with the water samples these were spiked with isotopic labelled and surrogate internal standards before further analysis.

QA/QC samples within each series were prepared from actual samples or by combining residues of actual samples. Analytes to be determined were added to these samples in a concentration of 5 to 20 10 times the expected limit of detection (LOD). The QA/QC samples were processed in the same way as the actual samples and the method blanks.

### 3.2 Methods for the General Components

#### 3.2.1 *Field measurements of water samples*

The majority of the General Components parameters for water samples are parameters that were determined in the field or shortly after sampling in the laboratory. In discussions with the SERBD laboratory it was decided which parameters would be determined there and which would be done by the TNO laboratory. Some equipment for the field measurements was sent by TNO to the SERBD laboratory in Kilkenny. The

parameters that are measured by the SERBD laboratory are given in table 6 in paragraph 2.2.

### 3.2.2 *General Components for water*

The parameters determined by the TNO laboratory are nitrate, total nitrogen, total organic carbon and total phosphorus. The following methods were used:

Nitrate is determined according to NEN-EN-ISO 13395, “Water quality – Determination of nitrate nitrogen and nitrite nitrogen and the sum of both by flow analysis (CFA and FIA) and spectrometric detection”. The sample is injected in an auto-analyser and nitrate is reduced to nitrite, which is then reacted to an azo-complex, which is measured photometrically.

Total nitrogen is determined according to NEN 6646, “Water – Photometric determination of the content of ammonium nitrogen and the sum of the contents of ammoniacal and organically bound nitrogen according to Kjeldahl by continuous flow analysis”. The sample is injected in an auto-analyser and is heated and digested under acidic conditions using UV-irradiation. The formed ammonium is measured photometrically.

Total organic carbon is determined according to NEN-EN 1484, “Water analysis – Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)”. For TOC the non-filtered and acidified sample is injected in an auto-analyser and heated and digested under acidic conditions using UV-irradiation. The formed carbon dioxide is measured with an infra-red detector.

Total phosphorus is determined according to NEN-EN-ISO 15681-1, “Water quality – Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA) – Part 1: Method by flow injection analysis (FIA)”. The sample is injected in an auto-analyser and is heated and digested under acidic conditions using UV-irradiation. The formed phosphate is measured photometrically.

### 3.2.3 *General Components for sediments*

The parameters determined by the TNO laboratory are aluminium, moisture content, particle size distribution and total organic carbon. The following methods were used:

Aluminium was determined with inductively coupled plasma with mass spectrometry (ICP/MS) as described in paragraph 3.3.4.2.

The moisture content was determined gravimetrically from the dried residue. A sub-sample was dried at 105°C until constant weight was observed. The moisture content was calculated from the weight loss of the sample.

The particle size distribution was determined with a laser diffraction method using a Malvern 2000 master sizer. A sub-sample was put in an ultrasonic bath, which is connected to a measuring cell in front of the laser. The suspension is cycled through the measuring cell and the scattered light is detected. Particle size distribution is calculated according to Fraunhofer method.

The total organic carbon content (TOC) was determined gravimetrically from the ash residue. A sub-sample was dried at 105°C and then heated at 750°C to oxidise any organic material in the sample until constant weight was observed. The TOC content was calculated from the weight loss of the sample.

#### 3.2.4 *General Components for biota*

The parameters determined by the TNO laboratory are total lipid content and moisture content. The following methods were used:

The total lipid content was determined gravimetrically after extraction of the freeze-dried sample. A sub-sample was extracted overnight. The extract was dried, concentrated to remove the solvent and finally dried at 105°C until constant weight was observed to remove any residual solvent. The lipid content was determined from the weight of the extracted lipids.

The moisture content was determined gravimetrically from the dried residue. A sub-sample was dried at 105°C until constant weight was observed. The moisture content was calculated from the weight loss of the sample.

### 3.3 **Methods for the Priority Action Substances**

#### 3.3.1 *Method P1, P2: Pesticides (GC), Polycyclic Aromatic Hydrocarbons and Phthalates*

##### 3.3.1.1 *Water samples*

After receipt of the samples the following surrogate standards were added:

- <sup>13</sup>C-Polychlorinated benzenes
- <sup>2</sup>D-Ethylparathion and -2,4D
- 6-Methylchrysene
- <sup>2</sup>D-Polyaromatic hydrocarbons, 16 EPA PAH

The sample was homogenized by shaking and the sample pH was adjusted to 4. The sample was extracted using solid phase extraction (SPE) and the isolated compounds were eluted from the SPE cartridge using methyl-t-butyl ether (MTBE). A saturated diazomethane solution is added to the extract for the derivatization of compounds with acidic properties. The resulting extract is purified using a column clean-up procedure resulting in fractions for the instrumental analysis of the pesticides and the PAHs. The fractions are concentrated to a small volume and analysed using gas chromatography in combination with mass spectrometry (GC/MS) after the addition of a syringe standard. The MS is used in the selected ion-monitoring mode (SIM).

Identification of the pesticides and phthalates is based on retention times and ion ratios. Quantification is based on external standards and a correction for the added syringe standard. The recovery of the added surrogate standards is used to evaluate the performance of the method. The results are not corrected for this recovery.

Identification of PAH is based on retention times and ion ratios. Quantification is based on an external standard and the recovery of the added labelled internal standards. The latter means that the results are corrected for the recovery of the internal standards

#### 3.3.1.2 *Sediment samples*

A sub-sample is collected from the freeze-dried sediment samples and spiked with the same internal standards as the water samples. The sample is extracted using accelerated solvent extraction with a mixture of hexane/diethyl ether. The raw extract is further processed in the same way as the extract from the SPE cartridge.

#### 3.3.1.3 *Biota samples*

A sub-sample is collected from the freeze-dried biota samples and spiked with the same internal standards as the water samples. The sample is extracted using soxhlett extraction with a mixture of hexane/diethyl ether. For the determination of the pesticides gel permeation chromatography (GPC) was used to remove lipids from the raw extracts. For the polycyclic aromatic hydrocarbons and the phthalates a hexane-acetonitril partitioning followed by a column chromatography over silica was applied to remove lipids from the extracts. The purified extracts were further processed in the same way as the extract from the SPE cartridge.

### 3.3.2 *Method P3: Volatiles*

#### 3.3.2.1 *Water samples*

After receipt the samples for the determination of the volatiles sub-sample are prepared in SPME vials and spiked with the following surrogate standards:

- Monofluorobenzene
- <sup>2</sup>D-Dichlorobenzene

The extraction and on-line analyses is performed using a GC/MS equipped with an SPME extraction device with a Supelco Carboxen coated SPME fiber. The extracted volatiles are on-line analysed with a GC/MS. The MS is used in the scanning mode (SCAN).

Identification is based on retention time and full-scan mass spectra. Quantification is based on external standards prepared in organic-free Milli-Q water. The surrogate standards are used to evaluate the performance of the method. The results are not corrected for this recovery.

#### 3.3.2.2 *Sediment samples*

Sub-samples are collected from a field wet sediment sample and placed in a purge vessel. Organic-free MilliQ water is added followed by the above mentioned surrogate standards. The purged volatiles are isolated on Tenax adsorption tubes and analysed off-line using a GC/MS. The MS is used in the scanning mode (SCAN).

Identification is based on retention time and full-scan mass spectra. Quantification is based on external standards prepared in organic-free Milli-Q water and with the addition of purified sea-sand as a substitute matrix. The surrogate standards are used to evaluate the performance of the method. The results are not corrected for this recovery.

### 3.3.2.3 *Biota samples*

Sub-samples, collected after receipt of the samples, were allowed to thaw and the shells were removed. The samples were cut into smaller pieces, cryogenically grinded, and a sub-sample was placed in a purge vessel. Organic-free MilliQ water is added followed by the above mentioned surrogate standards. The purged volatiles are isolated on Tenax adsorption tubes and analysed off-line using a GC/MS. The MS is used in the scanning mode (SCAN).

Identification is based on retention time and full-scan mass spectra. Quantification is based on external standards prepared in organic-free Milli-Q water. The surrogate standards are used to evaluate the performance of the method. The results are not corrected for this recovery.

### 3.3.3 *Method P4: Brominated Flame Retardants and Polychlorinated Aliphatics*

#### 3.3.3.1 *Water samples*

To the sample the following internal surrogate standards were added:

- $^{13}\text{C}$ -Decabrominated diphenyl ether
- $^{13}\text{C}$ -PCB-209

The sample is extracted at neutral pH using hexane and the resulting extract is split into equal parts. One part is purified using a column clean-up procedure with sulphuric acid impregnated silica, the extracts are concentrated to a small volume and a syringe standard is added. The extracts are analysed for polybrominated diphenyl ethers (PBDE) with GC/MS in the SIM mode.

Identification of PBDEs is based on retention times and ion ratios. Quantification is based on external standards and a correction for the added syringe standard. The recovery of the internal surrogate standards is used to evaluate the performance of the method. The results are not corrected for this recovery.

The second part of the extract is purified with column chromatography on florisil to isolate the short-chain polychlorinated aliphatics (PCA). The purified extract is concentrated to a small volume and analysed using GC/MS with negative chemical ionisation (NCI). Identification of PCA is based on specific ions and pattern recognition (i.e. technical mixture composition). Quantification is based on external standards of technical PCA mixtures.

#### 3.3.3.2 *Sediment*

Sub-samples of the freeze-dried sediment samples are Soxhlett extracted with a mixture of hexane/diethylether after the addition of the above listed internal standards. The raw extract is split into equal parts and analysed in the same way as the extracts resulting from the extraction of the water samples.

#### 3.3.3.3 *3.3.3.3 Biota samples*

Sub-samples of the freeze-dried biota samples are Soxhlett extracted with a mixture of hexane/diethylether after the addition of the above listed internal standards. The organic

extract is concentrated and purified over a multi-layer silica column impregnated with sulphuric acid, sodium hydroxide and silver nitrate. The purified extract is split in two parts, which are processed further as described above.

#### 3.3.4 *Method P5: Metals*

##### 3.3.4.1 *Water samples*

The sub-sample for dissolved metals was already filtered over a 0.45 µm filter and the solute acidified to pH 2 with nitric acid by the SERBD laboratory in Kilkenny. Metal concentrations are determined using inductively coupled plasma interfaced to a mass spectrometer (ICP/MS) in the SIM mode.

Identification is based on correct ion ratios, quantification on a calibration graph produced in the samples by standard addition. Mercury is measured with cold vapour atomic fluorescence spectrometry (CV-AFS).

##### 3.3.4.2 *Sediment samples*

A sub-sample of the freeze-dried material is digested with nitric acid in a microwave prior to measurement. After dilution the metals are determined in the acid extract as described above.

##### 3.3.4.3 *Biota samples*

A sub-sample of the freeze-dried material is digested with nitric acid in a microwave prior to measurement. After dilution the metals are determined in the acid extract as described above.

#### 3.3.5 *Method P6, P7: Pesticides (LC), Alkylphenols and Alkylphenols Ethoxylates*

##### 3.3.5.1 *Water samples*

The following surrogate standards are added for the determination of the pesticides and phenols:

- <sup>2</sup>D-Diuron
- <sup>2</sup>D-Bisphenol-A

The sample is extracted at neutral pH using solid phase extraction (SPE) and the SPE cartridge is eluted with MTBE. The extract is concentrated and solvent-exchanged into a mixture of MilliQ water/acetonitrile (80/20). The extract is analysed using liquid chromatography in combination with mass spectrometry (LC/MS), in the positive SIM mode for the pesticides and the alkylphenols, and in the negative SIM mode for the alkylphenol ethoxylates. In the latter case 30 ions are monitored to cover the possible range of ethoxylate fragments.

Identification of the pesticides, alkylphenols and alkylphenol ethoxylates is based on retention times and ion ratios. Quantification is based on external standards. The surrogate standards are used to evaluate the performance of the procedure. The results are not corrected for the recovery of these standards.



### 3.3.5.2 *Sediment samples*

Sub-samples of the freeze-dried sediment samples are sonicated with acetonitril after the addition of the above listed surrogate standards. The extract is concentrated to a small volume and diluted with MilliQ water. This aqueous sample is extracted on a SPE cartridge in the same way as the water samples and the extracts are processed and analysed similar to the extracts from the water samples.

### 3.3.5.3 *Biota samples*

Sub-samples of the freeze-dried biota samples are soxhlet extracted overnight after the addition of the above listed surrogate standards. Gel permeation chromatography (GPC) was used to remove lipids from the raw extracts. Two fractions were collected, the first containing the alkylphenols and ethoxylates was solvent exchanged into methanol for the instrumental analysis. The second fraction is solvent exchanged into a mixture of MilliQ water/acetonitrile for the instrumental analysis of the pesticides. The instrumental analyses are as described above.

## 3.3.6 *Method P8: Organotin Compounds*

### 3.3.6.1 *Water samples*

The following surrogate standards are added to the water samples:

- Monohexyltin chloride
- Dihexyltin chloride
- Tetrapropyltin

The water samples are acidified to pH 5 and potassium bromide (KBr) is added followed by sodium tetraethylborate ( $\text{NaBEt}_4$ ) is added for the in-situ derivatization of the organotin analytes. The sample is extracted with hexane. The extract is dried, concentrated and purified using a silica column clean-up procedure. After addition of a syringe standard the extract is analysed with GC/MS in the SIM mode.

Identification of the organotin analytes is based on retention times and ion ratios. Quantification is based on external standards. The recovery of the added surrogate standards is used to evaluate the performance of the method. The results are not corrected for the recovery of the added internal standards.

### 3.3.6.2 *Sediment samples*

A field wet sediment sample is digested by hydrochloric acid for 30 min after the addition of the above mentioned surrogate standards. An acetate buffer (HAc/NaAc, pH 4.5) is added and the resulting mixture is extracted with hexane. The combined extracts are concentrated and derivatization of the organotin analytes is achieved by shaking the extract with sodium tetraethylborate in an acetate buffer at pH 4.5. The hexane extract is recovered, dried and concentrated to a small volume. Clean-up and further analysis of the extract is similar to that for the water samples.

#### 3.3.6.3 *Biota samples*

Sub-samples of the freeze-dried material is overnight digested by hydrochloric acid in methanol after the addition of the above mentioned surrogate standards. The resulting mixture is centrifuged and an acetate buffer (HAc/NaAc, pH 4.5) is added to the methanol extract. Sodium tetraethylborate (NaBEt<sub>4</sub>) is added for the in-situ derivatization of the organotin analytes and the resulting mixture is extracted with hexane. Clean-up and further analysis of the extract is similar to that for the water samples.

### 3.4 **Additional Methods for the Relevant Pollutants**

#### 3.4.1 *Method R1: Polychlorinated Benzenes and Industrial Chemicals*

##### 3.4.1.1 *Water samples*

The determination of the polychlorinated benzenes in water was combined with the determination of the pesticides (P2). Industrial chemicals were not determined in the water samples.

##### 3.4.1.2 *Sediment samples*

Sub-samples of the freeze-dried sediment samples are Soxhlett extracted with hexane/diethyl ether after the addition of the above listed internal standards. The resulting extract is purified and analysed in the same way as described above.

##### 3.4.1.3 *Biota samples*

The determination of the polychlorinated benzenes and industry chemicals was combined with the determination of the pesticides (P2). Gel permeation chromatography (GPC) was used to remove lipids from the raw extracts. The resulting extract is further purified using a column clean-up procedure. The purified extracts are concentrated to a small volume and analysed using gas chromatography in combination with mass spectrometry (GC/MS) after the addition of a syringe standard. The MS is used in the selected ion-monitoring mode (SIM).

Identification of is based on retention times and ion ratios. Quantification is based on external standards and a correction for the added syringe standard. The recovery of the added surrogate standards is used to evaluate the performance of the method. The results are not corrected for this recovery.

#### 3.4.2 *Method R2, R4: Polychlorinated Biphenyls, Polychlorinated Phenols and Dioxins*

##### 3.4.2.1 *Water samples*

Dioxins were not determined in the water samples. The following internal standards are added to the aqueous samples:

- <sup>13</sup>C-Polychlorinated biphenyls
- <sup>13</sup>C-Polychlorinated phenols

The samples are acidified to pH 4 and extracted using liquid-liquid extraction with hexane. The raw extract is washed with an aqueous potassium carbonate ( $K_2CO_3$ ) solution. This aqueous extract (containing the phenolic compounds) is set aside for later analysis. The organic extract is concentrated and purified over a multi-layer silica column impregnated with sulphuric acid, sodium hydroxide and silver nitrate. The extract is analysed using GC/MS in the SIM mode. Identification of PCB's is based on retention times and ion ratios. Quantification is based on external standards and the added labelled standards. The PCB results are corrected for the recovery of this internal standard.

Acetic anhydride ( $(CH_3CO)_2O$ ) is added to the aqueous phase that was set-aside after the primary extraction of the sample to achieve the acetylation of the chlorinated phenols. The acetylated phenols are then isolated from this aqueous phase by an extraction with hexane. After addition of a syringe standard the extract is analysed using GC/MS in the SIM mode.

Identification of the chlorinated phenols is based on retention times and ion ratios. Quantification is based on external standards and the added labelled standards. The results of the PCP are corrected for the recovery of these compound-specific internal standards.

#### 3.4.2.2 *Sediment samples*

Sub-samples of the freeze-dried sediment samples are Soxhlett extracted after the addition of the in paragraph 3.4.2.2 listed internal standards with a mixture of hexane/diethyl ether. The raw extract is analysed in the same way as the extract resulting from the liquid-liquid extraction of the aqueous samples.

#### 3.4.3 *Method R3: Alkylamines*

Alkylamines were determined only in water and sediment samples.

##### 3.4.3.1 *Water samples*

To the aqueous samples the following surrogate standard is added:

- Monohexylamine

A small sub-sample of the aqueous samples is filtered through a 0.45  $\mu m$  filter and the pH of the solute is adjusted to pH 9 with a potassium carbonate ( $K_2CO_3$ ) solution. Finally, an aliquot of an N-alpha-(9-fluorenylmethyl oxycarbonyl (Fmoc) solution in acetonitril is added to the solute. The sample is then directly analysed with LC/MS in the positive SIM mode.

Identification of the alkylamines is based on retention times and ion ratios. Quantification is based on external standards. The recovery of the added surrogate standard is used to evaluate the performance of the method. The results of the alkylamines are not corrected for this recovery.

#### 3.4.3.2 *Sediment samples*

Field wet sediment samples are extracted with Milli-Q water at pH 4. The aqueous extract is then treated and analysed as the aqueous samples in paragraph 3.4.3.1.

#### 3.4.3.3 *Biota samples*

Sub-samples of the freeze-dried biota samples are Soxhlett extracted after the addition of the following internal standards:

- $^{13}\text{C}$ -Polychlorinated biphenyls
- $^{13}\text{C}$ -Polychlorinated phenols
- $^{13}\text{C}$ -2,3,7,8-Substituted dioxin congeners

The raw extract is washed with an aqueous potassium carbonate ( $\text{K}_2\text{CO}_3$ ) solution. This aqueous extract (containing the phenolic compounds) is set aside for later analysis. The organic extract is split into two parts.

The first part is concentrated and analysed for PCBs after the addition of a syringe standard. The extract is analysed using GC/MS in the SIM mode. Identification of PCB's is based on retention times and ion ratios. Quantification is based on external standards and the added labelled standards. The PCB results are corrected for the recovery of this internal standard.

The second part of the extract is purified further for dioxins using planar chromatography and a clean up over an aluminium oxide column to separate the dioxins from the co-planar PCB's. After the addition of a syringe standard the final extract is analysed with gas chromatography in combination with high-resolution mass spectrometry (GC/HRMS).

Identification of dioxins is based on retention times and ion ratios. Quantification is based on external standards and the added labelled standards. The results of dioxins are corrected for the recovery of the added internal standards.

Acetic anhydride ( $(\text{CH}_3\text{CO})_2\text{O}$ ) is added to the aqueous phase that was set aside after the primary extraction of the sample to achieve the acetylation of the chlorinated phenols. The acetylated phenols are then isolated from this aqueous phase by an extraction with hexane. After addition of a syringe standard the extract is analysed using GC/MS in the SIM mode.

Identification of the chlorinated phenols is based on retention times and ion ratios. Quantification is based on external standards and the added labelled standards. The results of the PCP are corrected for the recovery of these compound-specific internal standards.

#### 3.4.4 *Method R5: Fluoride, Chloride, Cyanide and Phenols*

Fluoride, chloride, cyanide and total phenols were determined only in water and sediment samples.

#### 3.4.4.1 *Water samples*

Fluoride was determined according to NEN 6483, “Water – Potentiometric determination of the total fluoride content”. A sub-sample is stabilized by the addition of a buffer solution and the concentration of fluoride is measured with an ion-selective electrode.

Chloride was determined according to NEN-EN-ISO 15682, “Water quality – Determination of chloride by flow analysis (CFA and FIA) and photometric or potentiometric detection”. The sample is injected in an auto-analyser and chloride is reacted with mercury thiocyanate to form a red complex that is measured photometrically.

Cyanide was determined according to NEN-EN-ISO 14403, “Water quality – Determination of total cyanide and free cyanide by continuous flow analysis”. The filtered sample is injected in an auto-analyser and on-line acidified while UV-irradiation is used to break down complex cyanides. The sample flow is heated to vaporize the released cyanide, which is then measured photometrically.

Total (water soluble) phenols was determined according to NEN-EN-ISO 14402, “Water quality – Determination of phenol index by flow analysis (FIA and CFA)”. The sample is injected in an auto-analyser and heated to achieve a steam distillation of the phenols across a semi-permeable membrane. After condensation of the distillate the phenol content is determined photometrically.

#### 3.4.4.2 *Sediment samples*

Fluoride and chloride are measured following an extraction of the freeze-dried sediment samples with Milli-Q water. The extracts are filtered through a 0.45µm filter and the concentration of fluoride and chloride in the aqueous extracts is determined using ion chromatography.

Total cyanide is determined by the extraction of the freeze-dried sediment samples with a 10% sodium hydroxide (NaOH) solution in Milli-Q water. The aqueous extract is diluted with Milli-Q water and the total cyanide content is measured as in the water samples in 3.4.4.1.

#### 3.4.5 *Method R6: Glyphosate*

Glyphosate is determined only in water samples.

A sub-sample is collected and filtered through a 0.45 µm filter. The pH is adjusted to 9 with potassium carbonate ( $K_2CO_3$ ) and an aliquot of an FMOc solution in acetonitril is added to the solute. The sample is then directly analysed with LC/MS in the positive SIM mode.

Identification is based on retention time and ion ratios. Quantification is based on external standards and standard addition to the sample. It is expected (but not confirmed) that glyphosate trimesium is derivatised in the same procedure and measured as glyphosate. The result is therefore the sum of glyphosate and glyphosate trimesium and both analytes cannot be distinguished by this method.

### 3.4.6 *Method R7: Dithiocarbamates (Maneb, Mancozeb and Zineb)*

Dithiocarbamates are determined only in water and sediment samples.

#### 3.4.6.1 *Water*

The aqueous sample is purged to remove any free carbon disulfide in the sample. Concentrated hydrochloric acid (HCl), tin(II)chloride (SnCl<sub>2</sub>) and the following surrogate standard are added:

- Dichloromethane

The vial with the aqueous sample and reagents is closed, heated at 80°C and carbon disulfide liberated by the thioureas is measured in the headspace using a direct injection of part of the headspace. The headspace is analysed using GC/MS in the SIM mode. Identification is based on retention time and ion ratios. Quantification is based on external standards and standard addition to samples. The recovery of the surrogate standard is used to evaluate the performance of the method. The results are not corrected for this recovery. Note that maneb, mancozeb and zineb all produce carbon disulfide and can therefore not be distinguished by this method.

#### 3.4.6.2 *Sediment*

Field wet sediment samples are mixed with organic-free Milli-Q water. This sample is treated with hydrochloric acid and tin(II)chloride in the same way as the aqueous samples and analysed as such.

### 3.4.7 *Method R8: Chlormequat and Paraquat*

Chlormequat and paraquat are only analysed in water samples.

The pH of the aqueous samples is adjusted to pH 2 and the sample is concentrated on a cation-exchange type SPE column. The SPE column is eluted, the extract diluted in a sodium octanesulfonate solution, and analysed with ion-pair chromatography with UV detection.

Identification is based on retention time. Quantification is based on external standards and standard addition to samples.

### 3.4.8 *Method R9: Estrogens*

Estrogens are only analysed in water samples of the series 1 to 14. The following internal standards are added to the aqueous samples:

- <sup>2</sup>D-Ethinestradiol
- <sup>2</sup>D-β-Estradiol

A sub-sample is concentrated on an Oasis HLB type SPE column. The SPE column is eluted and the extract is evaporated until dryness. The residue is derivatized with hexafluorobutyric acid (HFBA). Following completion of the reaction, the extract is solvent exchanged and analysed with gas chromatography in combination with high-resolution mass spectrometry (GC/HRMS). Identification is based on retention time and ion

ratio's. Quantification is based on external standards. The recovery of the added surrogate standard is used to evaluate the performance of the method. The results of the estrogens are not corrected for this recovery.

### 3.5 Identification, limits of detection, calculation and expression of results

As mentioned in the previous sections identification of analytes is always based on retention times, and if the instrumental analyses was carried out with mass spectrometry (which is the case for most analytes), on qualifier ion ratios. Retention times and qualifier ion ratios are determined using external standards of the analytes. Quantification is based on relative response factors obtained from external standards analysed together with the sample extracts. The recovery of the added internal standards was used to evaluate the performance of the analysis in the case of surrogate standards. In the case of isotopic labelled internal standards the recovery is not only used to evaluate the performance of the method, but since the recovery is compounds specific, also used to correct the results of the target compounds. This type of correction was applied in the analysis of the dioxins, PCB, PCBz, PCP and PAH.

Typically, the limit of detection (LOD) is defined as that concentration in a sample that produces a signal-to-noise (S/N) ratio of three in the analysis. In the same way the limit of quantitation (LOQ) is defined as the concentration that produces a signal with an S/N ratio of ten. The LOD of parameters has been determined in validation studies and is part of the standard operating procedure for these parameters. Actual "sample specific" LOD value may vary to some extent from the procedural LOD depending on the composition of the sample. During the analysis of actual samples intermediate LOD values are calculated from the signals of internal and external standards and the noise in the measurement for a particular parameter. If the intermediate LOD is equal or below the procedural LOD, the procedural LOD value is used whenever a parameter is not detected. If the intermediate LOD is above the procedural LOD value the intermediate LOD value is used. In this report only LOD values are used. LOQ values can be calculated by multiplying the LOD with a factor of three.

Unless stated otherwise, the results of the analyses are expressed in µg/l for water. When reading the tables in section 4 and the appendix of this report please note that while results are rounded to the correct decimal number, they are not always rounded to the correct number of significant units. In general no more than two significant numbers apply. Non-rounded numbers are used throughout the report because of the traceability of the numbers in the different tables and the text.

In the summary tables in section 4, percentiles (25<sup>th</sup>, 50<sup>th</sup>, 75<sup>th</sup> and 90<sup>th</sup>) are given to provide additional information about the distribution of the results. Percentiles are used instead of averages because the distribution of the results is not a normal distribution (many results are below the detection limit) and percentiles give in that case a more realistic estimate. The 50<sup>th</sup> percentile is the median concentration. The percentiles are calculated on the results of all samples. Results that are below the detection limit are set to zero. If the calculated percentile is smaller than the method detection limit, it is replaced by the method detection limit.

## 4 Results

### 4.1 Priority Action Substances

The Priority Action Substances form a group of 41 parameters. Due to the fact that some parameters consist of more than one compound (for instance the parameter “drins” contains 4 individual compounds) there are 51 individual compounds in the group of Priority Action Substances. In this section the findings for these compounds are summarised and briefly discussed. For the benefit of clarity compounds are grouped per compound type, e.g.; volatiles, metals, pesticides etc. which is different from the order used in appendix 3 where the complete results of all parameters are listed according to their parameter number.

#### 4.1.1 *Polycyclic aromatic hydrocarbons*

Polycyclic aromatic hydrocarbons (PAH) enter the environment from the incomplete combustion of organic compounds via acetylene intermediates. The sources include coal tar, creosote, industrial and private incinerators, and motorised vehicle exhausts. The Priority Action Substances contain 8 of the 16 EPA PAH and the results are summarized in table 8a, 8b and 8c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23.

##### 4.1.1.1 *Water*

The results show that most PAH were identified in one or more of the water samples. As in Phase 1 and 2, naphthalene was found in virtually every sample, generally in low concentrations. However, naphthalene was also found in all blank samples analysed with the actual samples. Because these blank levels ranged from 2 to 5 times the LOD value, the LOD for naphthalene was set to 1.0 µg/l and results below this value were removed. As a result the frequency with which naphthalene is detected is zero, far lower than in Phase 1 and 2. The maximum concentrations for the other PAH are lower than in Phase 1, however the 90 pct values are very similar to Phase 1. The average recoveries of the added internal standards in the samples range from 67% for naphthalene to 107% for benzo[b]fluoranthene, indicating a good performance of the method. Note that the results are corrected for these compound-specific internal standards.

##### 4.1.1.2 *Sediment*

The results for PAH in the sediment samples are listed in table 8b. As expected all PAHs were found in every sample. The recoveries of the added internal standards range from 66% for naphthalene to 100% for benzo[g,h,i]perylene. The results are corrected for these recoveries. The 75-pct of the blank levels of naphthalene was 8 times the LOD. Results were not corrected for this blank value but the detection limit was raised to 1 µg/kg dw for naphthalene.



#### 4.1.1.3 *Biota*

The results for PAH in the biota samples are listed in table 8c. Only a few PAH are found in biota samples, with the highest concentration of 62 µg/kg dw for naphthalene.

The recoveries of the added internal standards range from 78% for benzo[a]pyrene to 92% for benzo[k]fluoranthene. The results are corrected for these recoveries. The 75-pct of the blank levels of naphthalene were 20 times the LOD. Results were not corrected for this blank value but the detection limit was raised to 1 µg/kg dw for naphthalene.

#### 4.1.2 *Pesticides and polychlorobenzenes*

Agro-chemicals, more commonly known as pesticides, are widely used against insects (insecticides), hazardous fungi (fungicides) and weeds (herbicides). The most prominent chemical representatives are organo-chlorides, ureatic derivatives, triazines, carbamates and organo-phosphates. Well known compounds such as DDT, lindane, aldrin and dieldrin belong to the organo-chloride group, which, in the past, was widely used over the world. Although their manufacture and application are now largely prohibited or restricted they can still be found due to their persistent nature. The results for the pesticides and polychlorobenzenes within the group of Priority Action Substances are summarized in table 9a, 9b and 9c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23.

##### 4.1.2.1 *Water*

From the results it is clear that with a few exceptions pesticides and polychlorobenzenes are found only in a limited number of samples. Although the concentrations in Phase 3 are generally lower than in Phase 1 and similar in Phase 2, the overall picture is similar. The main pesticides found are the 1,3,5-triazines atrazine and simazine and diuron.

While the concentrations in individual samples may exceed the target EQS value, only the 90-percentile values of simazine and atrazine do exceed this value. The recovery of added internal standards ranges from 83% to 102% indicating a good method performance. The recoveries of the individual compounds in the spiked QC samples also indicate good recoveries, generally above 70%. For pentachlorophenol a blank result was found with a concentration equal to, or just above the LOD value.

##### 4.1.2.2 *Sediment*

Only a few pesticides are detected in one or more sediment samples, generally in low concentrations. The highest concentration was found forendosulfan-beta, up to 13 µg/kg dw. The recoveries of the individual compounds in the spiked QC samples also indicate good recoveries, generally above 72%. An exception was hexachlorobutadiene for which the recovery from a spiked sediment sample was only 57%.

##### 4.1.2.3 *Biota*

As in water, only a few pesticides are detected in the biota, generally in low concentrations. The highest concentrations were found for the DDT's, up to 4,15 µg/kg for 4,4 DDT. The presence of these compounds and that of hexachlorobenzene and pentachlorobenzene may be expected because of its persistent nature and global distribution.

As in the water samples recoveries of added internal standards and QC samples were generally above 77%. An exception was pentachlorophenol for which the recovery from the added internal standards was 57%.

#### 4.1.3 *Volatiles*

Industry has a very heavy consumption of volatile solvents of all kinds. In addition many solvents are used in cleaning processes such as perchloroethylene in dry washing, in products like paints and lacquers, and in various common household products. Through industrial wastewater emissions, but also more diffuse domestic emissions, volatiles will enter the environment. The results for the volatiles within the group of Priority Action Substances are summarized in table 10a, 10b and 10c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23.

##### 4.1.3.1 *Water*

The results for the volatiles in the Priority Action Substances are summarized in table 10a. These compounds are found only in a limited number of samples with trichloromethane being the most prominent. Trichloromethane was found in 35% of the samples. In general the concentrations in Phase 3 are slightly lower as in Phase 1 and 2. None of the concentrations exceed the target EQS values. The recoveries of the individual compounds in the spiked QC samples also indicate good recoveries, generally above 94%.

##### 4.1.3.2 *Sediment*

The results for sediment samples are summarized in table 10b. Di- and trichloromethane were found in most samples, dichloromethane being the most prominent. The recoveries of the individual compounds in the spiked QC samples also indicate good recoveries, generally above 87%.

##### 4.1.3.3 *Biota*

The results for biota samples are summarized in table 10c. With the exception of dichloromethane no other volatiles were found. Dichloromethane was found in 3 of the samples in concentrations 14 to 22 µg/kg dw. The recoveries of the spiked volatiles in the QC sample ranges from 84% to 97%. No blanks were found in the method blank samples

#### 4.1.4 *Metals*

Metals are widely distributed in our environment and their accumulation can cause health damage. This is particularly true for lead, mercury and cadmium. Not surprisingly they are therefore part of the Priority Action Substances as is nickel. The results for these metals are summarized in table 11a, 11b and 11c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23. **Please note that for sediment the results of QA/QC-samples are expressed as the differences between duplicates.**

#### 4.1.4.1 *Water*

The results for water samples are summarized in table 11a. As in Phase 1 and 2, nickel is most often found in 50% of the samples in concentrations ranging from 1.0 to 14 µg/l, which is lower to the results in Phase 1 and 2. Lead and mercury are both found in 2,5 and 5% respectively of the samples, cadmium is not found in samples. The maximum concentrations found for lead and mercury do not exceed the target EQS value. The recoveries of the individual compounds in the spiked QC samples also indicate good recoveries, generally above 95%.

#### 4.1.4.2 *Sediment*

The results for sediment samples are summarized in table 11b. **Please notice that these results are expressed in mg/kg dw and not in µg/kg dw.** Cadmium, lead, mercury and nickel were found in all samples in concentrations up to 96 mg/kg dw for lead. The lowest concentrations were found for mercury. The results of duplicate analysis of samples show that differences between duplicates are generally less than 2% indicating good method repeatability.

#### 4.1.4.3 *Biota*

The results for biota are summarized in table 11c. **Please notice that these results are expressed in mg/kg dw and not in µg/kg dw.** Cadmium, lead, mercury and nickel were found in all samples in concentrations up to 0.43 mg/kg dw for lead and up to 1,4 mg/kg dw for nickel. The results of duplicate analysis of samples show that differences between duplicates are generally less than 5% indicating good method repeatability.

#### 4.1.5 *Hormone-disrupting compounds*

Over recent decades, disruptions in reproduction of a number of species have been shown. These disruptions are ascribed to the influence of particular compounds in the aquatic environment on the hormone systems of exposed animals or their offspring. This last group of compounds within the Priority Action Substances group are compounds with potential or suspected hormone-disrupting effects. Well known examples are organotin compounds (TBT) used in anti-fouling paints on ships. A series of “new” chemicals are suspected to have hormone-disrupting properties. These include phthalates, alkylphenols and brominated flame-retardants. The results for these metals are summarized in table 12a, 12b and 12c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23.

##### 4.1.5.1 *Water*

The results for water samples are summarized in table 12a. Of the brominated flame retardants the pentabromo diphenyl ether (penta-BDE) are found in 28% of the samples in concentrations ranging from 0.001 to 0.008 µg/l, while the octa-BDE are only found in one of the samples. This is comparable to the results in Phase 1 and 2. In manufacturing the so-called Penta-mix, Octa-mix and Deca-mix are commercially used with the Penta- and Deca-mix being used most. This, combined with the much lower water solubility of the octa- and deca-BDE, and the lesser detection limits for these compounds, makes that the penta-BDE dominates in the results. The concentrations found

compare well with concentrations found in rainwater and surface water in The Netherlands. However, concentrations in wastewater can be much higher due to the higher levels of suspended matter or DOC in such waters.

Short-chain polychlorinated aliphatics that are used as cutting oils in the metal industry were found in 4 of the samples. Of the alkylphenols only the nonylphenol was found in concentrations up to 0.31 µg/l. Di-(2-ethylhexyl) phthalate (DEHP) was found in only 3 of the samples in a concentration of 1.2 to 1.6 µg/l. This is comparable to the situation in The Netherlands where DEHP concentrations in surface waters vary between 0.2 and 1.0 µg/l with excursions up to 5 µg/l.

The recoveries of added internal standards and of individual compounds in the QC samples were above 69%. As in Phase 1 and 2 recoveries for DEHP were irregular and blank values were found in most method blank samples. This is a consequence of the use of DEHP in many materials. Although such materials were avoided in the analysis, blank values for this compound are often unavoidable. Based on the method blank level and its variance the LOD for DEHP in water samples was raised to 1 µg/l after correction for the blank value. Note that the results for DEHP are corrected for the actual method blank in each series.

#### 4.1.5.2 *Sediment*

The results for sediment samples are summarized in table 12b. Pentabromo diphenylethers and tributyltin were found in only 1 of the 7 sediment samples in relatively low concentrations. Di-(2-ethylhexyl) phthalate (DEHP) was found in 2 of the 7 sediment samples with a maximum concentration of 36 µg/kg dw. Due to the blank result the detection limit for this compound had to be raised to 20 µg/kg dw. Short-chain polychlorinated aliphatics and alkylphenols were found in none of the samples. The recovery of the internal standard ranged from 69 to 93%.

#### 4.1.5.3 *Biota*

The results for biota are summarized in table 12c. Pentabromo diphenylethers were found in 2 biota samples with a maximum concentration of 5,4 µg/kg dw. Nonylphenols were found in 1 biota sample at a concentration of 3.3 µg/kg dw. Di-(2-ethylhexyl) phthalate (DEHP) was found in all samples but in a similar concentration in the method blank. Due to the blank result the detection limit for this compound had to be raised to 500 µg/kg dw. Concentrations that were found in food samples (including fish) normally are below this value. No other components were found in the biota samples. The recovery of the internal standard ranged from 95 to 102%. The recovery for DEHP could not be determined as a consequence of the blank level.

Table 8a Priority Action Substances: Polycyclic aromatic hydrocarbons in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
naphthalene	P001	1.0	1.0	µg/l	0	<	<	-	-	-	-
anthracene	P006	0.010	0.002	µg/l	17	0.002	<b>0.010</b>	0.003	0.004	0.007	<b>0.010</b>
fluoranthene	P007	0.025	0.005	µg/l	28	0.005	<b>0.025</b>	0.008	0.011	0.016	0.020
benzo[b]fluoranthene	P011	n/a	0.005	µg/l	5	0.007	0.009	0.007	0.008	0.008	0.008
benzo[k]fluoranthene	P012	0.040	0.005	µg/l	0	<	<	-	-	-	-
benzo[a]pyrene	P013	0.010	0.005	µg/l	6	0.005	0.008	0.006	0.007	0.007	0.007
indeno[1,2,3-cd]pyrene	P014	0.040	0.005	µg/l	0	<	<	-	-	-	-
benzo[g,h,i]perylene	P016	0.030	0.005	µg/l	4	0.005	0.008	0.006	0.006	0.007	0.007

Table 8b Priority Action Substances: Polycyclic aromatic hydrocarbons in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
naphthalene	P001	n/a	1.0	µg/kg dw	7	5.5	13	6.0	6.6	8.8	11
anthracene	P006	n/a	0.50	µg/kg dw	3	7.6	13	7.9	8.3	11	12
fluoranthene	P007	n/a	0.50	µg/kg dw	7	0.68	105	1.8	2.4	41	74
benzo[b]fluoranthene	P011	n/a	0.50	µg/kg dw	6	1.1	101	1.6	12	28	65
benzo[k]fluoranthene	P012	n/a	0.50	µg/kg dw	5	0.52	26	0.61	8.8	13	21
benzo[a]pyrene	P013	n/a	0.50	µg/kg dw	6	0.91	88	1.2	13	24	56
indeno[1,2,3-cd]pyrene	P014	n/a	0.50	µg/kg dw	6	0.66	48	0.77	6.3	13	31
benzo[g,h,i]perylene	P016	n/a	0.50	µg/kg dw	6	0.66	53	0.75	7.1	14	34

Table 8c Priority Action Substances: Polycyclic aromatic hydrocarbons in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
naphthalene	P001	n/a	1.0	µg/kg dw	4	3.3	62	5.0	7.3	22	46
anthracene	P006	n/a	0.50	µg/kg dw	2	0.58	1.1	0.72	0.85	0.98	1.1
fluoranthene	P007	n/a	0.50	µg/kg dw	3	0.58	0.7	0.59	0.60	0.67	0.71
benzo[b]fluoranthene	P011	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
benzo[k]fluoranthene	P012	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
benzo[a]pyrene	P013	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
indeno[1,2,3-cd]pyrene	P014	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
benzo[g,h,i]perylene	P016	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<

Table 9a Priority Action Substances: Pesticides in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
pentachlorophenol	P041	0.10	0.010	µg/l	2	0.014	0.015	-	-	-	-
1,3,5-trichlorobenzene	P048	0.10	0.010	µg/l	1	0.038	0.038	-	-	-	-
1,2,4-trichlorobenzene	P049	0.10	0.010	µg/l	1	0.053	0.053	-	-	-	-
1,2,3-trichlorobenzene	P050	0.10	0.010	µg/l	1	0.049	0.049	-	-	-	-
pentachlorobenzene	P053	1.0	0.002	µg/l	1	0.004	0.004	-	-	-	-
hexachlorobenzene	P054	0.010	0.002	µg/l	3	0.004	0.009	-	-	-	-
hexachlorobutadiene	P202	0.10	0.002	µg/l	1	0.0023	0.0023	-	-	-	-
trifluralin	P214	0.037	0.005	µg/l	2	0.011	0.012	-	-	-	-
atrazine	P218	0.10	0.010	µg/l	18	0.010	<b>0.28</b>	0.020	0.033	0.055	<b>0.12</b>
lindane	P219	0.010	0.005	µg/l	0	<	<	-	-	-	-
alachlor	P225	0.035	0.010	µg/l	0	<	<	-	-	-	-
aldrin	P232	0.010	0.005	µg/l	1	<b>0.071</b>	<b>0.071</b>	-	-	-	-
chlorpyrifos(-ethyl)	P233	0.10	0.010	µg/l	1	<b>0.26</b>	<b>0.26</b>	-	-	-	-
isodrin	P238	0.005	0.005	µg/l	0	<	<	-	-	-	-
chlorfenvinphos	P241	0.10	0.010	µg/l	1	<b>0.514</b>	<b>0.514</b>	-	-	-	-
endosulfan-alpha	P243	0.10	0.010	µg/l	0	<	<	-	-	-	-
dieldrin	P244	0.005	0.005	µg/l	0	<	<	-	-	-	-
endrin	P246	0.005	0.005	µg/l	0	<	<	-	-	-	-
endosulfan-beta	P247	0.10	0.010	µg/l	1	0.025	0.03	-	-	-	-
2,4'-DDT	P248	0.010	0.002	µg/l	1	0.004	0.004	-	-	-	-
4,4'-DDT	P250	0.010	0.002	µg/l	0	<	<	-	-	-	-
simazine	P306	0.020	0.010	µg/l	16	0.016	<b>0.153</b>	<b>0.022</b>	<b>0.025</b>	<b>0.032</b>	<b>0.045</b>
isoproturon	P308	0.10	0.010	µg/l	2	0.014	0.016	-	-	-	-
diuron	P309	0.050	0.010	µg/l	18	0.014	0.042	0.024	0.032	0.034	0.036

Table 9b Priority Action Substances: Pesticides in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
pentachlorophenol	P041	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
1,3,5-trichlorobenzene	P048	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
1,2,4-trichlorobenzene	P049	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
1,2,3-trichlorobenzene	P050	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
pentachlorobenzene	P053	n/a	0.20	µg/kg dw	0	<	<	<	<	<	<
hexachlorobenzene	P054	n/a	0.20	µg/kg dw	0	<	<	<	<	<	<
hexachlorobutadiene	P202	n/a	0.20	µg/kg dw	0	<	<	<	<	<	<
trifluralin	P214	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
atrazine	P218	n/a	1.0	µg/kg dw	1	<	<	<	<	<	<
lindane	P219	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
alachlor	P225	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
aldrin	P232	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
chlorpyrifos(-ethyl)	P233	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
isodrin	P238	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
chlorfenvinphos	P241	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
endosulfan-alpha	P243	n/a	1.0	µg/kg dw	1	<	<	<	<	<	<
dieldrin	P244	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
endrin	P246	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
endosulfan-beta	P247	n/a	1.0	µg/kg dw	2	6.2	13	7.9	9.5	11	12
2,4'-DDT	P248	n/a	0.20	µg/kg dw	2	0.51	0.68	0.55	0.59	0.64	0.66
4,4'-DDT	P250	n/a	0.20	µg/kg dw	2	2.6	4.3	3.0	3.5	3.9	4.2
simazine	P306	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
isoproturon	P308	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
diuron	P309	n/a	1.0	µg/kg dw	1	<	<	<	<	<	<



Table 9c Priority Action Substances: Pesticides in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
pentachlorophenol	P041	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
1,3,5-trichlorobenzene	P048	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
1,2,4-trichlorobenzene	P049	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
1,2,3-trichlorobenzene	P050	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
pentachlorobenzene	P053	n/a	0.20	µg/kg dw	4	0.26	0.55	0.31	0.42	0.51	0.53
hexachlorobenzene	P054	n/a	0.20	µg/kg dw	4	2.7	4.1	2.8	3.0	3.4	3.8
hexachlorobutadiene	P202	n/a	0.20	µg/kg dw	0	<	<	<	<	<	<
trifluralin	P214	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
atrazine	P218	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
lindane	P219	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
alachlor	P225	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
aldrin	P232	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
chlorpyrifos(-ethyl)	P233	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
isodrin	P238	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
chlorfenvinphos	P241	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
endosulfan-alpha	P243	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
dieldrin	P244	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
endrin	P246	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<
endosulfan-beta	P247	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
2,4'-DDT	P248	n/a	0.20	µg/kg dw	4	1.6	3.2	2.0	2.1	2.4	2.9
4,4'-DDT	P250	n/a	0.20	µg/kg dw	1	4.15	4.15	<	<	<	<
simazine	P306	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
isoproturon	P308	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
diuron	P309	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<

Table 10a Priority Action Substances: Volatiles in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
dichloromethane	P103	10	0.10	µg/l	2	0.21	0.55	-	-	-	-
trichloromethane	P109	1.0	0.10	µg/l	14	0.14	0.91	0.18	0.22	0.56	0.80
tetrachloromethane	P111	n/a	0.10	µg/l	0	<	<	-	-	-	-
1,2-dichloroethane	P112	2.0	0.10	µg/l	1	0.11	0.11	-	-	-	-
benzene	P113	1.0	0.10	µg/l	0	<	<	-	-	-	-
trichloroethene	P114	n/a	0.10	µg/l	1	0.35	0.35	-	-	-	-
tetrachloroethene	P120	n/a	0.10	µg/l	3	0.16	0.86	-	-	-	-

Table 10b Priority Action Substances: Volatiles in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
dichloromethane	P103	n/a	1.0	µg/kg dw	7	15	219	39	82	91	145
trichloromethane	P109	n/a	1.0	µg/kg dw	5	1.0	3.8	1.2	1.2	2.9	3.4
tetrachloromethane	P111	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
1,2-dichloroethane	P112	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
benzene	P113	n/a	1.0	µg/kg dw	3	1.8	3.0	1.9	2.1	2.5	2.8
trichloroethene	P114	n/a	1.0	µg/kg dw	1	<	<	<	<	<	<
tetrachloroethene	P120	n/a	1.0	µg/kg dw	1	<	<	<	<	<	<

Table 10c Priority Action Substances: Volatiles in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
dichloromethane	P103	n/a	10	µg/kg dw	3	14	22	14	14	18	21
trichloromethane	P109	n/a	10	µg/kg dw	0	<	<	<	<	<	<
tetrachloromethane	P111	n/a	10	µg/kg dw	0	<	<	<	<	<	<
1,2-dichloroethane	P112	n/a	10	µg/kg dw	0	<	<	<	<	<	<
benzene	P113	n/a	10	µg/kg dw	0	<	<	<	<	<	<
trichloroethene	P114	n/a	10	µg/kg dw	0	<	<	<	<	<	<
tetrachloroethene	P120	n/a	10	µg/kg dw	0	<	<	<	<	<	<

Table 11a Priority Action Substances: Metals in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
cadmium	P500	0.40	0.10	µg/l	0	<	<	-	-	-	-
lead	P501	2.0	1.0	µg/l	1	1.1	1.1	-	-	-	-
mercury	P502	0.20	0.10	µg/l	2	0.10	0.10	-	-	-	-
nickel	P503	1.8	1.0	µg/l	20	1.0	4.0	1.7	2.0	2.6	2.8

Table 11b Priority Action Substances: Metals in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
cadmium	P500	n/a	0.10	mg/kg dw	7	0.12	0.43	0.15	0.21	0.34	0.42
lead	P501	n/a	0.10	mg/kg dw	7	4.9	96	8.9	18	27	55
mercury	P502	n/a	0.10	mg/kg dw	7	0.01	0.05	0.01	0.01	0.03	0.05
nickel	P503	n/a	0.10	mg/kg dw	7	9.8	26	13	16	17	21

Table 11c Priority Action Substances: Metals in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
cadmium	P500	n/a	0.010	mg/kg dw	4	0.052	0.22	0.090	0.15	0.20	0.21
lead	P501	n/a	0.010	mg/kg dw	4	0.20	0.43	0.22	0.27	0.34	0.39
mercury	P502	n/a	0.010	mg/kg dw	4	0.34	0.48	0.35	0.42	0.47	0.48
nickel	P503	n/a	0.010	mg/kg dw	4	0.86	1.4	1.0	1.1	1.2	1.3

Table 12a Priority Action Substances: Hormone-disrupting compounds in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
di-(2-ethylhexyl)-phthalate (DEHP)	P251	0.50	1.00	µg/l	3	1.2	1.6	-	-	-	-
nonylphenols	P358	n/a	0.010	µg/l	3	0.026	0.074	-	-	-	-
4-tert-octylphenol	P357	0.30	0.010	µg/l	0	<	<	-	-	-	-
C10-C13 (PCA)	P917	n/a	0.10	µg/l	4	0.22	0.31	0.23	0.27	0.30	0.30
BDE-209	P914	n/a	0.020	µg/l	0	<	<	<	<	<	<
sum diphenyl ether, pentabromo de	P920	0.53	0.001	µg/l	11	0.001	0.008	0.002	0.002	0.004	0.005
sum diphenyl ether, octabromo der	P921	n/a	0.002	µg/l	1	0.009	0.009	-	-	-	-
tributyltin	P930	0.014	0.005	µg/l	0	<	<	-	-	-	-

Table 12b Priority Action Substances: Hormone-disrupting compounds in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
di-(2-ethylhexyl)-phthalate (DEHP)	P251	n/a	20	µg/kg dw	2	14	36	20	25	31	34
4-tert-octylphenol	P357	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
nonylphenol	P358	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
C10-C13 (PCA)	P917	n/a	10	µg/kg dw	0	<	<	<	<	<	<
BDE-209	P914	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
sum diphenyl ether, pentabromo de	P920	n/a	0.10	µg/kg dw	1	0.3	0.3	<	<	<	<
sum diphenyl ether, octabromo der	P921	n/a	0.20	µg/kg dw	0	<	<	<	<	<	<
tributyltin	P930	n/a	0.500	µg/kg dw	1	0.6	0.6	<	<	<	<

Table 12c Priority Action Substances: Hormone-disrupting compounds in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
di-(2-ethylhexyl)-phthalate (DEHP)	P251	n/a	500	µg/kg dw	0	<	<	<	<	<	<
nonylphenols	P358	n/a	1.0	µg/kg dw	1	3.3	3.3	<	<	<	<
4-tert-octylphenol	P357	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
BDE-209	P914	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
C10-C13 (PCA)	P917	n/a	10	µg/kg dw	0	<	<	<	<	<	<
sum diphenyl ether, pentabromo de	P920	n/a	0.10	µg/kg dw	2	1.0	5.4	2.1	3.2	4.3	4.9
sum diphenyl ether, octabromo der	P921	n/a	0.20	µg/kg dw	0	<	<	<	<	<	<
tributyltin	P930	n/a	0.50	µg/kg dw	0	<	<	<	<	<	<

## 4.2 Relevant Pollutants

### 4.2.1 PCB, PCP and PCBz

Polychlorinated biphenyls were once marketed as cooling or insulating fluids for transformers, as softeners in varnish and adhesive industries, and as hydraulic fluids. Because of their persistence, PCB's are widely spread in the environment and although their use has been restricted and prohibited in many countries, PCB's are still found in the environment. The results for PCB, but also for polychlorinated terphenyls (PCT) and polychlorinated naphthalenes (PCN) are summarized in table 13a, 13b and 13c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23.

#### 4.2.1.1 Water

The results for water are summarized in table 13a. As expected mainly the more volatile PCB's are found in the aqueous samples in concentrations ranging from 0.002 µg/l up to a maximum of 0.010 µg/l for PCB-28. PCB-28 and PCB-52 were found in about half of the method blanks in concentrations comparable to the LOD (PCB-52) or up to 3 times the LOD (PCB-28). For this reason the results have been corrected for these blank values and the LOD for PCB-28 is set to 0.005 µg/l. The target EQS values was exceeded in none of the samples.

The recovery of the internal standard ranged from 88% to 102%. The results are corrected for these recoveries.

Polychlorinated terphenyls (PCT) and polychloronaphthalenes (PCN) were not found in the samples.

Chlorinated phenols, especially pentachlorophenol (see Priority Action Substances), were used as pesticides (mainly as insecticides) and disinfectants. Trichlorophenols determined in this study were found in 6 of 40 samples in low concentrations up to 0.015 µg/l. Concentrations did not exceed the target EQS values. Mono-, di- and tetrachlorobenzenes were not found in the samples. The recoveries of the individual compounds in the spiked QC samples also indicate good recoveries, generally above 79%.

#### 4.2.1.2 Sediment

The results for sediment samples are summarized in table 13b. In the 7 samples no polychloro-biphenyls (PCB), -phenols (PCP) and - benzenes (PCBz) were found. The recoveries of the added internal standards of the PCB, PCP and PCBz in the water samples were above 71%.

#### 4.2.1.3 Biota

The results for biota are summarized in table 13c. All PCB's were found in the biota samples in concentrations up to 19 µg/kg dw for the sum-PCB and 5.6 µg/kg dw for individual PCB's.

Polychlorinated terphenyls (PCT), polychloronaphthalenes (PCN) and chlorobenzenes were not found. Trichlorophenols were found in 2 samples in concentrations up to 10 µg/kg dw.

The recoveries of the internal standards in the biota samples ranged from 87% to 119% for the PCB's, from 84% to 98% for the chlorophenols with the exception of mono-chlorobenzene (20%) and from 58% to 98% for the chlorobenzenes. With the exception of PCB-28, PCB-52 and dichlorobenzenes no blank values were observed in the method blank sample.

#### 4.2.2 *Pesticides*

In addition to the pesticides in the Priority Action Substances a large number other pesticides were determined as Relevant Pollutants. The results are summarized in table 14a, 14b and 14c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23.

##### 4.2.2.1 *Water*

The results for water are summarized in table 14a. Only a few of these pesticides were found, generally in very low concentrations. Exceptions are MCPA, mecoprop and dichlobenil that were found in 23% to 58% of the samples. MCPA was detected in 58% of the samples in concentrations ranging from 0.010 to 0.20 µg/l. Dichlobenil was found in 30% of the samples in concentrations ranging from 0.012 to 0.09 µg/l. Mecoprop was found in 23% of the samples in concentrations ranging from 0.024 up to 0.105 µg/l, each exceeding the target EQS value.

Thioureas are not found in Phase 3. Note that the thioureas maneb/zineb/mancozeb can not be differentiated by the analytical method and are reported as a sum, which also includes thiram since these all produce CS<sub>2</sub> in the analysis of the thioureas.

The average recovery for these pesticides in the QC-samples was 76% ± 17%. Detailed information for most components can be found in table 23.

##### 4.2.2.2 *Sediment*

The results of the pesticides in the sediment samples are summarized in table 14b.

Almost no pesticides were found in the sediment samples. Only in one sample the pesticides dichlobenil (17 µg/kg dw) and biphenyl (13 µg/kg dw) were found.

No pesticides were detected in the blank samples.

The average recovery for the pesticides in the QC-samples was 85% ± 22%. Detailed information for most components can be found in table 23.

##### 4.2.2.3 *Biota*

The results of the pesticides in the biota samples are summarized in table 14c. No pesticides were found in the biota samples.

The average recovery for these pesticides in the QC-samples was 85% ± 19%. Detailed information for most components can be found in table 23. No pesticides were detected in the blank samples.

#### 4.2.3 *Volatiles*

The results are summarized in table 15a, 15b and 15c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23.

##### 4.2.3.1 *Water*

The results for water are summarized in table 15a. Only a few chlorinated volatiles were found in some samples. For most components the target EQS was not exceeded. Exceptions are 1,2-dichloropropane and 1,3-dichloropropene that were found only once at a concentration of respectively 0.3 and 2.2 µg/l.

The recoveries of the individual compounds in the spiked QC samples indicate good recoveries, generally above 85%.

##### 4.2.3.2 *Sediment*

The results of the volatiles in the Relevant Pollutants group in sediment samples are summarized in table 15b. Carbondisulfide and toluene both are found in 4 samples. The highest concentrations are found for toluene, ranging from 81 up to 1468 µg/kg dw. For carbon disulfide the concentrations are ranging from 25 up to 223 µg/kg dw. The recoveries of the individual compounds in the spiked QC samples indicate good recoveries, generally above 73%. Exceptions are 1,1,2-trichloro-1,2,2-trifluoroethane, hexachloroethane, 2,3-dichloropropene and 2-chlorotoluene with a recovery of respectively 32%, 45%, 59% and 68%. No method blanks were observed in the sediment analysis.

##### 4.2.3.3 *Biota*

The results of the volatiles in the Relevant Pollutants group for biota are summarized in table 15c. Toluene was found in 4 samples, ranging from 17 up to 83 µg/kg dw. MTBE, ethylbenzene, and xylenes were found in concentrations ranging from 11 µg/kg dw for MTBE up to 61 µg/kg dw for xylenes. Other components were not found.

The recoveries of the individual compounds in the spiked QC samples indicate good recoveries, generally above 69%. Exceptions are hexachloroethane and 1,1,2 trichloro-1,2,2 trifluoroethane with a recovery of respectively 46% and 32%. No method blanks were observed in the biota analysis.

#### 4.2.4 *Metals*

In addition to the metals in the Priority Action Substances, 18 metals were determined as Relevant Pollutants. The results of these metals are summarized in table 15a and 15b. The results are summarized in table 16a, 16b and 16c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23. **Please note that for sediment the results of QA/QC-samples are expressed as the differences between duplicates.**

##### 4.2.4.1 *Water*

The results of the metals in the Relevant Pollutants group in water are summarized in table 16a. With the exception of tin, beryllium, thallium, tellurium and silver all these metals were found in one or more samples with barium and zinc in almost every



sample. In general the results are very comparable with those of Phase 1 and 2, frequency of detection as well as concentrations.

The recoveries of the individual compounds in the spiked QC-samples indicate good recoveries, ranging from 72% up to 106% with the exception of selenium (43%).

#### 4.2.4.2 *Sediment*

The results of the metals in the Relevant Pollutants group in sediment samples are summarized in table 16b. **Please notice that these results are expressed in mg/kg dw and not in µg/kg dw.** Almost all metals were found in all samples. The highest concentrations were found for aluminium, ranging from 12 up to 61 g/kg dw. Titanium, barium and cobalt also show relatively high concentrations.

Duplicate samples were analysed to check the performance of the method. In general differences between duplicates were below 5.3, indicating a good repeatability of the method. No metals were detected in the method blanks.

#### 4.2.4.3 *Biota*

The results of the metals in the Relevant Pollutants group in biota are summarized in table 16c. **Please notice that these results are expressed in mg/kg dw and not in µg/kg dw.** Metals are widely found in all biota samples with the exception of thallium that was found in only 1 of the samples. The highest concentrations were found for zinc, 65 mg/kg dw.

Duplicate samples were analysed to check the performance of the method. In general differences between duplicates were below 5.5%, with exception of molybdenum (12%), beryllium (22%) and vanadium (11%), indicating a good repeatability of the method. No metals were detected in the method blanks.

#### 4.2.5 *Hormone-disrupting compounds*

Another set of (potentially or suspected) hormone-disrupting compounds is determined as Relevant Pollutants. The results are summarized in table 17a, 17b and 17c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23.

##### 4.2.5.1 *Water*

As expected the most frequently found types are phthalates. The results for the phthalates are comparable to Phase 1. The highest concentration was found for di-isononyl phthalate, 5.1 µg/kg dw. This may be because this DINP is rapidly replacing other phthalates, especially DEHP, in many products. On the other hand it should be mentioned that blank problems with all the phthalates make the numbers less reliable.

As in Phase 1 and 2, blank values were observed for di-n-butylphthalate in about half of the blank samples. The detection limit for this compound was raised to 1.0 µg/l as it was in Phase 1. More disturbing is that blank levels were also found for butylbenzyl- and di-isononyl phthalate. Therefore, the detection limits of these compounds were raised to 0.05 and 2.0 µg/l.

Bisphenol-A, a monomer used for the production of polycarbonate plastics, was found in 8% of the samples in concentrations ranging from 0.010 to 0.020 µg/l. Nonylphenol ethoxylates are in 8% of the samples found in concentrations ranging

from 0.067 to 0.070 µg/l. Both concentrations are in the range of what is found in Dutch surface waters.

Tetrabromobisphenol-A (TBBPA) and hexabromocyclododecane (HBCD) are both used as flame-retardants, HBCD mainly as a replacement for the PBDE's while TBBPA as a reactive flame retardant used in printed circuit boards. Both were not found in any of the samples.

Of the additional organotin compounds only tetrabutyltin, was found in one sample in a concentration of 0.017 µg/l.

Recoveries of internal standards and the recoveries of individual compounds in the spiked QC samples are generally above 69%. Results for the phthalates are corrected for the blank levels.

#### 4.2.5.2 *Sediment*

The results for the sediment samples are given in table 16b. In the sediment samples only di-n-butyl phthalate was found in concentrations up to 56 µg/kg dw.

Recoveries of internal standards and the recoveries of individual compounds in the spiked QC samples are generally above 62% with the exception of the nonylphenol ethoxylates for which a recovery of 53% was found.

Results for the phthalates are corrected for the blank levels.

#### 4.2.5.3 *Biota*

The results for the biota samples are given in table 16c. For the phthalates again high blank results were found. As a result the detection limit of di-n-butyl phthalate was raised to 100 µg/kg dw and those of the two other phthalates to 20 µg/kg dw. The highest concentrations were found for di-isononyl phthalate in 50% of the samples, ranging from 6985 up to 13242 µg/kg dw. Butylbenzyl phthalate was found in all samples, ranging from 102 to 6349 µg/kg dw. Di-n-butyl phthalate was found in 50% of the samples, ranging from 51 to 176 µg/kg dw.

Bisphenol-A was found in 1 of the samples (21 µg/kg dw).

Recoveries of internal standards and the recoveries of individual compounds in the spiked QC samples are generally above 79% with the exception of the phthalates for which irregular recoveries were found. This is probably caused by the blank levels for these compounds. Results for the phthalates are corrected for the blank levels.

#### 4.2.6 *Nitrated aromatics and amines*

Nitrogen containing compounds are widespread in our environment in different forms. Many of these compounds and their derivatives are known for their carcinogenic properties. Aromatic amines such as benzidines and toluidines are often formed as side-products in the production of dyes, or are formed as degradation products of dyes used in products. The results are summarized in table 18a, 18b and 18c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23.

##### 4.2.6.1 *Water*

The results for the water samples are summarized in table 18a. Only dimethyl- and diethylamine have been determined in water and the results are summarized in table

18a. No amines were found in these samples. The recovery of a surrogate standard in the analysis of the amines was 102%.

#### 4.2.6.2 *Sediment*

The results for the sediment samples are summarized in table 18b. Only dimethylamine was found in the samples, ranging from 13 up to 25 µg/kg dw. The recoveries of the individual compounds in the spiked QC samples indicate good recoveries, mostly above 78%.

The recoveries for most individual compounds in the spiked QC samples are good, however those for the dichloroanilines and chloronitrotoluenes showed irregular results. Because of this the reported concentrations for the dichloroanilines and chloronitrotoluenes (monochlorotoluidines) should be interpreted as an indication.

#### 4.2.6.3 *Biota*

The results for the biota are summarized in table 18c. Dimethyl- and diethylamine were not determined in biota. No components were found in the biota samples.

No blank levels were observed in the method blank sample. The recoveries of the individual compounds in the spiked QC samples indicate good recoveries, mostly above 64%, with exception of 2-chloroaniline (37%), benzidine (39%) and 3,3'-dichlorobenzidine (11%).

#### 4.2.7 *Polychlorinated dibenzodioxins and dibenzofurans*

Polychlorinated dibenzodioxins (PCDD) and polychlorinated dibenzofurans (PCDF) belong to the dioxin group and occur as undesired by-products in the manufacture of chlorophenols, chlorinated biphenyls and naphthalenes, chlorobenzenes and certain biocides. They also occur in paper pulp and sludge and are found in emissions of incinerators and car exhausts. Of particular interest are the 2,3,7,8-substituted dioxins, especially 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), which is an extremely toxic compound. Due to its environmental stability, good solubility in fats and slow metabolism, dioxins can be observed in biological samples including human fats and milk. Based on the results in Phase 1 it was decided not to analyse dioxins during Phase 3 in the water samples. The results for these compounds are summarized in table 19a and 19b for respectively sediment and biota. The results for the QA/QC can be found in table 23.

##### 4.2.7.1 *Water*

Based on the results in Phase 1 it was decided not to analyse dioxins during Phase 3 in the water samples.

##### 4.2.7.2 *Sediment*

The results for dioxins and furans in sediment samples are summarized in table 19a.

**Please notice that these results are expressed in ng/kg dw and not in µg/kg dw.**

In these samples only O8CDD is found in all samples in concentrations ranging from 10 to 18 ng/kg dw. Because of the small TEF-factor for O8CDD the results for TEQ are < 2 ng TEQ/kg dw. In 2 samples H7CDD was found in the samples, ranging from 1.2 up to 1.2 ng/kg dw.

The recoveries of the added internal standards in the biota samples were ranging from 59% to 107% for the individual congeners. Note that the results are corrected for the recovery of these internal standards. Blank values were not found in any of the method blank

#### 4.2.7.3 *Biota*

The results for dioxins and furanes in biota are summarized in table 18c. Please notice that these results are expressed in ng/kg dw and not in µg/kg dw.

Only T4CDD and H6CDF were found in the biota samples. Because of the small TEF-factor for these components the results for TEQ are < 2 ng TEQ/kg dw.

The recoveries of the added internal standards in the biota samples were ranging from 56% to 92% for the individual congeners. Note that the results are corrected for the recovery of these internal standards. Blank values were not found in any of the method blank.

#### 4.2.8 *Anions and phenols*

Finally, a number of anions and total phenols are part of the Relevant Pollutants group. The results are summarized in table 20a, 20b and 20c for respectively water, sediment and biota. The results for the QA/QC can be found in table 23.

##### 4.2.8.1 *Water*

The results for anions and phenols are summarized in table 20a. **Please notice that the results are expressed in mg/l and not in µg/l.** As expected chloride is found in every sample but in none of the samples the target EQS is exceeded. This is no surprise since seawater and/or brackish water samples were involved. Fluoride is also found in 13% of the samples. Because the target EQS is very low all samples exceed this EQS value. Cyanide and phenols were not found. In general the results are comparable to those in Phase 1.

The QC samples for cyanide, fluoride and chloride in water show recoveries above 88%, that of phenols 100%.

##### 4.2.8.2 *Sediment*

The results of anions and phenols in sediment are listed in table 20b. **Please notice that the results are expressed in mg/kg dw and not in µg/kg dw.** Chloride has been found in 43% of the samples in concentrations up to 34 mg/kg dw.

The QC samples for cyanide, fluoride, chloride and phenols in sediment are not determined.

##### 4.2.8.3 *Biota*

Anions and phenols were not analysed in the biota samples.

#### 4.2.9 *Water samples from the forestry and sheep dipping target sites.*

These water samples were only tested for a limited amount of pesticide parameters, see table 21. For the 21 water samples none of the pesticides were demonstrated, except in one case, where the atrazine was measured.

Table 13a Relevant Pollutants: Polychloro-biphenyls, -phenols and -benzenes in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
PCB 28	R017	0.50	0.005	µg/l	12	0.005	0.010	0.006	0.007	0.008	0.010
PCB 52	R018	0.50	0.002	µg/l	13	0.003	0.008	0.004	0.005	0.006	0.006
PCB 101	R019	0.50	0.002	µg/l	10	0.002	0.004	0.002	0.003	0.003	0.003
PCB 118	R020	0.50	0.002	µg/l	1	0.004	0.004	-	-	-	-
PCB 153	R021	0.50	0.002	µg/l	0	<	<	-	-	-	-
PCB 138	R022	0.50	0.002	µg/l	0	<	<	-	-	-	-
PCB 180	R023	0.50	0.002	µg/l	0	<	<	-	-	-	-
sum PCB	R060	0.50	0.10	µg/l	0	<	<	-	-	-	-
sum PCT	R919	0.50	0.10	µg/l	0	<	<	-	-	-	-
sum polychloronaphthalenes	R918	0.77	0.10	µg/l	0	<	<	-	-	-	-
2,4/2,5-dichlorophenol	R028	10	0.010	µg/l	0	<	<	-	-	-	-
mono-chlorophenol	R042	10	0.050	µg/l	0	<	<	-	-	-	-
trichlorophenols	R043	1.0	0.010	µg/l	6	0.010	0.015	0.011	0.012	0.014	0.015
4-chloor-3-methylfenol	R950	10	0.010	µg/l	0	<	<	-	-	-	-
mono-chlorobenzene	R044	1.0	0.10	µg/l	0	<	<	-	-	-	-
1,2,4,5-tetrachlorobenzene	R051	n/a	0.10	µg/l	0	<	<	-	-	-	-
dichlorobenzenes	R055	10	0.10	µg/l	0	<	<	-	-	-	-

Table 13b Relevant Pollutants: Polychloro-biphenyls, -phenols and -benzenes in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
PCB 28	R017	n/a	0.40	µg/kg dw	1	<	<	<	<	<	<
PCB 52	R018	n/a	0.40	µg/kg dw	0	<	<	<	<	<	<
PCB 101	R019	n/a	0.40	µg/kg dw	0	<	<	<	<	<	<
PCB 118	R020	n/a	0.40	µg/kg dw	0	<	<	<	<	<	<
PCB 153	R021	n/a	0.40	µg/kg dw	0	<	<	<	<	<	<
PCB 138	R022	n/a	0.40	µg/kg dw	0	<	<	<	<	<	<
PCB 180	R023	n/a	0.40	µg/kg dw	0	<	<	<	<	<	<
sum PCB	R060	n/a	0.002	µg/kg dw	1	<	<	<	<	<	<
sum PCT	R919	n/a	0.40	µg/kg dw	0	<	<	<	<	<	<
sum polychloronaphthalenes	R918	n/a	20	µg/kg dw	0	<	<	<	<	<	<
2,4/2,5-dichlorophenol	R028	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
mono-chlorophenol	R042	n/a	10	µg/kg dw	0	<	<	<	<	<	<
trichlorophenols	R043	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
4-chloor-3-methylfenol	R950	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
mono-chlorobenzene	R044	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1,2,4,5-tetrachlorobenzene	R051	n/a	20	µg/kg dw	0	<	<	<	<	<	<
dichlorobenzenes	R055	n/a	20	µg/kg dw	0	<	<	<	<	<	<

Table 13c Relevant Pollutants: Polychloro-biphenyls, -phenols and -benzenes in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
PCB 28	R017	n/a	0.40	µg/kg dw	4	1.7	2.4	1.8	1.8	2.0	2.2
PCB 52	R018	n/a	0.40	µg/kg dw	4	1.2	2.1	1.2	1.3	1.5	1.9
PCB 101	R019	n/a	0.40	µg/kg dw	4	0.81	1.5	0.92	1.1	1.3	1.4
PCB 118	R020	n/a	0.40	µg/kg dw	4	1.0	2.4	1.4	1.8	2.1	2.3
PCB 153	R021	n/a	0.40	µg/kg dw	4	2.9	5.6	3.8	4.7	5.3	5.5
PCB 138	R022	n/a	0.40	µg/kg dw	4	1.6	4.8	2.7	3.5	4.2	4.6
PCB 180	R023	n/a	0.40	µg/kg dw	4	1.1	2.4	1.4	1.7	2.0	2.2
sum PCB	R060	n/a	2.0	µg/kg dw	4	11	19	13	17	19	19
sum PCT	R919	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
sum polychloronaphthalenes	R918	n/a	20	µg/kg dw	0	<	<	<	<	<	<
2,4/2,5-dichlorophenol	R028	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
mono-chlorophenol	R042	n/a	10	µg/kg dw	0	<	<	<	<	<	<
trichlorophenols	R043	n/a	2.0	µg/kg dw	2	2.8	10	4.5	6.2	7.9	9.0
4-chloor-3-methylfenol	R950	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
mono-chlorobenzene	R044	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1,2,4,5-tetrachlorobenzene	R051	n/a	20	µg/kg dw	0	<	<	<	<	<	<
dichlorobenzenes	R055	n/a	20	µg/kg dw	0	<	<	<	<	<	<

Table 14a Relevant Pollutants : Pesticides in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
cyanuric chloride	R200	0.10	0.050	µg/l	0	<	<	-	-	-	-
oxydemeton-methyl	R201	0.50	0.10	µg/l	0	<	<	-	-	-	-
dichlobenil	R203	n/a	0.010	µg/l	12	0.012	0.09	0.015	0.017	0.047	0.091
tribenuron-methyl	R204	0.10	0.020	µg/l	0	<	<	-	-	-	-
biphenyl	R205	1.0	0.010	µg/l	0	<	<	-	-	-	-
mecoprop	R206	0.020	0.020	µg/l	9	<b>0.024</b>	<b>0.105</b>	<b>0.026</b>	<b>0.042</b>	<b>0.070</b>	<b>0.087</b>
MCPA	R207	0.10	0.010	µg/l	23	0.010	<b>0.20</b>	0.020	0.029	0.046	0.088
propachlor	R208	1.3	0.010	µg/l	0	<	<	-	-	-	-
dichlorprop	R209	0.40	0.020	µg/l	1	0.023	0.023	-	-	-	-
bromoxynil	R210	100	0.020	µg/l	0	<	<	-	-	-	-
2,4-D	R211	0.10	0.020	µg/l	0	<	<	-	-	-	-
ethoprophos	R212	0.010	0.010	µg/l	0	<	<	-	-	-	-
chlorpropham	R213	10	0.020	µg/l	0	<	<	-	-	-	-
dimethoate	R215	0.10	0.020	µg/l	0	<	<	-	-	-	-
carbofuran	R216	0.10	0.010	µg/l	0	<	<	-	-	-	-
triclopyr		n/a	0.020	µg/l	0	n/a	n/a	n/a	n/a	n/a	n/a
propyzamide	R220	100.000	0.020	µg/l	0	<	<	-	-	-	-
triallate	R221	0.019	0.005	µg/l	0	<	<	-	-	-	-
pirimicarb	R222	0.09	0.020	µg/l	0	<	<	-	-	-	-
bentazon	R223	0.10	0.020	µg/l	0	<	<	-	-	-	-
tolclofos-methyl	R224	1	0.020	µg/l	0	<	<	-	-	-	-
ioxynil	R226	10.000	0.050	µg/l	0	<	<	-	-	-	-
diazinon		n/a	0.020	µg/l	0	n/a	n/a	n/a	n/a	n/a	n/a
pirimiphos-methyl	R227	0.050	0.010	µg/l	0	<	<	-	-	-	-
ethofumesate	R228	0.100	0.020	µg/l	0	<	<	-	-	-	-
fenitrothion	R229	0.010	0.010	µg/l	1	<b>0.36</b>	<b>0.36</b>	-	-	-	-
malathion	R231	0.010	0.010	µg/l	1	<b>0.24</b>	<b>0.24</b>	-	-	-	-



Table 14a (continued). Relevant Pollutants : Pesticides in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
fenpropimorf	R234	0.10	0.020	µg/l	0	<	<	-	-	-	-
pendimethalin	R239	1.5	0.010	µg/l	0	<	<	-	-	-	-
metazachlor	R240	0.34	0.020	µg/l	0	<	<	-	-	-	-
captan	R242	0.10	0.10	µg/l	0	<	<	-	-	-	-
kresoxim-methyl	R245	0.10	0.010	µg/l	0	<	<	-	-	-	-
permethrin	R252	0.0	0.020	µg/l	0	<	<	-	-	-	-
prochloraz	R255	4.00	0.020	µg/l	0	<	<	-	-	-	-
cyfluthrin	R256	0.020	0.020	µg/l	0	<	<	-	-	-	-
cypermethrin	R257	0.1	0.020	µg/l	0	<	<	-	-	-	-
deltamethrin	R258	0.020	0.020	µg/l	0	<	<	-	-	-	-
oxamyl	R300	1.80	0.050	µg/l	0	<	<	-	-	-	-
trichlorofon	R301	0.02	0.020	µg/l	0	<	<	-	-	-	-
metamitron	R302	0.10	0.010	µg/l	0	<	<	-	-	-	-
carbendazim	R303	0.1	0.010	µg/l	0	<	<	-	-	-	-
chloridazon	R304	0.10	0.020	µg/l	0	<	<	-	-	-	-
thiabendazole	R305	5.00	0.050	µg/l	0	<	<	-	-	-	-
chlorotoluron	R307	0.400	0.020	µg/l	0	<	<	-	-	-	-
monolinuron	R310	0.10	0.010	µg/l	0	<	<	-	-	-	-
methiocarb	R311	0.01	0.010	µg/l	0	<	<	-	-	-	-
linuron	R312	0.100	0.010	µg/l	0	<	<	-	-	-	-
epoxiconazole	R313	0.10	0.01	µg/l	4	0.040	0.068	0.040	0.045	0.054	0.062
diflubenzuron	R314	0.015	0.01	µg/l	0	<	<	-	-	-	-
glyphosate	R350	0.10	0.10	µg/l	3	<b>0.12</b>	<b>0.20</b>	-	-	-	-
amitraz		n/a	0.02	µg/l	0	n/a	n/a	n/a	n/a	n/a	n/a
chlormequat	R358	n/a	0.100	µg/l	0	<	<	-	-	-	-
paraquat	R359	0.100	0.500	µg/l	0	<	<	-	-	-	-
maneb/zineb/thiram/mancozeb	R940	0.100	0.100	µg/l	0	<	<	-	-	-	-

Table 14b Relevant Pollutants : Pesticides in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
cyanuric chloride	R200	n/a	10	µg/kg dw	0	<	<	<	<	<	<
oxydemeton-methyl	R201	0.0003	20	µg/kg dw	0	<	<	<	<	<	<
dichlobenil	R203	n/a	4.0	µg/kg dw	1	17	17	<	<	<	<
tribenuron-methyl	R204	n/a	10	µg/kg dw	0	<	<	<	<	<	<
biphenyl	R205	n/a	2.0	µg/kg dw	1	13	13	<	<	<	<
mecoprop	R206	0.02	2.0	µg/kg dw	0	<	<	<	<	<	<
MCPA	R207	0.05	2.0	µg/kg dw	0	<	<	<	<	<	<
propachlor	R208	0.06	4.0	µg/kg dw	0	<	<	<	<	<	<
dichlorprop	R209	32	4.0	µg/kg dw	0	<	<	<	<	<	<
bromoxynil	R210	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
2,4-D	R211	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
ethoprophos	R212	0.003	2.0	µg/kg dw	0	<	<	<	<	<	<
chlorpropham	R213	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
dimethoate	R215	0.8	4.0	µg/kg dw	0	<	<	<	<	<	<
carbofuran	R216	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
propyzamide	R220	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
triallate	R221	0.2	1.0	µg/kg dw	0	<	<	<	<	<	<
pirimicarb	R222	0.02	4.0	µg/kg dw	0	<	<	<	<	<	<
bentazon	R223	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
tolclofos-methyl	R224	1	4.0	µg/kg dw	0	<	<	<	<	<	<
ioxynil	R226	n/a	10	µg/kg dw	0	<	<	<	<	<	<
pirimiphos-methyl	R227	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
ethofumesate	R228	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
fenitrothion	R229	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
malathion	R231	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<

Table 14b (continued). Relevant Pollutants : Pesticides in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
fenpropimorf	R234	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
pendimethalin	R239	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
metazachlor	R240	3.0	4.0	µg/kg dw	0	<	<	<	<	<	<
captan	R242	n/a	20	µg/kg dw	0	<	<	<	<	<	<
kresoxim-methyl	R245	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
permethrin	R252	0.009	4.0	µg/kg dw	0	<	<	<	<	<	<
prochloraz	R255	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
cyfluthrin	R256	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
cypermethrin	R257	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
deltamethrin	R258	0.010	4.0	µg/kg dw	0	<	<	<	<	<	<
oxamyl	R300	0.010	10	µg/kg dw	0	<	<	<	<	<	<
trichlorofon	R301	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
metamitron	R302	1.0	2.0	µg/kg dw	0	<	<	<	<	<	<
carbendazim	R303	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
chloridazon	R304	3.0	4.0	µg/kg dw	0	<	<	<	<	<	<
thiabendazole	R305	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
chlorotoluron	R307	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
monolinuron	R310	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
methiocarb	R311	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
linuron	R312	0.90	2.0	µg/kg dw	0	<	<	<	<	<	<
epoxiconazole	R313	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
diflubenzuron	R314	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
maneb/zineb/thiram/mancozeb	R940	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<

Table 14c Relevant Pollutants : Pesticides in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
cyanuric chloride	R200	n/a	10	µg/kg dw	0	<	<	<	<	<	<
oxydemeton-methyl	R201	n/a	20	µg/kg dw	0	<	<	<	<	<	<
dichlobenil	R203	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
tribenuron-methyl	R204	n/a	10	µg/kg dw	0	<	<	<	<	<	<
biphenyl	R205	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
mecoprop	R206	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
MCPA	R207	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
propachlor	R208	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
dichlorprop	R209	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
bromoxynil	R210	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
2,4-D	R211	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
ethoprophos	R212	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
chlorpropham	R213	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
dimethoate	R215	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
carbofuran	R216	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
propyzamide	R220	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
triallate	R221	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
pirimicarb	R222	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
bentazon	R223	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
tolclofos-methyl	R224	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
ioxynil	R226	n/a	10	µg/kg dw	0	<	<	<	<	<	<
pirimiphos-methyl	R227	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
ethofumesate	R228	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
fenitrothion	R229	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
malathion	R231	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<

Table 14c (continued). Relevant Pollutants : Pesticides in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
fenpropimorf	R234	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
pendimethalin	R239	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
metazachlor	R240	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
captan	R242	n/a	20	µg/kg dw	0	<	<	<	<	<	<
kresoxim-methyl	R245	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
permethrin	R252	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
prochloraz	R255	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
cyfluthrin	R256	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
cypermethrin	R257	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
deltamethrin	R258	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
oxamyl	R300	n/a	10	µg/kg dw	0	<	<	<	<	<	<
trichlorofon	R301	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
metamitron	R302	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
carbendazim	R303	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
chloridazon	R304	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
thiabendazole	R305	n/a	10	µg/kg dw	0	<	<	<	<	<	<
chlorotoluron	R307	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
monolinuron	R310	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
methiocarb	R311	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
linuron	R312	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
epoxiconazole	R313	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
diflubenzuron	R314	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<

Table 15a Relevant Pollutants : Volatiles in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
vinylchloride	R100	0.50	0.10	µg/l	0	<	<	-	-	-	-
bromomethane	R101	0.10	0.50	µg/l	0	<	<	-	-	-	-
1,1-dichloroethene	R102	10	0.10	µg/l	0	<	<	-	-	-	-
carbon disulphide	R104	n/a	0.10	µg/l	0	<	<	-	-	-	-
MTBE	R105	n/a	0.10	µg/l	0	<	<	-	-	-	-
1,2-dichloroethene	R106	10	0.10	µg/l	0	<	<	-	-	-	-
1,1-dichloroethane	R107	10	0.10	µg/l	0	<	<	-	-	-	-
1,1,1-trichloroethane	R110	10	0.10	µg/l	0	<	<	-	-	-	-
1,2-dichloropropane	R115	0.10	0.10	µg/l	1	<b>0.3</b>	<b>0.3</b>	-	-	-	-
1,3-dichloropropene	R116	0.10	0.10	µg/l	1	<b>2.2</b>	<b>2.2</b>	-	-	-	-
toluene	R117	10	0.20	µg/l	1	5.6	5.6	-	-	-	-
1,1,2-trichloroethane	R119	10	0.10	µg/l	0	<	<	-	-	-	-
1,2-dibromoethane	R121	2.0	0.10	µg/l	1	0.80	0.80	-	-	-	-
ethylbenzene	R122	10	0.10	µg/l	0	<	<	-	-	-	-
p,m-xylene	R123	10	0.10	µg/l	0	<	<	-	-	-	-
o-xylene	R124	10	0.10	µg/l	0	<	<	-	-	-	-
styrene	R125	50	0.10	µg/l	0	<	<	-	-	-	-
iso-propylbenzene	R126	4.2	0.10	µg/l	1	0.13	0.13	-	-	-	-
1,1,2,2-tetrachloroethane	R127	10	0.10	µg/l	0	<	<	-	-	-	-
chloroprene	R134	10.0	0.10	µg/l	0	<	<	-	-	-	-
3-chloropropene	R135	10.0	0.10	µg/l	0	<	<	-	-	-	-
dichloro-di-isopropylether	R136	10.0	0.10	µg/l	0	<	<	-	-	-	-
2,3-dichloropropene	R137	10	0.10	µg/l	0	<	<	-	-	-	-
epichlorohydrin	R138	0.10	0.10	µg/l	0	<	<	-	-	-	-
hexachloroethane	R139	10	0.10	µg/l	0	<	<	-	-	-	-
1,1,2-trichloro-1,2,2-trifluoroethane	R140	4	0.10	µg/l	0	<	<	-	-	-	-

Table 15b Relevant Pollutants : Volatiles in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
vinylchloride	R100	n/a	20	µg/kg dw	0	<	<	<	<	<	<
bromomethane	R101	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1,1-dichloroethene	R102	n/a	20	µg/kg dw	0	<	<	<	<	<	<
carbon disulphide	R104	n/a	20	µg/kg dw	4	25	223	37	69	129	186
MTBE	R105	n/a	20	µg/kg dw	1	<	<	<	<	<	<
1,2-dichloroethene	R106	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1,1-dichloroethane	R107	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1,1,1-trichloroethane	R110	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1,2-dichloropropane	R115	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1,3-dichloropropene	R116	n/a	20	µg/kg dw	0	<	<	<	<	<	<
toluene	R117	n/a	20	µg/kg dw	4	81	1468	82	126	495	1079
1,1,2-trichloroethane	R119	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1,2-dibromoethane	R121	n/a	20	µg/kg dw	0	<	<	<	<	<	<
ethylbenzene	R122	n/a	20	µg/kg dw	0	<	<	<	<	<	<
p,m-xylene	R123	n/a	20	µg/kg dw	0	<	<	<	<	<	<
o-xylene	R124	n/a	20	µg/kg dw	0	<	<	<	<	<	<
styrene	R125	n/a	20	µg/kg dw	0	<	<	<	<	<	<
iso-propylbenzene	R126	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1,1,2,2-tetrachloroethane	R127	n/a	20	µg/kg dw	0	<	<	<	<	<	<
2-chlorotoluene	R128	n/a	20	µg/kg dw	0	<	<	<	<	<	<
3-chlorotoluene	R129	n/a	20	µg/kg dw	0	<	<	<	<	<	<
4-chlorotoluene	R130	n/a	20	µg/kg dw	0	<	<	<	<	<	<
chloroprene	R134	n/a	20	µg/kg dw	0	<	<	<	<	<	<
3-chloropropene	R135	n/a	20	µg/kg dw	1	<	<	<	<	<	<
dichloro-di-isopropylether	R136	n/a	20	µg/kg dw	0	<	<	<	<	<	<
2,3-dichloropropene	R137	n/a	20	µg/kg dw	0	<	<	<	<	<	<
epichlorohydrin	R138	n/a	20	µg/kg dw	0	<	<	<	<	<	<
hexachloroethane	R139	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1,1,2-trichloro-1,2,2-trifluoroethan	R140	n/a	20	µg/kg dw	0	<	<	<	<	<	<

Table 15c Relevant Pollutants : Volatiles in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
vinylchloride	R100	n/a	10	µg/kg dw	0	<	<	<	<	<	<
bromomethane	R101	n/a	10	µg/kg dw	0	<	<	<	<	<	<
1,1-dichloroethene	R102	n/a	10	µg/kg dw	0	<	<	<	<	<	<
carbon disulphide	R104	n/a	10	µg/kg dw	0	<	<	<	<	<	<
MTBE	R105	n/a	10	µg/kg dw	2	11	19	13	15	17	18
1,2-dichloroethene	R106	n/a	10	µg/kg dw	0	<	<	<	<	<	<
1,1-dichloroethane	R107	n/a	10	µg/kg dw	0	<	<	<	<	<	<
1,1,1-trichloroethane	R110	n/a	10	µg/kg dw	0	<	<	<	<	<	<
1,2-dichloropropane	R115	n/a	10	µg/kg dw	0	<	<	<	<	<	<
1,3-dichloropropene	R116	n/a	10	µg/kg dw	0	<	<	<	<	<	<
toluene	R117	n/a	10	µg/kg dw	4	17	83	22	27	43	67
1,1,2-trichloroethane	R119	n/a	10	µg/kg dw	0	<	<	<	<	<	<
1,2-dibromoethane	R121	n/a	10	µg/kg dw	0	<	<	<	<	<	<
ethylbenzene	R122	n/a	10	µg/kg dw	2	26	41	29	33	37	39
p,m-xylene	R123	n/a	10	µg/kg dw	2	43	49	45	46	47	48
o-xylene	R124	n/a	10	µg/kg dw	2	14	22	16	18	20	21
styrene	R125	n/a	10	µg/kg dw	0	<	<	<	<	<	<
iso-propylbenzene	R126	n/a	10	µg/kg dw	0	<	<	<	<	<	<
1,1,2,2-tetrachloroethane	R127	n/a	10	µg/kg dw	0	<	<	<	<	<	<
2-chlorotoluene	R128	n/a	10	µg/kg dw	0	<	<	<	<	<	<
3-chlorotoluene	R129	n/a	10	µg/kg dw	0	<	<	<	<	<	<
4-chlorotoluene	R130	n/a	10	µg/kg dw	0	<	<	<	<	<	<
chloroprene	R134	n/a	10	µg/kg dw	0	<	<	<	<	<	<
3-chloropropene	R135	n/a	10	µg/kg dw	0	<	<	<	<	<	<
dichloro-di-isopropylether	R136	n/a	10	µg/kg dw	0	<	<	<	<	<	<
2,3-dichloropropene	R137	n/a	10	µg/kg dw	0	<	<	<	<	<	<
epichlorohydrin	R138	n/a	10	µg/kg dw	0	<	<	<	<	<	<
hexachloroethane	R139	n/a	10	µg/kg dw	0	<	<	<	<	<	<
1,1,2-trichloro-1,2,2-trifluoroethan	R140	n/a	10	µg/kg dw	0	<	<	<	<	<	<



Table 16a Relevant Pollutants : Metals in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
arsenic	R504	1.0	0.10	µg/l	24	0.22	<b>1.2</b>	0.52	0.63	0.74	0.97
zinc	R505	2.3	0.10	µg/l	39	<b>2.6</b>	<b>283</b>	<b>6.1</b>	<b>11</b>	<b>29</b>	<b>85</b>
copper	R506	0.50	0.10	µg/l	31	<b>0.55</b>	<b>7.2</b>	<b>0.88</b>	<b>1.4</b>	<b>2.1</b>	<b>3.0</b>
chromium	R507	0.30	0.10	µg/l	2	0.52	0.62	-	-	-	-
selenium	R508	5.3	0.10	µg/l	1	0.11	0.11	-	-	-	-
antimony	R509	0.40	0.10	µg/l	16	0.11	0.25	0.14	0.16	0.19	0.22
molybdenum	R510	4.3	0.10	µg/l	32	0.10	0.95	0.14	0.24	0.47	0.65
titanium	R511	20	0.10	µg/l	4	1.3	3.5	1.3	1.5	2.2	3.0
tin	R512	0.20	0.10	µg/l	0	<	<	-	-	-	-
barium	R513	75	0.10	µg/l	39	2.6	<b>90</b>	5.5	8.9	29	<b>81</b>
beryllium	R514	0.20	0.10	µg/l	0	<	<	-	-	-	-
boron	R515	6.5	0.10	µg/l	33	6.3	<b>67</b>	<b>10</b>	<b>15</b>	<b>20</b>	<b>40</b>
uranium	R516	1.0	0.10	µg/l	21	0.10	0.51	0.15	0.22	0.46	0.48
vanadium	R517	0.90	0.10	µg/l	33	0.10	0.71	0.20	0.27	0.39	0.6
cobalt	R518	0.20	0.10	µg/l	27	0.11	<b>0.65</b>	0.14	<b>0.20</b>	<b>0.30</b>	<b>0.44</b>
thallium	R519	1.6	0.10	µg/l	0	<	<	-	-	-	-
tellurium	R520	100	0.10	µg/l	0	<	<	-	-	-	-
silver	R521	1.2	0.10	µg/l	0	<	<	-	-	-	-

Table 16b Relevant Pollutants : Metals in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
arsenic	R504	29	0.010	mg/kg dw	7	4.8	12	5.8	6.6	7.8	10
zinc	R505	140	0.010	mg/kg dw	7	30	85	42	66	75	83
copper	R506	36	0.010	mg/kg dw	7	6.5	15	7.8	10	13	14
chromium	R507	100	0.010	mg/kg dw	7	22	40	26	29	35	38
selenium	R508	0.7	0.14	mg/kg dw	7	0.22	<b>13</b>	0.36	0.46	0.52	<b>5.4</b>
antimony	R509	3	0.010	mg/kg dw	7	0.14	0.9	0.18	0.40	0.7	0.9
molybdenum	R510	3	0.010	mg/kg dw	7	0.20	1.1	0.52	1.0	1.06	1.1
titanium	R511	n/a	0.010	mg/kg dw	7	823	3353	1276	1976	2214	2782
tin	R512	n/a	0.010	mg/kg dw	7	0.51	46.1	0.8	1.2	2.4	20
barium	R513	160	0.010	mg/kg dw	7	107	<b>924</b>	117	<b>161</b>	<b>671</b>	<b>869</b>
beryllium	R514	1.1	0.010	mg/kg dw	7	0.32	<b>2.0</b>	0.41	1.0	1.9	<b>2.0</b>
boron	R515	n/a	1.3	mg/kg dw	6	2.3	16	4.8	7.0	12	15
uranium	R516	n/a	0.010	mg/kg dw	7	0.55	2.4	0.85	1.2	1.9	2.4
vanadium	R517	42	0.010	mg/kg dw	7	15	<b>53</b>	21	<b>42</b>	<b>48</b>	<b>51</b>
cobalt	R518	9	0.010	mg/kg dw	7	<b>11</b>	<b>458</b>	<b>138</b>	<b>162</b>	<b>196</b>	<b>319</b>
thallium	R519	1	0.010	mg/kg dw	7	0.024	0.48	0.06	0.22	0.31	0.43
tellurium	R520	n/a	0.010	mg/kg dw	7	0.019	0.066	0.027	0.037	0.048	0.06
silver	R521	5.5	0.010	mg/kg dw	7	0.087	0.14	0.09	0.10	0.12	0.13
aluminium	R980	n/a	0.010	mg/kg dw	7	11584	61211	15378	27893	54403	57647

Table 16c Relevant Pollutants : Metals in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
arsenic	R504	n/a	0.010	mg/kg dw	4	1.4	1.7	1.4	1.5	1.6	1.6
zinc	R505	n/a	0.010	mg/kg dw	4	50	65	54	56	59	62
copper	R506	n/a	0.010	mg/kg dw	4	1.5	2.6	1.7	2.1	2.4	2.5
chromium	R507	n/a	0.010	mg/kg dw	4	0.43	1.4	0.72	0.82	1.0	1.2
selenium	R508	n/a	0.010	mg/kg dw	4	6.0	7.5	6.4	6.9	7.3	7.4
antimony	R509	n/a	0.010	mg/kg dw	1	0.15	0.15	<	<	<	<
molybdenum	R510	n/a	0.010	mg/kg dw	4	0.020	0.046	0.032	0.039	0.043	0.045
titanium	R511	n/a	0.010	mg/kg dw	4	6.1	10	6.9	7.9	9.0	10
tin	R512	n/a	0.010	mg/kg dw	0	<	<	<	<	<	<
barium	R513	n/a	0.010	mg/kg dw	4	0.91	17	0.95	1.1	5.1	12
beryllium	R514	n/a	0.010	mg/kg dw	0	<	<	<	<	<	<
boron	R515	n/a	0.010	mg/kg dw	0	<	<	<	<	<	<
uranium	R516	n/a	0.010	mg/kg dw	0	<	<	<	<	<	<
vanadium	R517	n/a	0.010	mg/kg dw	2	1.2	1.7	1.3	1.4	1.6	1.6
cobalt	R518	n/a	0.010	mg/kg dw	0	<	<	<	<	<	<
thallium	R519	n/a	0.010	mg/kg dw	0	<	<	<	<	<	<
tellurium	R520	n/a	0.010	mg/kg dw	0	<	<	<	<	<	<
silver	R521	n/a	0.010	mg/kg dw	0	<	<	<	<	<	<

Table 17a Relevant Pollutants: Hormone-disrupting compounds in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
di-n-butylphthalate	R230	0.10	1.0	µg/l	2	1.1	1.2	-	-	-	-
butylbenzylphthalate	R249	n/a	0.050	µg/l	5	0.018	0.18	0.052	0.055	0.062	0.13
diisononylester DINP	R254	n/a	2.000	µg/l	4	2.7	5.1	2.7	3.9	5.0	5.0
nonylphenol ethoxylates	R355	0.10	0.050	µg/l	3	0.067	0.070	-	-	-	-
bisphenol-A	R356	n/a	0.010	µg/l	3	0.010	0.020	-	-	-	-
HBCD	R915	n/a	0.020	µg/l	0	<	<	-	-	-	-
tetrabromobisphenol-A	R951	n/a	0.001	µg/l	0	<	<	-	-	-	-
dibutyltin	R931	0.010	0.005	µg/l	0	<	<	-	-	-	-
tetrabutyltin	R932	0.016	0.005	µg/l	1	0.017	0.017	-	-	-	-
triphenyltin	R933	0.005	0.005	µg/l	0	<	<	-	-	-	-
tri-n-propyltin	R934	n/a	0.005	µg/l	0	<	<	-	-	-	-

Table 17b Relevant Pollutants: Hormone-disrupting compounds in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
di-n-butylphthalate	R230	n/a	5.0	µg/kg dw	4	3.4	56	5.9	16	33	47
butylbenzylphthalate	R249	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
diisononylester DINP	R254	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
nonylphenol ethoxylates	R355	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
bisphenol-A	R356	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
di-2-ethylhexyl adipate (DEHA)	R423	n/a	2.0	µg/kg dw	0	<	<	<	<	<	<
HBCD	R915	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
tetrabromobisphenol-A	R951	n/a	0.20	µg/kg dw	0	<	<	<	<	<	<
dibutyltin	R931	n/a	0.500	µg/kg dw	0	<	<	<	<	<	<
tetrabutyltin	R932	0.80	0.500	µg/kg dw	0	<	<	<	<	<	<
triphenyltin	R933	n/a	0.500	µg/kg dw	0	<	<	<	<	<	<
tri-n-propyltin	R934	n/a	0.500	µg/kg dw	0	<	<	<	<	<	<

Table 17c Relevant Pollutants: Hormone-disrupting compounds in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
di-n-butylphthalate	R230	n/a	100	µg/kg dw	2	51	176	82	113	145	164
butylbenzylphthalate	R249	n/a	20	µg/kg dw	4	102	6349	118.5	3129	6187	6284
diisononylester DINP	R254	n/a	20	µg/kg dw	2	6985	13242	8549	10114	11678	12617
nonylphenol ethoxylates	R355	n/a	10	µg/kg dw	0	<	<	<	<	<	<
bisphenol-A	R356	n/a	2.0	µg/kg dw	1	21	21	<	<	<	<
HBCD	R915	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
tetrabromobisphenol-A	R951	n/a	0.20	µg/kg dw	0	<	<	<	<	<	<
dibutyltin	R931	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
tetrabutyltin	R932	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
triphenyltin	R933	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
tri-n-propyltin	R934	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<

Table 18a Relevant Pollutants: Amines in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
dimethylamine	R352	7.500	1.000	µg/l	0	<	<	-	-	-	-
diethylamine	R353	10.000	1.000	µg/l	0	<	<	-	-	-	-

Table 18b Relevant Pollutants: Nitrated aromatics and amines in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
dimethylamine	R352	n/a	10	µg/kg dw	3	13	25	15	16	21	23
diethylamine	R353	n/a	10	µg/kg dw	0	<	<	<	<	<	<
benzylchloride	R400	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
nitrobenzene	R401	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
2-chloroaniline	R402	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
benzylidenechloride	R403	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
4-nitrotoluene	R407	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1-chloronaphthalene	R427	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
1-chloro-2,4-dinitrobenzene	R433	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
4-chloro-2-nitroaniline	R434	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
benzidine	R435	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
3,3'-dichlorobenzidine	R436	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
monochlorotoluidines:	R480	n/a	20	µg/kg dw	0	<	<	<	<	<	<
chloronitrotoluenes	R481	n/a	10	µg/kg dw	0	<	<	<	<	<	<
dichloroanilines	R482	n/a	10	µg/kg dw	0	<	<	<	<	<	<
chloronitrobenzenes	R483	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
dichloronitrobenzenes:	R484	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<

Table 18c Relevant Pollutants: Nitrated aromatics and amines in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
benzylchloride	R400	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
nitrobenzene	R401	n/a	10	µg/kg dw	0	<	<	<	<	<	<
2-chloroaniline	R402	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
benzylidenchloride	R403	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
4-nitrotoluene	R407	n/a	20	µg/kg dw	0	<	<	<	<	<	<
1-chloronaphthalene	R427	n/a	1.0	µg/kg dw	0	<	<	<	<	<	<
1-chloro-2,4-dinitrobenzene	R433	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
4-chloro-2-nitroaniline	R434	n/a	20	µg/kg dw	0	<	<	<	<	<	<
benzidine	R435	n/a	5.0	µg/kg dw	0	<	<	<	<	<	<
3,3'-dichlorobenzidine	R436	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<
monochlorotoluidines	R480	n/a	20	µg/kg dw	0	<	<	<	<	<	<
chloronitrotoluenes	R481	n/a	20	µg/kg dw	0	<	<	<	<	<	<
dichloroanilines	R482	n/a	10	µg/kg dw	0	<	<	<	<	<	<
chloronitrobenzenes	R483	n/a	10	µg/kg dw	0	<	<	<	<	<	<
dichloronitrobenzenes	R484	n/a	4.0	µg/kg dw	0	<	<	<	<	<	<

Table 19a Relevant Pollutants: Polychlorinated dibenzodioxins and dibenzofuranes in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
2378 T4CDD	R600	n/a	0.200	ng/kg dw	0	<	<	<	<	<	<
12378 P5CDD	R601	n/a	0.200	ng/kg dw	0	<	<	<	<	<	<
123478 H6CDD	R602	n/a	1.000	ng/kg dw	0	<	<	<	<	<	<
123678 H6CDD	R603	n/a	1.000	ng/kg dw	0	<	<	<	<	<	<
123789 H6CDD	R604	n/a	1.000	ng/kg dw	0	<	<	<	<	<	<
1234678 H7CDD	R605	n/a	1.000	ng/kg dw	2	1.2	1.2	<	<	<	<
12346789 O8CDD	R606	n/a	10.000	ng/kg dw	7	10	18	10	10	14	18
2378 T4CDF	R607	n/a	0.200	ng/kg dw	0	<	<	<	<	<	<
12378 P5CDF	R608	n/a	0.200	ng/kg dw	0	<	<	<	<	<	<
23478 P5CDF	R609	n/a	0.200	ng/kg dw	0	<	<	<	<	<	<
123478 H6CDF	R610	n/a	1.000	ng/kg dw	0	<	<	<	<	<	<
123678 H6CDF	R611	n/a	1.000	ng/kg dw	0	<	<	<	<	<	<
123789 H6CDF	R612	n/a	1.000	ng/kg dw	0	<	<	<	<	<	<
234678 H6CDF	R613	n/a	1.000	ng/kg dw	0	<	<	<	<	<	<
1234678 H7CDF	R614	n/a	1.000	ng/kg dw	0	<	<	<	<	<	<
1234789 H7CDF	R615	n/a	1.000	ng/kg dw	0	<	<	<	<	<	<
12346789 O8CDF	R616	n/a	10.000	ng/kg dw	0	<	<	<	<	<	<
sum PCDDF TEQ	R620	n/a	2.000	ng/kg dw	0	<	<	<	<	<	<
sum dioxins	R621	n/a	10.000	ng/kg dw	7	10	20	10	11	14	19
sum furans	R622	n/a	10.000	ng/kg dw	0	<	<	<	<	<	<



Table 19b Relevant Pollutants: Polychlorinated dibenzodioxins and dibenzofuranes in biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
2378 T4CDD	R600	n/a	0.20	ng/kg dw	0	<	<	<	<	<	<
12378 P5CDD	R601	n/a	0.20	ng/kg dw	1	0.15	0.15	<	<	<	<
123478 H6CDD	R602	n/a	1.0	ng/kg dw	0	<	<	<	<	<	<
123678 H6CDD	R603	n/a	1.0	ng/kg dw	0	<	<	<	<	<	<
123789 H6CDD	R604	n/a	1.0	ng/kg dw	0	<	<	<	<	<	<
1234678 H7CDD	R605	n/a	1.0	ng/kg dw	0	<	<	<	<	<	<
12346789 O8CDD	R606	n/a	10	ng/kg dw	0	<	<	<	<	<	<
2378 T4CDF	R607	n/a	0.20	ng/kg dw	0	<	<	<	<	<	<
12378 P5CDF	R608	n/a	0.20	ng/kg dw	0	<	<	<	<	<	<
23478 P5CDF	R609	n/a	0.20	ng/kg dw	0	<	<	<	<	<	<
123478 H6CDF	R610	n/a	1.0	ng/kg dw	1	4.3	4.3	<	<	<	<
123678 H6CDF	R611	n/a	1.0	ng/kg dw	0	<	<	<	<	<	<
123789 H6CDF	R612	n/a	1.0	ng/kg dw	0	<	<	<	<	<	<
234678 H6CDF	R613	n/a	1.0	ng/kg dw	0	<	<	<	<	<	<
1234678 H7CDF	R614	n/a	1.0	ng/kg dw	0	<	<	<	<	<	<
1234789 H7CDF	R615	n/a	1.0	ng/kg dw	0	<	<	<	<	<	<
12346789 O8CDF	R616	n/a	10	ng/kg dw	0	<	<	<	<	<	<
sum PCDDF TEQ	R620	n/a	2.0	ng/kg dw	0	<	<	<	<	<	<
sum dioxins	R621	n/a	10	ng/kg dw	0	<	<	<	<	<	<
sum furans	R622	n/a	10	ng/kg dw	0	<	<	<	<	<	<

Table 20a Relevant Pollutants: Anions and sum-parameters in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
cyanide	R522	0.001	0.002	mg/l	0	<	<	-	-	-	-
fluoride	R523	0.001	0.10	mg/l	5	0.1	0.24	0.12	0.17	0.19	0.22
chloride	R524	250	1.0	mg/l	40	7.7	45	13	16	18	25
phenols	R974	0.030	0.030	mg/l	0	<	<	-	-	-	-

Table 20b Relevant Pollutants: Anions and sum-parameters in sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
cyanide	R522	n/a	0.50	mg/kg dw	0	<	<	<	<	<	<
fluoride	R523	500	0.20	mg/kg dw	0	<	<	<	<	<	<
chloride	R524	n/a	0.40	mg/kg dw	3	21	34	24	27	31	33
phenols	R974	n/a	0.02	mg/kg dw	3	0.03	4.5	0.14	0.26	2.4	3.7

Table 21 Priority and Relevant Pollutants parameters for the forestry and sheep dipping target sites.

Parameter	No.	target EQS	LOD	Unit	frequency (N=21)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
triclopyr	P218	n/a	0.020	µg/l	0	<	<	<	<	<	<
atrazine		0.1	0.010	µg/l	1	0.014	0.014	<	<	<	<
diazinon		n/a	0.020	µg/l	0	<	<	<	<	<	<
alpha-cypermethrin	R257	0.1	0.020	µg/l	0	<	<	<	<	<	<
cypermethrin		0.1	0.020	µg/l	0	<	<	<	<	<	<
amitraz		n/a	-	µg/l	0	-	-	-	-	-	-
AMPA	X	n/a	0.10	µg/l	0	<	<	<	<	<	<
glyphosate	R350	0.1	0.10	µg/l	0	<	<	<	<	<	<

### 4.3 General Components

#### 4.3.1 *Nitrate and sum-parameters in water*

As mentioned before most parameters in the group of General Components are determined by the SERBD laboratory in Kilkenny. For the water samples 4 parameters were determined by TNO. The results of these parameters are summarized in table 22a. The results for the QA/QC can be found in table 24. **Please note that for sediment the results of QA/QC-samples for particle size and aluminium are expressed as the repeatability of these parameters.**

Nitrate should have been determined in saline water samples only, but was determined in all aqueous samples. Nitrate was found in 95% of the samples in concentrations ranging from 0.24 to 45 mg/l with a median concentration of 2.3 mg/l. The sum-parameters, total nitrogen, total organic carbon and total phosphorus were found in 53% to 78% of the samples up to concentrations of 21 mg/l for total organic carbon. While the frequency of detection of total phosphorus was higher than in Phase 1 and 2, the concentrations were similar to those in Phase 1. The maximum concentration of 200 mg/l in Phase 1 was an exception. The maximum concentration in Phase 3 was 0.22 mg/l with a 90-pct value of 0.19 mg/l. In Dutch surface waters total phosphorus is generally found in concentrations between 0.05 and 0.3 mg/l. The maximum concentrations for total nitrogen and total organic phosphorus are much lower than those in Phase 1 and 2. The maximum concentrations for Phase 3 were respectively 1.9 and 21 mg/l with a 90-pct value of 1.24 and 19 mg/l. The 90-pct values are similar to those measured in Phase 1 and 2.

QC-samples showed recoveries of 87% for total nitrogen up to 99% for total phosphorus in water.

#### 4.3.2 *TOC, particle size, aluminium and moisture content for sediment*

Aluminium is a common component in sediments and is found in all samples in concentrations up to 61 g/kg dw, similar to Phase 1. This parameter, together with total organic carbon, the particle size distribution and moisture content of the sediment is summarized in table 22b.

Recoveries from sediment were not determined. The repeatability of the particle size distribution is better than 3%. For Aluminium the repeatability is 5.9%.

#### 4.3.3 *Lipid and moisture content in biota*

Lipid and moisture content in biota were determined and the results are summarized in table 22c. The lipid content of the flesh of eel (serie 2) ranged from 6.8% to 22% which is around the average value of 16% that is normally found for eel tissue. The moisture content ranged from 58% to 76%, also a normal value. For the parameters lipid and moisture no QC-results are available.

Table 22a General Components : Nitrate and sum-parameters in water.

Parameter	No.	target EQS	LOD	Unit	frequency (N=40)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
nitrate	R972	n/a	0.050	mg/l	38	0.24	45	1.3	2.3	9.1	12
total nitrogen	R971	n/a	0.50	mg/l	30	0.50	1.9	0.60	0.83	1.1	1.3
total organic carbon	R973	n/a	5.0	mg/l	31	6.2	21	8.4	11	12	19
total phosphorus	R970	n/a	0.050	mg/l	21	0.050	0.22	0.070	0.10	0.12	0.19

Table 22b General Components : TOC, particle size, aluminium and moisture content for sediment.

Parameter	No.	target EQS	LOD	Unit	frequency (N=7)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
total organic carbon	R973	n/a	1.0	%	7	0.21	2.4	0.24	0.31	0.59	1.5
Particle Size % >2 µm	R975	n/a	1.0	%	7	100.0	100.0	100.0	100.0	100.0	100.0
Particle Size % <2 µm	R976	n/a	1.0	%	0	<	<	<	<	<	<
Particle Size % > 63 µm	R977	n/a	1.0	%	7	92.9	99.1	93.9	95.8	98.5	99.0
Particle Size % <63 µm	R978	n/a	1.0	%	7	0.8	6.6	1.2	3.6	5.7	6.3
aluminium	R980	n/a	0.010	mg/kg dw	7	11584	61211	15378	27893	54403	57647
moisture content	R979	n/a	1.0	%	7	2.7	31	8.0	14	17	24

Table 22c General Components : Total lipid and moisture content for biota.

Parameter	No.	target EQS	LOD	Unit	frequency (N=4)	measured		25-pct	50-pct	75-pct	90 pct
						min	max				
total lipid content		n/a	0.10	%	4	6.8	22	7.2	12	18	20
moisture content		n/a	1.0	%	4	58	76	64	70	74	75

#### 4.4 Results of QA/QC measures and samples

##### 4.4.1 *Sample integrity*

Upon receipt of the samples the integrity and the temperature of the samples was checked. All samples were received in good order and were in agreement with the sample registration form. For the water samples the temperature of the 5 shipments ranged from 7.0 °C to 8.1 °C. Considering that the samples were normally shipped with a temperature of around 4 °C, this means that the average temperature during the transportation period of maximum 3 days was around 7 °C.

##### 4.4.2 *Recovery of internal standards*

In most of the determinations an internal standard is added to the sample before analysis. Two kinds of internal standards are used, isotopically labelled internal standards and surrogate internal standards. Isotopically labelled internal standards are <sup>2</sup>D- or <sup>13</sup>C-labelled compounds identical to the actual compounds that will be determined in the analysis. These were used for instance for the dioxins, PAH, PCB and a few others. The labelled internal standards were used to determine the performance of the method and to quantify the analytes, e.g. the results were corrected for the recovery of the labelled internal standard. Surrogate standards are not compound specific and are used for example in the determination of the pesticides. If surrogate standards are applied the recovery is used to evaluate the performance of the method, but not to correct the quantification because the surrogate standards are not compound specific. An exception is the recovery of the surrogate standard for the organotin compounds that is used to correct the results for the other organotin compounds.

In general the performance of a method was accepted if the recoveries of the internal standards (label or surrogate) were in the range of 60% to 140%. Exceptions are the recovery of labelled internal standards with a high volatility. The recoveries of the internal standards are listed in table 22. The recoveries of internal standards used to correct the results of analytes are printed bold. In general the recoveries are in the range of 60% to 140%.

##### 4.4.3 *Results of spiked samples and duplicates*

With each series of samples a spiked sample was generated by the addition of a mixture containing most of the compounds of interest to a mixed sample. This was done for most of the organic analytes, volatiles as well as semi-volatiles. These spiked samples were stored for 24 hours at 4 °C and were analysed together with the actual samples. The concentration spiked to the samples was about 5 to 20 times the expected limit of detection. For dioxins these QC samples were omitted because of the relative high price of these analyses, the amount of sample required and the fact that a labelled internal standard is applied that already contains all 17 dioxins. Other analytes that were not added are chloroprene, the dimethyl- and diethylamine and chlormequat. For the biota samples a spiked sample was prepared for those analyses where no or surrogate standards were added. In the case of the addition of compound specific labelled internal standards, as in the analysis of the dioxins, polychlorobiphenyls, polycyclic aromatic hydrocarbons, polychlorinated phenols and polychlorinated benzenes, no additional spiked samples with the native compounds were analysed.

The recoveries of the analytes in the spiked samples are given in table 23. In general the results show good recoveries in the range of 60% to 140%. Exceptions are the chloro-anilines for which the recovery strongly depends on the quality of the analytical column and the composition of the sample extract. In addition erratic results were found for the recovery of di-butyl-, di-(2-ethylhexyl) phthalate and di-isononyl phthalate. These were caused by relatively high blank values, which forced us to raise the detection limits for these phthalates. As a consequence low concentrations that may have been present in the samples could not be determined.

For the metal determinations samples were analysed in duplicate. As a quality control the differences in the results relative to the average result were evaluated. The results are given in table 23 and are printed in italics to distinguish them from the recoveries of the other compounds. In general these differences are smaller than 10%.

For anions and total phosphate QC samples were prepared in milli-Q water and analysed with the samples. The results indicate good recoveries.

#### 4.4.4 *Results of method blanks*

With each series a method blank was analysed. This blank is a complete method blank including all steps and reagents but without an actual sample. In the case of the metals and anions a sample of milli-Q water was used. The results are given in table 23 showing that for most analytes no blank values were observed. Notable exceptions are dibutyl-, di-(2-ethylhexyl) and di-isononyl phthalate, as mentioned on several occasions in this report. Other compounds for which blank values were found are naphthalene, PCB 28 and to a lesser extent PCB-52. Results for naphthalene and PCB-28 were corrected and the detection limit was set to a higher value.

Table 23 Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data water sample analyses					LOD	Unit	QC data sediment sample analyses				
				internal standard		QC samples		method blank			internal standard		QC samples		method blank average
				recovery %	variance %	recovery %	variance %				recovery %	variance %			
naphthalene	P001	0.10	µg/l	67	26	83	35	0.45	1.0	µg/kg dw	66	13	159	-	4.4
anthracene	P006	0.002	µg/l	79	28	78	16	<	0.50	µg/kg dw	78	5	145	-	<
fluoranthene	P007	0.005	µg/l	88	30	89	16	0.014	0.50	µg/kg dw	96	1	117	-	0.58
benzo[b]fluoranthene	P011	0.005	µg/l	107	35	91	17	<	0.50	µg/kg dw	96	7	90	-	<
benzo[k]fluoranthene	P012	0.005	µg/l	97	33	84	12	<	0.50	µg/kg dw	89	7	122	-	<
benzo[a]pyrene	P013	0.005	µg/l	91	29	75	11	<	0.50	µg/kg dw	69	13	113	-	<
indeno[1,2,3-cd]pyrene	P014	0.005	µg/l	97	32	89	12	<	0.50	µg/kg dw	90	5	119	-	<
benzo[g,h,i]perylene	P016	0.005	µg/l	99	33	86	13	<	0.50	µg/kg dw	100	6	109	-	<
pentachlorophenol	P041	0.010	µg/l	90	32	100	13	0.023	1.0	µg/kg dw	117	8	-	-	<
1,3,5-trichlorobenzene	P048	0.010	µg/l			93	10	<	1.0	µg/kg dw			86	-	<
1,2,4-trichlorobenzene	P049	0.010	µg/l	98	33	126	8	0.02	1.0	µg/kg dw	82	14	123	-	<
1,2,3-trichlorobenzene	P050	0.010	µg/l			95	6	<	1.0	µg/kg dw			86	-	<
pentachlorobenzene	P053	0.002	µg/l	94	33	100	14	<	0.20	µg/kg dw	100	6	95	-	<
hexachlorobenzene	P054	0.002	µg/l	102	34	97	10	<	0.20	µg/kg dw	110	5	90	-	<
dichloromethane	P103	0.10	µg/l			95	14	<	1.0	µg/kg dw			98	-	<
trichloromethane	P109	0.10	µg/l			103	9	<	1.0	µg/kg dw			100	-	<
tetrachloromethane	P111	0.10	µg/l			111	26	<	1.0	µg/kg dw			101	-	<
1,2-dichloroethane	P112	0.10	µg/l	116	48	100	20	<	1.0	µg/kg dw	59	16	104	-	<
benzene	P113	0.10	µg/l			106	18	<	1.0	µg/kg dw			101	-	<
trichloroethene	P114	0.10	µg/l			100	14	<	1.0	µg/kg dw			87	-	<
tetrachloroethene	P120	0.10	µg/l			94	16	<	1.0	µg/kg dw			97	-	<
hexachlorobutadiene	P202	0.002	µg/l			67	12	<	0.20	µg/kg dw			57	-	<
trifluralin	P214	0.005	µg/l			83	20	<	0.50	µg/kg dw			113	-	<
atrazine	P218	0.010	µg/l			99	10	<	1.0	µg/kg dw			75	-	<
lindane	P219	0.005	µg/l			82	7	<	0.50	µg/kg dw			87	-	<
alachlor	P225	0.010	µg/l			83	9	<	1.0	µg/kg dw			98	-	<
aldrin	P232	0.005	µg/l			105	8	<	0.50	µg/kg dw			107	-	<
chlorpyrifos(-ethyl)	P233	0.010	µg/l	83	27	86	8	<	1.0	µg/kg dw	95	8	88	-	<
isodrin	P238	0.005	µg/l			86	7	<	0.50	µg/kg dw			72	-	<
chlorfenvinphos	P241	0.010	µg/l			88	7	<	1.0	µg/kg dw			98	-	<
endosulfan-alpha	P243	0.010	µg/l			81	10	<	1.0	µg/kg dw			74	-	<
dieldrin	P244	0.005	µg/l			85	9	<	0.50	µg/kg dw			97	-	<
endrin	P246	0.005	µg/l			81	12	<	0.50	µg/kg dw			87	-	<
endosulfan-beta	P247	0.010	µg/l			100	10	<	1.0	µg/kg dw			80	-	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data biota sample analyses				method blank 75-pct
				internal standard		QC samples		
				recovery %	variance %	recovery %	variance %	
naphthalene	P001	1.0	µg/kg dw	79	11	94	6	10
anthracene	P006	0.50	µg/kg dw	80	9	98	8	<
fluoranthene	P007	0.50	µg/kg dw	84	9	115	14	2.0
benzo[b]fluoranthene	P011	0.50	µg/kg dw	91	18	90	10	<
benzo[k]fluoranthene	P012	0.50	µg/kg dw	92	14	130	30	<
benzo[a]pyrene	P013	0.50	µg/kg dw	78	8	97	9	<
indeno[1,2,3-cd]pyrene	P014	0.50	µg/kg dw	86	25	113	14	<
benzo[g,h,i]perylene	P016	0.50	µg/kg dw	88	21	105	12	<
pentachlorophenol	P041	1.0	µg/kg dw	57	14	96	17	<
1,3,5-trichlorobenzene	P048	1.0	µg/kg dw			114	9	<
1,2,4-trichlorobenzene	P049	1.0	µg/kg dw	77	14	153	43	4.0
1,2,3-trichlorobenzene	P050	1.0	µg/kg dw			135	49	1.8
pentachlorobenzene	P053	0.20	µg/kg dw	104	14	103	1	<
hexachlorobenzene	P054	0.20	µg/kg dw	108	12	108	9	<
dichloromethane	P103	10	µg/kg dw			91	10	<
trichloromethane	P109	10	µg/kg dw			84	23	<
tetrachloromethane	P111	10	µg/kg dw			93	11	<
1,2-dichloroethane	P112	10	µg/kg dw	29	5	92	16	<
benzene	P113	10	µg/kg dw			87	20	<
trichloroethene	P114	10	µg/kg dw			97	14	<
tetrachloroethene	P120	10	µg/kg dw			89	11	<
hexachlorobutadiene	P202	0.20	µg/kg dw			52	7	<
trifluralin	P214	0.50	µg/kg dw			27	14	<
atrazine	P218	1.0	µg/kg dw			77	9	<
lindane	P219	0.50	µg/kg dw			96	11	<
alachlor	P225	1.0	µg/kg dw			94	3	<
aldrin	P232	0.50	µg/kg dw			105	9	<
chlорpyrifos(-ethyl)	P233	1.0	µg/kg dw	95	5	93	9	<
isodrin	P238	0.50	µg/kg dw			88	8	<
chlorfenvinphos	P241	1.0	µg/kg dw			108	10	<
endosulfan-alpha	P243	1.0	µg/kg dw			93	5	<
dieldrin	P244	0.50	µg/kg dw			89	1	<
endrin	P246	0.50	µg/kg dw			93	5	<
endosulfan-beta	P247	1.0	µg/kg dw			102	4	<



Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	QC data water sample analyses						QC data sediment sample analyses							
		LOD	Unit	internal standard		QC samples		method blank	LOD	Unit	internal standard		QC samples		method blank
				recovery	variance	recovery	variance				recovery	variance	recovery	variance	
				%	%	%	%				%	%	%	%	
2,4'-DDT	P248	0.002	µg/l			87	15	<	0.20	µg/kg dw			82	-	<
4,4'-DDT	P250	0.002	µg/l			85	15	<	0.20	µg/kg dw			101	-	<
di-(2-ethylhexyl)-phthalate (DEHP)	P251	1.0	µg/l			96	71	<	50	µg/kg dw			160	-	85
simazine	P306	0.010	µg/l	83	27	99	10	<	1.0	µg/kg dw	95	8	108	-	<
isoproturon	P308	0.010	µg/l			79	4	<	1.0	µg/kg dw			115	-	<
diuron	P309	0.010	µg/l			86	16	<	1.0	µg/kg dw			119	-	<
4-tert-octylphenol	P357	0.010	µg/l	-	-	86	13	<	1.0	µg/kg dw	-	-	45	-	<
nonylphenols	P358	0.010	µg/l	-	-	90	15	<	1.0	µg/kg dw	-	-	37	-	<
cadmium	P500	0.10	µg/l			101	4	<	0.10	mg/kg dw			0.17	-	<
lead	P501	1.0	µg/l			95	1	<	0.10	mg/kg dw			0.49	-	<
mercury	P502	0.10	µg/l	-	-	-	-	<	0.10	mg/kg dw	89	7	-	-	<
nickel	P503	1.0	µg/l			95	2	<	0.10	mg/kg dw			1.8	-	<
BDE-209	P914	0.020	µg/l			69	15	<	2.0	µg/kg dw			69	-	<
C10-C13 (PCA)	P917	0.10	µg/l			103	11	<	10	µg/kg dw			87	-	<
sum diphenyl ether, pentabromo	P920	0.001	µg/l	105	35	91	5	0.013	0.10	µg/kg dw	93	13	90	-	<
sum diphenyl ether, octabromo	P921	0.002	µg/l			81	8	<	0.20	µg/kg dw			40	-	<
tributyltin	P930	0.005	µg/l	85	39	103	21	<	0.500	µg/kg dw	69	14	105	-	<
PCB 28	R017	0.005	µg/l	91	30	103	21	<	0.40	µg/kg dw	91	3	-	-	0.46
PCB 52	R018	0.002	µg/l	88	29	129	42	0.006	0.40	µg/kg dw	96	2	-	-	<
PCB 101	R019	0.002	µg/l			104	8	0.005	0.40	µg/kg dw			-	-	<
PCB 118	R020	0.002	µg/l	90	30	103	6	0.003	0.40	µg/kg dw	103	5	-	-	<
PCB 153	R021	0.002	µg/l			110	16	<	0.40	µg/kg dw			-	-	<
PCB 138	R022	0.002	µg/l	102	33	105	9	<	0.40	µg/kg dw	100	4	-	-	<
PCB 180	R023	0.002	µg/l	93	31	79	18	<	0.40	µg/kg dw	110	12	-	-	<
2,4/2,5-dichlorophenol	R028	0.010	µg/l	92	30	100	7	<	1.0	µg/kg dw	74	15	-	-	<
mono-chlorophenol	R042	0.050	µg/l	48	20	101	12	<	10	µg/kg dw	81	19	-	-	<
trichlorophenols	R043	0.010	µg/l	93	33	102	17	<	2.0	µg/kg dw	80	14	-	-	<
mono-chlorobenzene	R044	0.10	µg/l	66	26	92	27	<	20	µg/kg dw	71	22	-	-	<
1,2,4,5-tetrachlorobenzene	R051	0.10	µg/l	92	31	115	10	<	20	µg/kg dw	93	9	-	-	<
dichlorobenzenes	R055	0.10	µg/l	100	34	111	6	<	20	µg/kg dw	75	16	-	-	<
sum PCB	R060	0.10	µg/l	-	-	-	-	-	0.002	µg/kg dw	-	-	-	-	-
vinylchloride	R100	0.10	µg/l			106	26	<	20	µg/kg dw			80	-	<
bromomethane	R101	0.50	µg/l			112	22	<	20	µg/kg dw			82	-	<
1,1-dichloroethene	R102	0.10	µg/l	106	53	105	23	<	20	µg/kg dw	59	16	108	-	<
carbon disulphide	R104	0.10	µg/l			117	6	<	20	µg/kg dw			101	-	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data biota sample analyses				method blank 75-pct
				internal standard		QC samples		
				recovery %	variance %	recovery %	variance %	
2,4'-DDT	P248	0.20	µg/kg dw			89	6	<
4,4'-DDT	P250	0.20	µg/kg dw			104	10	<
di-(2-ethylhexyl)-phthalate (DEH)	P251	500	µg/kg dw	95	5	irregular	-	<
simazine	P306	1.0	µg/kg dw				83	30
isoproturon	P308	1.0	µg/kg dw			46	19	<
diuron	P309	1.0	µg/kg dw			85	1	<
4-tert-octylphenol	P357	1.0	µg/kg dw	-	-	-	-	<
nonylphenols	P358	1.0	µg/kg dw	-	-	-	-	<
cadmium	P500	0.010	mg/kg dw			1.3	1.3	<
lead	P501	0.010	mg/kg dw	95	4	2.6	2.0	<
mercury	P502	0.010	mg/kg dw			-	-	<
nickel	P503	0.010	mg/kg dw			4.3	5.7	<
BDE-209	P914	2.0	µg/kg dw			96	3.2	<
C10-C13 (PCA)	P917	10	µg/kg dw	102	11	89	8.5	<
sum diphenyl ether, pentabromo	P920	0.10	µg/kg dw			91	8.7	<
sum diphenyl ether, octabromo	P921	0.20	µg/kg dw			82	9.5	<
tributyltin	P930	0.50	µg/kg dw	98	4	118	23	<
PCB 28	R017	0.40	µg/kg dw	87	16	96	15	1.6
PCB 52	R018	0.40	µg/kg dw	101	17	88	13	1.1
PCB 101	R019	0.40	µg/kg dw	99	10	101	7	<
PCB 118	R020	0.40	µg/kg dw			109	23	<
PCB 153	R021	0.40	µg/kg dw	97	22	96	26	<
PCB 138	R022	0.40	µg/kg dw			105	11	<
PCB 180	R023	0.40	µg/kg dw	119	22	105	11	<
2,4/2,5-dichlorophenol	R028	2.0	µg/kg dw	89	9	104	2	<
mono-chlorophenol	R042	10	µg/kg dw	84	11	102	6	<
trichlorophenols	R043	2.0	µg/kg dw	98	11	103	6	<
mono-chlorobenzene	R044	20	µg/kg dw	20	13	98	18	<
1,2,4,5-tetrachlorobenzene	R051	20	µg/kg dw	98	15	129	8	<
dichlorobenzenes	R055	20	µg/kg dw	58	9	134	21	27
sum PCB	R060	2.0	µg/kg dw	-	-	-	-	-
vinylchloride	R100	10	µg/kg dw			69	16	<
bromomethane	R101	10	µg/kg dw			72	14	<
1,1-dichloroethene	R102	10	µg/kg dw	54	18	93	20	<
carbon disulphide	R104	10	µg/kg dw			90	16	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data water sample analyses					LOD	Unit	QC data sediment sample analyses				
				internal standard		QC samples		method blank			internal standard		QC samples		method blank average
				recovery %	variance %	recovery %	variance %				recovery %	variance %			
MTBE	R105	0.10	µg/l			118	32	1	20	µg/kg dw			115	-	<
1,2-dichloroethene	R106	0.10	µg/l			107	24	<	20	µg/kg dw			102	-	<
1,1-dichloroethane	R107	0.10	µg/l			104	11	<	20	µg/kg dw			101	-	<
1,1,1-trichloroethane	R110	0.10	µg/l			106	22	<	20	µg/kg dw			101	-	<
1,2-dichloropropane	R115	0.10	µg/l			106	11	<	20	µg/kg dw			100	-	<
1,3-dichloropropene	R116	0.10	µg/l	106	53	96	15	<	20	µg/kg dw	59	16	106	-	<
toluene	R117	0.10	µg/l			101	15	0.10	20	µg/kg dw			92	-	<
1,1,2-trichloroethane	R119	0.10	µg/l			106	12	<	20	µg/kg dw			104	-	<
1,2-dibromoethane	R121	0.10	µg/l			96	8	<	20	µg/kg dw			107	-	<
ethylbenzene	R122	0.10	µg/l			91	15	<	20	µg/kg dw			97	-	<
p,m-xylene	R123	0.10	µg/l			91	18	<	20	µg/kg dw			97	-	<
o-xylene	R124	0.10	µg/l			96	14	<	20	µg/kg dw			97	-	<
styrene	R125	0.10	µg/l			92	12	<	20	µg/kg dw			99	-	<
iso-propylbenzene	R126	0.10	µg/l			86	19	<	20	µg/kg dw			93	-	<
1,1,2,2-tetrachloroethane	R127	0.10	µg/l			100	15	<	20	µg/kg dw			107	-	<
2-chlorotoluene	R128	0.10	µg/l			90	14	<	20	µg/kg dw			68	-	<
3-chlorotoluene	R129	0.10	µg/l			not deter.	-	<	20	µg/kg dw			80	-	<
4-chlorotoluene	R130	0.10	µg/l			91	35	<	20	µg/kg dw			76	-	<
chloroprene	R134	0.10	µg/l	116	48	89	8	<	20	µg/kg dw	59	16	73	-	<
3-chloropropene	R135	0.10	µg/l			87	10	<	20	µg/kg dw			73	-	<
dichloro-di-isopropylether	R136	0.10	µg/l			90	7	<	20	µg/kg dw			75	-	<
2,3-dichloropropene	R137	0.10	µg/l			85	12	<	20	µg/kg dw			59	-	<
epichlorohydrin	R138	0.10	µg/l			86	9	<	20	µg/kg dw			76	-	<
hexachloroethane	R139	0.10	µg/l			87	16	<	20	µg/kg dw			45	-	<
1,1,2-trichloro-1,2,2-trifluoroeth:	R140	0.10	µg/l			98	8	<	20	µg/kg dw			32	-	<
cyanuric chloride	R200	0.050	µg/l			83	9	<	10	µg/kg dw			89	-	<
oxydemeton-methyl	R201	0.10	µg/l			80	17	<	20	µg/kg dw			36	-	<
dichlobenil	R203	0.010	µg/l			74	11	<	4.0	µg/kg dw			79	-	<
tribenuron-methyl	R204	0.020	µg/l			50	29	<	10	µg/kg dw			110	-	<
biphenyl	R205	0.010	µg/l	102	35	66	9	<	2.0	µg/kg dw	115	6	74	-	<
mecoprop	R206	0.020	µg/l			73	28	<	2.0	µg/kg dw			50	-	<
MCPA	R207	0.010	µg/l			54	24	<	2.0	µg/kg dw			86	-	<
propachlor	R208	0.010	µg/l			91	9	<	4.0	µg/kg dw			89	-	<
dichlorprop	R209	0.020	µg/l			66	27	<	4.0	µg/kg dw			75	-	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data biota sample analyses				method blank 75-pct
				internal standard		QC samples		
				recovery %	variance %	recovery %	variance %	
MTBE	R105	10	µg/kg dw			69	16	<
1,2-dichloroethene	R106	10	µg/kg dw			72	14	<
1,1-dichloroethane	R107	10	µg/kg dw			93	20	<
1,1,1-trichloroethane	R110	10	µg/kg dw			90	16	<
1,2-dichloropropane	R115	10	µg/kg dw			122	10	<
1,3-dichloropropene	R116	10	µg/kg dw	29	5	83	27	<
toluene	R117	10	µg/kg dw			86	21	<
1,1,2-trichloroethane	R119	10	µg/kg dw			102	1	<
1,2-dibromoethane	R121	10	µg/kg dw			79	30	<
ethylbenzene	R122	10	µg/kg dw			80	36	<
p,m-xylene	R123	10	µg/kg dw			77	21	<
o-xylene	R124	10	µg/kg dw			79	34	<
styrene	R125	10	µg/kg dw			82	35	<
iso-propylbenzene	R126	10	µg/kg dw			88	12	<
1,1,2,2-tetrachloroethane	R127	10	µg/kg dw			96	2	<
2-chlorotoluene	R128	10	µg/kg dw			89	4	<
3-chlorotoluene	R129	10	µg/kg dw			91	15	<
4-chlorotoluene	R130	10	µg/kg dw			88	11	<
chloroprene	R134	10	µg/kg dw	54	18	104	3	<
3-chloropropene	R135	10	µg/kg dw			87	18	<
dichloro-di-isopropylether	R136	10	µg/kg dw			85	18	<
2,3-dichloropropene	R137	10	µg/kg dw			71	17	<
epichlorohydrin	R138	10	µg/kg dw			not det.	-	<
hexachloroethane	R139	10	µg/kg dw			46	1	<
1,1,2-trichloro-1,2,2-trifluoroethane	R140	10	µg/kg dw			32	1	<
cyanuric chloride	R200	10	µg/kg dw			89	14	<
oxydemeton-methyl	R201	20	µg/kg dw			92	12	<
dichlobenil	R203	4.0	µg/kg dw			75	14	<
tribenuron-methyl	R204	10	µg/kg dw			47	32	<
biphenyl	R205	2.0	µg/kg dw	98	14	62	5	<
mecoprop	R206	2.0	µg/kg dw			111	4	<
MCPA	R207	2.0	µg/kg dw			94	13	<
propachlor	R208	4.0	µg/kg dw			78	2	<
dichlorprop	R209	4.0	µg/kg dw			112	4	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data water sample analyses					LOD	Unit	QC data sediment sample analyses				
				internal standard		QC samples		method blank 75-pct			internal standard		QC samples		method blank average
				recovery	variance	recovery	variance				recovery	variance			
				%	%	%	%				%	%			
bromoxynil	R210	0.020	µg/l			53	36	<	4.0	µg/kg dw			75	-	<
2,4-D	R211	0.020	µg/l			37	10	<	4.0	µg/kg dw			85	-	<
ethoprophos	R212	0.010	µg/l			94	9	<	2.0	µg/kg dw			99	-	<
chlorpropham	R213	0.020	µg/l			95	8	<	4.0	µg/kg dw			90	-	<
dimethoate	R215	0.020	µg/l			90	17	<	4.0	µg/kg dw			90	-	<
carbofuran	R216	0.010	µg/l			97	12	<	2.0	µg/kg dw			89	-	<
triclopyr		0.020	µg/l			56	31	<							
propyzamide	R220	0.020	µg/l			97	17	<	2.0	µg/kg dw			84	-	<
triallate	R221	0.005	µg/l			80	6	<	1.0	µg/kg dw			83	-	<
pirimicarb	R222	0.020	µg/l			82	12	<	4.0	µg/kg dw			71	-	<
bentazon	R223	0.020	µg/l			50	32	<	4.0	µg/kg dw			57	-	<
tolclofos-methyl	R224	0.020	µg/l			82	7	<	4.0	µg/kg dw			97	-	<
ioxynil	R226	0.050	µg/l			75	31	<	10	µg/kg dw			76	-	<
diazinon		0.020	µg/l			54	25	<							
pirimiphos-methyl	R227	0.010	µg/l			76	10	<	2.0	µg/kg dw			83	-	<
ethofumesate	R228	0.020	µg/l			85	10	<	4.0	µg/kg dw			87	-	<
fenitrothion	R229	0.010	µg/l			105	21	<	2.0	µg/kg dw			111	-	<
di-n-butylphthalate	R230	1.0	µg/l	102	35	79	162	1.7	1.0	µg/kg dw	115	6	109	-	<
malathion	R231	0.010	µg/l			80	10	<	2.0	µg/kg dw			105	-	<
fenpropimorf	R234	0.020	µg/l			62	27	<	4.0	µg/kg dw			85	-	<
pendimethalin	R239	0.010	µg/l			93	9	<	5.0	µg/kg dw			110	-	<
metazachlor	R240	0.020	µg/l			95	13	<	4.0	µg/kg dw			99	-	<
captan	R242	0.10	µg/l			94	16	1	20	µg/kg dw			84	-	<
kresoxim-methyl	R245	0.010	µg/l			72	8	<	2.0	µg/kg dw			90	-	<
butylbenzylphthalate	R249	0.050	µg/l			80	12	0.04	2.0	µg/kg dw			74	-	<
permethrin	R252	0.020	µg/l			97	9	<	4.0	µg/kg dw			102	-	<
diisononylester DINP	R254	2.0	µg/l			81	26	3.0	2.0	µg/kg dw			109	-	<
prochloraz	R255	0.020	µg/l			73	12	<	2.0	µg/kg dw			79	-	<
cyfluthrin	R256	0.020	µg/l			98	10	<	4.0	µg/kg dw			103	-	<
cypermethrin	R257	0.020	µg/l			99	8	<	4.0	µg/kg dw			106	-	<
deltamethrin	R258	0.020	µg/l			99	6	<	4.0	µg/kg dw			102	-	<
oxamyl	R300	0.050	µg/l			61	24	<	10	µg/kg dw			79	-	<
trichlorofon	R301	0.020	µg/l			91	17	<	4.0	µg/kg dw			128	-	<
metamitron	R302	0.010	µg/l			69	11	<	2.0	µg/kg dw			52	-	<
carbendazim	R303	0.010	µg/l			56	32	<	2.0	µg/kg dw			67	-	<
chlolidazon	R304	0.020	µg/l			91	16	<	4.0	µg/kg dw			99	-	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data biota sample analyses				method blank 75-pct
				internal standard		QC samples		
				recovery %	variance %	recovery %	variance %	
bromoxynil	R210	4.0	µg/kg dw			98	14	<
2,4-D	R211	4.0	µg/kg dw			89	17	<
ethoprophos	R212	2.0	µg/kg dw			90	10	<
chlorpropham	R213	4.0	µg/kg dw			87	15	<
dimethoate	R215	4.0	µg/kg dw			97	11	<
carbofuran	R216	2.0	µg/kg dw			101	12	<
triclopyr						-	-	
propyzamide	R220	2.0	µg/kg dw			96	12	<
triallate	R221	1.0	µg/kg dw			83	4	<
pirimicarb	R222	4.0	µg/kg dw			77	2	<
bentazon	R223	4.0	µg/kg dw			60	5	<
tolclofos-methyl	R224	4.0	µg/kg dw			93	5	<
ioxynil	R226	10	µg/kg dw			88	8	<
diazinon						-	-	
pirimiphos-methyl	R227	2.0	µg/kg dw			82	3	<
ethofumesate	R228	4.0	µg/kg dw			106	15	<
fenitrothion	R229	2.0	µg/kg dw			114	12	<
di-n-butylphthalate	R230	100	µg/kg dw	98	14	irregular	-	<
malathion	R231	2.0	µg/kg dw			103	10	<
fenpropimorf	R234	4.0	µg/kg dw			31	20	<
pendimethalin	R239	5.0	µg/kg dw			95	16	<
metazachlor	R240	4.0	µg/kg dw			89	1	<
captan	R242	20	µg/kg dw			95	24	<
kresoxim-methyl	R245	2.0	µg/kg dw			92	5	<
butylbenzylphthalate	R249	20	µg/kg dw			irregular	-	<
permethrin	R252	4.0	µg/kg dw			104	7	<
diisononylester DINP	R254	20	µg/kg dw			irregular	-	<
prochloraz	R255	2.0	µg/kg dw			83	18	<
cyfluthrin	R256	4.0	µg/kg dw			91	2	<
cypermethrin	R257	4.0	µg/kg dw			104	7	<
deltamethrin	R258	4.0	µg/kg dw			102	12	<
oxamyl	R300	10	µg/kg dw			64	3	<
trichlorofon	R301	4.0	µg/kg dw			104	8	<
metamitron	R302	2.0	µg/kg dw			74	49	<
carbendazim	R303	2.0	µg/kg dw			42	13	<
chloridazon	R304	4.0	µg/kg dw			53	38	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data water sample analyses				method blank	75-pct	LOD	Unit	liment sample analyses				method blank average
				internal standard recovery %	variance %	QC samples recovery %	variance %					internal standard recovery %	variance %	QC samples recovery %	variance %	
thiabendazole	R305	0.050	µg/l			36	23	<		2.0	µg/kg dw			57	-	<
chlorotoluron	R307	0.020	µg/l			80	9	<		4.0	µg/kg dw			85	-	<
monolinuron	R310	0.010	µg/l			62	11	<		2.0	µg/kg dw			86	-	<
methiocarb	R311	0.010	µg/l	102	35	100	46	<		2.0	µg/kg dw	115	6	82	-	<
linuron	R312	0.010	µg/l			64	8	<		2.0	µg/kg dw			110	-	<
epoxiconazole	R313	0.010	µg/l			79	11	<		2.0	µg/kg dw			116	-	<
diflubenzuron	R314	0.010	µg/l			87	20	<		2.0	µg/kg dw			94	-	<
glyphosate	R350	0.10	µg/l	65	32	69	26	<		-	-	-	-	-	-	-
amitraz		0.02	µg/l	-	-	-	-	-				93	36			
dimethylamine	R352	1.0	µg/l	102	33	not deter.	-	<		10	µg/kg dw			not deter.	-	<
diethylamine	R353	1.0	µg/l			not deter.	-	<		10	µg/kg dw	-	-	not deter.	-	<
nonylphenol ethoxylates	R355	0.050	µg/l	-	-	69	27	<		5.0	µg/kg dw	67	5	53	-	<
bisphenol-A	R356	0.010	µg/l	66	25	74	22	<		1.0	µg/kg dw	-	-	72	-	<
chlormequat	R358	0.10	µg/l	108	35	80	25	<		-	-	-	-	-	-	-
paraquat	R359	0.50	µg/l	-	-	80	24	<		-	-			-	-	-
benzylchloride	R400	-	-			-	-	-		5.0	µg/kg dw			65	-	<
nitrobenzene	R401	-	-			-	-	-		1.0	µg/kg dw			68	-	<
2-chloroaniline	R402	-	-			-	-	-		5.0	µg/kg dw			57	-	<
benzylidenechloride	R403	-	-			-	-	-		5.0	µg/kg dw			86	-	<
4-nitrotoluene	R407	-	-			-	-	-		20	µg/kg dw			36	-	<
di-2-ethylhexyl adipate (DEHA)	R423									2.0	µg/kg dw			not deter.	-	<
1-chloronaphthalene	R427	-	-			-	-	-		1.0	µg/kg dw	95	7	78	-	<
1-chloro-2,4-dinitrobenzene	R433	-	-	-	-	-	-	-		5.0	µg/kg dw			90	-	<
4-chloro-2-nitroaniline	R434	-	-			-	-	-		1.0	µg/kg dw			92	-	<
benzidine	R435	-	-			-	-	-		5.0	µg/kg dw			85	-	<
3,3'-dichlorobenzidine	R436	-	-			-	-	-		4.0	µg/kg dw			95	-	<
monochlorotoluidines:	R480	-	-			-	-	-		20	µg/kg dw			irregular	-	<
chloronitrotoluenes	R481	-	-			-	-	-		10	µg/kg dw			87	-	<
dichloroanilines	R482	-	-			-	-	-		10	µg/kg dw			irregular	-	<
chloronitrobenzenes	R483	-	-			-	-	-		4.0	µg/kg dw			78	-	<
dichloronitrobenzenes:	R484	-	-			-	-	-		4.0	µg/kg dw			84	-	<
arsenic	R504	0.10	µg/l	79	37	101	6	<		0.010	mg/kg dw	89	7	2.3	-	<
zinc	R505	0.10	µg/l			95	13	<		0.010	mg/kg dw			0.32	-	<
copper	R506	0.10	µg/l			94	2	<		0.010	mg/kg dw			1.1	-	<
chromium	R507	0.10	µg/l			101	5	<		0.010	mg/kg dw			5.3	-	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data biota sample analyses				method blank 75-pct
				internal standard		QC samples		
				recovery %	variance %	recovery %	variance %	
thiabendazole	R305	10	µg/kg dw			80	8	<
chlorotoluron	R307	4.0	µg/kg dw			66	36	<
monolinuron	R310	2.0	µg/kg dw			58	28	<
methiocarb	R311	2.0	µg/kg dw	98	14	90	25	<
linuron	R312	2.0	µg/kg dw			75	14	<
epoxiconazole	R313	2.0	µg/kg dw			88	21	<
diflubenzuron	R314	2.0	µg/kg dw			83	11	<
glyphosate	R350							
amitraz								
dimethylamine	R352							
diethylamine	R353							
nonylphenol ethoxylates	R355	10	µg/kg dw	-	-	-	-	<
bisphenol-A	R356	2	µg/kg dw	66	19	-	-	<
chlormequat	R358							
paraquat	R359							
benzylchloride	R400	5.0	µg/kg dw			87	17	<
nitrobenzene	R401	10	µg/kg dw			97	12	<
2-chloroaniline	R402	5.0	µg/kg dw			37	11	<
benzylidenechloride	R403	5.0	µg/kg dw			87	17	<
4-nitrotoluene	R407	20	µg/kg dw			86	15	<
1-chloronaphthalene	R427	1.0	µg/kg dw			90	6	<
1-chloro-2,4-dinitrobenzene	R433	5.0	µg/kg dw			66	16	<
4-chloro-2-nitroaniline	R434	20	µg/kg dw			88	6	<
benzidine	R435	5.0	µg/kg dw			39	9	<
3,3'-dichlorobenzidine	R436	4.0	µg/kg dw			11	13	<
monochlorotoluidines:	R480	20	µg/kg dw			63	21	<
chloronitrotoluenes	R481	20	µg/kg dw			94	4	<
dichloroanilines	R482	10	µg/kg dw			64	23	<
chloronitrobenzenes	R483	10	µg/kg dw			85	4	<
dichloronitrobenzenes:	R484	4.0	µg/kg dw			95	5	<
arsenic	R504	0.010	mg/kg dw			1.5	0.6	<
zinc	R505	0.010	mg/kg dw			1.2	0.4	<
copper	R506	0.010	mg/kg dw	95	4	2.2	0.4	<
chromium	R507	0.010	mg/kg dw			4.3	2.6	<



Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	water sample analyses		QC samples		method blank	LOD	Unit	limit sample analyses		QC samples		method blank
				recovery	variance	recovery	variance				recovery	variance	recovery	variance	
				%	%	%	%	75-pct					%	%	average
selenium	R508	0.10	µg/l			43	10	<	0.070	mg/kg dw			3.5	-	<
antimony	R509	0.10	µg/l			-	-	<	0.010	mg/kg dw			0.31	-	<
molybdenum	R510	0.10	µg/l			72	12	<	0.010	mg/kg dw			2.6	-	<
titanium	R511	0.10	µg/l			86	8	<	0.010	mg/kg dw			0.93	-	<
tin	R512	0.10	µg/l			96	10	<	0.010	mg/kg dw			0.01	-	<
barium	R513	0.10	µg/l			97	7	<	0.010	mg/kg dw			1.5	-	<
beryllium	R514	0.10	µg/l	79	37	106	7	<	0.010	mg/kg dw	89	7	0.54	-	<
boron	R515	0.10	µg/l			104	22	<	1.3	mg/kg dw			-	-	<
uranium	R516	0.10	µg/l			94	8	<	0.010	mg/kg dw			1.9	-	<
vanadium	R517	0.10	µg/l			103	5	<	0.010	mg/kg dw			0.30	-	<
cobalt	R518	0.10	µg/l			98	8	<	0.010	mg/kg dw			1.2	-	<
thallium	R519	0.10	µg/l			76	33	<	0.010	mg/kg dw			1.8	-	<
tellurium	R520	0.10	µg/l			-	-	<	0.010	mg/kg dw			1.5	-	<
silver	R521	0.10	µg/l			101	35	<	0.010	mg/kg dw			3.7	-	<
cyanide	R522	0.002	mg/l			104	4	<	0.50	mg/kg dw	-	-	not deter.	-	<
fluoride	R523	0.10	mg/l	-	-	88	7	<	0.20	mg/kg dw	-	-	not deter.	-	<
chloride	R524	1.0	mg/l			100	0	<	0.40	mg/kg dw	-	-	not deter.	-	<
2378 T4CDD	R600	-	-	-	-	-	-	-	0.002	µg/kg dw	67	5	-	-	<
12378 P5CDD	R601	-	-	-	-	-	-	-	0.002	µg/kg dw	73	8	-	-	<
123478 H6CDD	R602	-	-	-	-	-	-	-	0.010	µg/kg dw	59	21	-	-	<
123678 H6CDD	R603	-	-	-	-	-	-	-	0.010	µg/kg dw	81	29	-	-	<
123789 H6CDD	R604	-	-	-	-	-	-	-	0.010	µg/kg dw	81	31	-	-	<
1234678 H7CDD	R605	-	-	-	-	-	-	-	0.010	µg/kg dw	82	31	-	-	<
12346789 O8CDD	R606	-	-	-	-	-	-	-	0.020	µg/kg dw	107	9	-	-	<
2378 T4CDF	R607	-	-	-	-	-	-	-	0.002	µg/kg dw	100	9	-	-	<
12378 P5CDF	R608	-	-	-	-	-	-	-	0.002	µg/kg dw	101	3	-	-	<
23478 P5CDF	R609	-	-	-	-	-	-	-	0.002	µg/kg dw	101	4	-	-	<
123478 H6CDF	R610	-	-	-	-	-	-	-	0.010	µg/kg dw	95	6	-	-	<
123678 H6CDF	R611	-	-	-	-	-	-	-	0.010	µg/kg dw	103	7	-	-	<
123789 H6CDF	R612	-	-	-	-	-	-	-	0.010	µg/kg dw	91	8	-	-	<
234678 H6CDF	R613	-	-	-	-	-	-	-	0.010	µg/kg dw	101	7	-	-	<
1234678 H7CDF	R614	-	-	-	-	-	-	-	0.010	µg/kg dw	97	23	-	-	<
1234789 H7CDF	R615	-	-	-	-	-	-	-	0.010	µg/kg dw	95	11	-	-	<
12346789 O8CDF	R616	-	-	-	-	-	-	-	0.020	µg/kg dw	102	13	-	-	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data biota sample analyses				method blank 75-pct
				internal standard		QC samples		
				recovery %	variance %	recovery %	variance %	
selenium	R508	0.010	mg/kg dw			2.4	2.1	<
antimony	R509	0.010	mg/kg dw			3.4	3.8	<
molybdenum	R510	0.010	mg/kg dw			12	17	<
titanium	R511	0.010	mg/kg dw			0.68	1.0	<
tin	R512	0.010	mg/kg dw			5.4	4.8	<
barium	R513	0.010	mg/kg dw			3.4	1.4	<
beryllium	R514	0.010	mg/kg dw	95	4	22	15	<
boron	R515					-	-	<
uranium	R516	0.010	mg/kg dw			4.1	2.3	<
vanadium	R517	0.010	mg/kg dw			11	3	<
cobalt	R518	0.010	mg/kg dw			1.6	1.4	<
thallium	R519	0.010	mg/kg dw			2.2	0.82	<
tellurium	R520	0.010	mg/kg dw			-	-	<
silver	R521	0.010	mg/kg dw			5.5	3.7	<
cyanide	R522							
fluoride	R523							
chloride	R524							
2378 T4CDD	R600	0.20	ng/kg dw	84	6	-	-	<
12378 P5CDD	R601	0.20	ng/kg dw	85	9	-	-	<
123478 H6CDD	R602	1.0	ng/kg dw	87	6	-	-	<
123678 H6CDD	R603	1.0	ng/kg dw	92	7	-	-	<
123789 H6CDD	R604	1.0	ng/kg dw	83	5	-	-	<
1234678 H7CDD	R605	1.0	ng/kg dw	98	11	-	-	<
12346789 O8CDD	R606	10	ng/kg dw	86	7	-	-	<
2378 T4CDF	R607	0.20	ng/kg dw	78	4	-	-	<
12378 P5CDF	R608	0.20	ng/kg dw	85	10	-	-	<
23478 P5CDF	R609	0.20	ng/kg dw	92	8	-	-	<
123478 H6CDF	R610	1.0	ng/kg dw	85	10	-	-	<
123678 H6CDF	R611	1.0	ng/kg dw	87	9	-	-	<
123789 H6CDF	R612	1.0	ng/kg dw	89	10	-	-	<
234678 H6CDF	R613	1.0	ng/kg dw	56	30	-	-	<
1234678 H7CDF	R614	1.0	ng/kg dw	89	9	-	-	<
1234789 H7CDF	R615	1.0	ng/kg dw	88	6	-	-	<
12346789 O8CDF	R616	10	ng/kg dw	78	6	-	-	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	water sample analyses		QC samples		method blank 75-pct	LOD	Unit	liment sample analyses		QC samples		method blank average
				internal standard recovery %	variance %	recovery %	variance %				internal standard recovery %	variance %	recovery %	variance %	
sum PCDDF TEQ	R620	-	-	-	-	-	-	-	0.020	µg/kg dw	-	-	-	-	<
sum dioxins	R621	-	-	-	-	-	-	-	0.10	µg/kg dw	-	-	-	-	<
sum furans	R622	-	-	-	-	-	-	-	0.10	µg/kg dw	-	-	-	-	<
HBBCD	R915	0.020	µg/l	111	46	98	8	<	4.0	µg/kg dw	93	13	98	-	<
polychloronaphthalenes	R918	0.10	µg/l	-	-	89	17	<	20	µg/kg dw	-	-	71	-	<
PCT	R919	0.10	µg/l	-	-	96	14	<	0.40	µg/kg dw	-	-	70	-	<
dibutyltin	R931	0.005	µg/l	-	-	95	24	<	0.500	µg/kg dw	-	-	96	-	<
tetrabutyltin	R932	0.005	µg/l	78	34	111	33	<	0.500	µg/kg dw	69	14	73	-	<
triphenyltin	R933	0.005	µg/l	-	-	96	25	<	0.500	µg/kg dw	-	-	105	-	<
tri-n-propyltin	R934	0.005	µg/l	-	-	103	37	<	0.500	µg/kg dw	-	-	62	-	<
maneb/zineb/thiram/mancozeb	R940	0.10	µg/l	86	37	101	19	<	4.0	µg/kg dw	75	20	89	-	<
4-chloor-3-methylfenol	R950	0.010	µg/l	-	-	81	13	<	5.0	µg/kg dw	-	-	not deter.	-	<
tetrabromobisphenol-A	R951	0.001	µg/l	111	46	60	10	<	0.20	µg/kg dw	93	13	116	-	<
ethinyl oestradiol	R960	-	-	-	-	-	-	-	-	-	-	-	-	-	-
oestradiol	R961	-	-	-	-	-	-	-	-	-	-	-	-	-	-
oestrone	R962	-	-	-	-	-	-	-	-	-	-	-	-	-	-
progesterone	R963	-	-	-	-	-	-	-	-	-	-	-	-	-	-
total phosphorus	R970	0.050	mg/l	-	-	99	9	<	-	-	-	-	-	-	-
total nitrogen	R971	0.50	mg/l	-	-	87	4	<	-	-	-	-	-	-	-
nitrate	R972	0.050	mg/l	-	-	89	1	<	-	-	-	-	-	-	-
total organic carbon	R973	5.0	mg/l	-	-	90	1	<	1.0	%	-	-	not deter.	-	<
phenols	R974	0.030	mg/l	-	-	100	2	<	0.020	mg/kg dw	-	-	not deter.	-	<
Particle Size % >2 µm	R975	-	-	-	-	-	-	-	1.0	%	-	-	3	-	-
Particle Size % <2 µm	R976	-	-	-	-	-	-	-	1.0	%	-	-	-	-	-
Particle Size % > 63 µm	R977	-	-	-	-	-	-	-	1.0	%	-	-	-	-	-
Particle Size % <63 µm	R978	-	-	-	-	-	-	-	1.0	%	-	-	3	-	-
Moisture content	R979	-	-	-	-	-	-	-	1.0	%	-	-	2	-	-
Aluminum	R980	-	-	-	-	-	-	-	0.10	mg/kg dw	-	-	5.9	-	<

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data biota sample analyses				method blank 75-pct
				internal standard		QC samples		
				recovery %	variance %	recovery %	variance %	
sum PCDDF TEQ	R620	2.0	ng/kg dw	-	-	-	-	
sum dioxins	R621	10	ng/kg dw	-	-	-	-	
sum furans	R622	10	ng/kg dw	-	-	-	-	
HBCD	R915	4.0	µg/kg dw	102	11	79	9	<
polychloronaphthalenes	R918	20	µg/kg dw	-	-	-	-	<
PCT	R919	2.0	µg/kg dw	-	-	-	-	<
dibutyltin	R931	1.0	µg/kg dw			89	3	<
tetrabutyltin	R932	1.0	µg/kg dw	98	4	81	7	<
triphenyltin	R933	1.0	µg/kg dw			95	8	<
tri-n-propyltin	R934	1.0	µg/kg dw			79	14	<
maneb/zineb/thiram/mancozeb	R940							
4-chloor-3-methylfenol	R950	5.0	µg/kg dw	-	-	107	2	<
tetrabromobisphenol-A	R951	0.20	µg/kg dw	102	11	99	24	<
total phosphorus	R970							
total nitrogen	R971							
nitrate	R972							
total organic carbon	R973							
phenols	R974							
total lipid		0.20	%					
moisture content		1.0	%					

Table 23 (continued). Recoveries of internal standards and results of QC samples.

Parameter	No.	LOD	Unit	QC data sheepdip sample analyses				
				internal standard		QC samples		method
				recovery	variance	recovery	variance	blank
				%	%	%	%	75-pct
triclopyr	P218	0.020	µg/l			91	10	<
atrazine		0.010	µg/l			97	11	<
diazinon		0.020	µg/l	84	13	74	19	<
alpha-cypermethrin	R257	0.020	µg/l			97	4	<
cypermethrin		0.020	µg/l					<
amitraz		-	µg/l	-	-	-	-	-
AMPA	X	0.10	µg/l	-	-	96	3	<
glyphosate	R350	0.10	µg/l	-	-	64	20	<

## 5 Conclusions

In this summary report no 2 the water and sediment samples from the target sites plus the forestry and sheep dipping samples of the SERBD Project were analysed for a large number of chemical parameters in Irish surface waters. The compound groups of interest were the Priority Action Substances, a large number of additional substances that were considered Relevant Pollutants, and a limited number of General Components. The results show that:

### *Priority Action Substances*

- Of the 51 Priority Action Substances in water, 16 compounds were not found at all, while only 2 compounds were found in more than 50% of the 40 samples that were analysed from series 21 to 29, and 8 in more than 25% of the samples. For about 12 compounds a 90-pct value is calculated indicating that the majority of compounds is found in no more than 10% of the aqueous samples. Overall, the highest concentrations were found for metals followed by the hormone disturbing compounds, than volatiles, than polycyclic aromatic hydrocarbons and pesticides.
- Of the priority Action Substances only fluoranthene and nickel were found in more than 50% of the aqueous samples. The median concentration of fluoranthene was 0.011 µg/l and for nickel was 1.1 mg/kg dw. No high concentrations were found. The pesticides atrazine, simazine and diuron are most often detected.
- In the sediment samples, that were analysed, 25 of the Priority Action Substances are not found at all, while 13 of the 51 compounds are found in more than 50% of the samples. The latter parameters mainly include polycyclic aromatic hydrocarbons, volatiles and metals with the highest concentrations found for the metals. All metals were found in every sediment sample.
- In the 4 biota samples that were analysed 37 of the Priority Action Substances are not found at all, while 12 of the 51 compounds are found in more than 50% of the samples. The latter parameters mainly include polycyclic aromatic hydrocarbons, pesticides and metals with the highest concentrations found for the pesticides. Most metals were found in every biota sample.

### *Relevant Pollutants*

- Of the 132 Relevant Pollutants determined in water, 93 were not found in any of the aqueous samples, while only 11 compounds are found in more than 50% of the 40 samples, that were analysed, and 16 in more than 25% of the samples. For about 21 compounds a 90-pct value is calculated indicating that the majority of compounds is found in no more than 10% of the aqueous samples. Overall, the highest concentrations were found for metals followed by the hormone disturbing compounds, volatiles and anions, than polycyclic aromatic hydrocarbons and pesticides.
- Relevant Pollutants found in more than 50% of the aqueous samples were MCPA, 9 metals and Chloride. The highest concentration was found for zinc, up to 283 µg/l, and barium, up to 90 µg/l. The median concentrations of these compounds were respectively 11 and 8.9 µg/l.

- For the 21 water samples from the forestry and sheep dipping target sites none of the pollutants were demonstrated, except in one case, where the pesticide atrazine was measured.
- In the sediment samples, that were analysed, 136 of the Relevant Pollutants are not found at all samples, while 24 compounds are found in more than 50% of the samples. The latter parameters mainly include metals with the highest concentrations found for aluminium, up to 61g/kg dw. All metals were found in all sediment samples. Mostly low concentrations were found in the sediment samples. This is the same as in Phase 1 of the project.
- In the 4 biota samples, that were analysed, 126 of the Relevant Pollutants are not found in all samples, while 17 of the 156 compounds are found in more than 50% of the samples. The latter parameters mainly include phthalates, metals and VOC with the highest concentrations found for the metals.
- In general, no extraordinary concentrations are found for the Relevant Pollutants in water, sediment or biota. Similar to the results reported in summary report no 1 for the Priority Action Substances most of the concentrations that are found can be found at other non-suspect locations.

## 6 QA/QC Statement

The determinations of organic parameters in this study are performed in compliance with NEN-EN-ISO/IEC 17025 and RvA accreditation no. 1, “The determination of polychlorodibenzo-p-dioxins and-dibenzofurans”; 2 “The determination of polychlorobiphenyls”; 8 “The determination of polycyclic aromatic hydrocarbons” and 19, “The development and application of methods for the determination of organic contaminants in environmental matrices, wastes and materials”. TNO Environment and Geosciences is listed in the RvA register under no. L 026.

RvA is the Dutch Council for Accreditation and is a member of the European co-operation for Accreditation (EA) and the International Laboratory Accreditation Co-operation (ILAC). In addition TNO Environment and Geosciences operates in compliance with the Quality System standard ISO 9001 (certificate no. 07246-2003-AQ-ROT-RvA).

The determinations of metals are performed by TNO Environment and Geosciences in compliance with the Quality System Standard ISO 9001 (certificate no. 07246-2003-AQ-ROT-RvA).

The determination of sum parameters and anions are performed by AL-West C.V. in compliance with NEN-EN-ISO/IEC 17025 and RvA accreditations no, 27, 35, 41, 42, 48, 49 and 51. A.L. West C.V. is listed in the RvA register under no. L005.



## 7 Signature

Name and address of the principal

Carlow County Council  
County Buildings Athy Road  
BA-County Carlow  
Carlow  
Ireland

Names and functions of the cooperators

Ing. M.M.G. Houtzager	Coordinator
Ing. H. Beeltje	Technician
Drs. R.J. van Delft	Technician
Ing. A. van Renesse	Technician
Ing. H. de Weerd	Technician
Ing. S. Walraven	Technician
Dr. B.J.H. van Os	Technician
P.G. Boshuis	Technician

Names and establishments to which part of the research was put out to contract

TNO-KvL: - Analyses of estrogens in water samples  
- HRMS analyses of dioxins in sample extracts of water and sediment samples

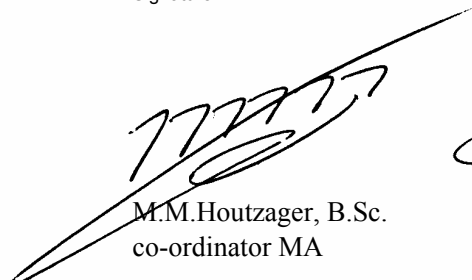
TNO-NITG: - Analyses of metals in water and sediment samples  
- Determination of particle size distribution in sediments

AL-West C.V.: - Analysis sum-parameters and anions in water samples

Date upon which, or period in which the research took place


July 2006 – December 2006

Signature:



M.M.Houtzager, B.Sc.  
co-ordinator MA

Approved by:



Dr L.A. van de Kuil  
team manager



# **1. Procedure ORG-220, “Guidelines for smapling**

Surface water, sediment and tissue”, version 1,  
date 2004/08/01, TNO Environmental, Energy and Process Innovation, Department of  
Environmental Quality

---

**Guidelines for sampling surface water, sediment and tissue**

Procedure : ORG-220  
Version/date : 1 2004/08/01  
Page no. : 1 of 19

---

**Prepared by** R.J.B. Peters  
**Authorized by** M.P. Keuken  
Head of Department  
**Date** 2004/08/01  
**Replaces** n.a.

---

**Verboden kopieën van dit werkvoorschrift te maken. Extra exemplaren kunnen worden aangevraagd bij de functionaris kwaliteitszorg van de divisie. Alleen geldig indien genummerd en met kwaliteitsstempel in rood gewaarmerkt**

---

**Exemplaar  
nr.**

---

Dutch title      Richtlijnen voor de monsterneming van oppervlaktewater, sediment en biota

---

**Contents**

- 1. Introduction
  - 2. Sampling preparation
    - 2.1 Project plans
    - 2.2 Sampling location
    - 2.3 Sampler design
    - 2.4 Cleaning methods for field equipment and sample containers
  - 3. Sampling procedure for surface water
    - 3.1 Sampler types and operation
    - 3.2 Sample collection and preservation
    - 3.3 Field quality control samples
  - 4. Sampling procedures for sediment
    - 4.1 Sampler types and operation
    - 4.2 Field sample handling
    - 4.3 Sample storage and preservation
    - 4.4 Field quality control samples
  - 5. Sampling procedures for tissue
    - 5.1 Sample collection.
    - 5.2 Sample processing
    - 5.3 Sample storage
    - 5.4 Field quality control samples
  - 6. Sample handling
    - 6.1 Sample shipment
    - 6.2 Chain of custody procedures
    - 6.3 Holding times and conditions
  - 7. Documentation and reporting
    - 7.1 Field notes
    - 7.2 Field analyses records
  - 8. Health and safety
  - 9. Import restrictions and legislation
- Appendix: Tables 1, 1a, 2 and 3

**1. Introduction**

This protocol presents guidelines for sampling surface water, sediment and tissue for the determination of chemical parameters. The guidelines include recommended sampling methodologies, quality control and quality assurance procedures, and documentation requirements. The purpose of developing sampling guidelines is to encourage the use of standardized methods by organizations and individuals involved in data generation activities in support of monitoring and regulatory programs. The use of standardized field sampling and measurement methodologies should aid in producing comparable data among future studies. It should be stressed that this document provides guidance on field sampling

methodologies. These guidelines are not intended to take the place of carefully written project planning documents.

## **2. Sampling preparation**

### **2.1 Project plans**

A prerequisite for the success of any sampling effort is the creation of a project plan. Regulatory programs all have specific project planning requirements and have available detailed guidance for the creation of project planning documents. The need for a statistical approach to sampling should never be overlooked when planning a project. Another critical aspect for project planning is the analytical laboratory that will be analyzing samples collected during the project. Laboratory input is invaluable to the success of the project. The project manager, lead field technician and analytical laboratory technician should review the project plan prior to sampling, and all sample handling personnel should be familiar with those criteria associated with their respective tasks.

### **2.2 Sampling location**

Proper sampling location positioning is a critical component of sampling and data collection. Successful positioning allows samples or data to be precisely collected from predetermined locations as well as allowing repeated sampling or data collection at the same location over time.

### **2.3 Sampler design**

A large selection of sampling devices is available for collecting surface waters and sediment samples. Sampling program requirements, along with knowledge of individual sampler characteristics, will aid in determining which type of device should provide the best performance. The types of sampling equipment

described below represent those samplers that are most frequently used.

#### ***2.3.1 Surface Water***

The main objective of surface water sampling is to obtain representative samples at an established sampling point and, if required, from a discrete depth (water column sampling). Water samples are usually collected with some type of water bottle sampler. These samplers typically consist of a cylindrical tube with stoppers at each end, along with a closing device that is activated from the surface by a messenger or an electrical signal. Water samples may also be collected with a pump, the intake of which has been deployed to a known and desired sampling depth. It is important for inner surfaces that come in contact with the sample to be made of inert, non-contaminating materials.

#### ***2.3.2 Sediment***

The main objective of sediment sampling is to obtain a sample that is closely representative of the environmental area of interest. The most often used sediment sampling devices are grab samplers and core samplers. While larger units are typically attached and deployed from a floating platform, small sample aliquots may be collected by hand if there is little or no overlying water. Sediment material may also be collected while it is still in the process of settling, the so-called suspended matter, usually through the use of sediment traps.

#### ***2.3.3 Tissue***

Over the years, a large assortment of sampling equipment has been developed to collect (marine) animals from essentially every major taxonomic group. The preferred method for sample collection will be determined by the type of organism required, and the nature of its

habitat. Primary concerns when collecting biota for chemical analyses are that the specimens are representative of the population and the geographic area being sampled and that metabolic changes are minimized during transit between sampling and analysis, i.e. that sample integrity is preserved.

## **2.4 Cleaning methods for field equipment and sample containers**

Proper cleaning of both sampling equipment and containers will enhance the representativeness of a sample by ensuring that detectable analytes are sample-related rather than equipment-related.

### **2.4.1 Laboratory cleaning of sampling equipment**

For conventional analysis, sample collection equipment should be cleaned with a phosphate-free detergent solution, followed by thorough rinses with hot tap water and analyte-free water. If oil analysis is required, equipment should also be rinsed with acetone or methanol in a well-ventilated area. If ammonia and nitrate/nitrite analysis is also required, a sulphuric acid dilution (2 percent  $\text{H}_2\text{SO}_4$ ) is to be used instead. The acids used should be of at least reagent-grade purity.

For metal analysis sampling and laboratory equipment should be thoroughly cleaned with a phosphate-free detergent solution, rinsed thoroughly with hot tap water, soaked a minimum of one hour in 2 percent  $\text{HNO}_3$ , and rinsed with analyte-free water. If sampling equipment contains metal components, those parts should be cleaned as stated above, but the acid-soak step should be omitted. If trace metals analysis is to be conducted, the water sampling bottles should not contain metal or rubber parts that could potentially contaminate the

water sample. The sampling bottles should be cleaned by first filling them with 2 percent  $\text{HNO}_3$  for at least 24 hours, followed by thorough rinsing with metal-free water.

For trace organics analyses other than volatile compounds, sample collection equipment should be cleaned with a phosphate-free detergent solution, followed by thorough rinses with hot tap water and analyte-free water. Before use, equipment should be rinsed with solvent (e.g., acetone, hexane or methanol) and air-dried. If samples are to be analyzed for volatile compounds, sampling equipment should be oven-dried at  $105^\circ\text{C}$  after the wash and water-rinse steps. A solvent rinse should be avoided to eliminate the possibility of analytical interferences. A 2 percent  $\text{HNO}_3$  soak may be used instead of the solvent rinse.

### **2.4.2 Field cleaning of sampling equipment**

Field cleaning of sediment sampling equipment and associated utensils should be conducted between sampling locations by scrubbing with a brush and phosphate-free detergent solution to remove excess sample material. The most suitable detergents would be those that leave the least amount of residue behind, especially residue containing analytes that could bias sample results. All equipment should then be thoroughly rinsed with clean *in-situ* water, followed by a second rinse with analyte-free water. At contaminated sites with high concentrations of organic compounds, a solvent rinse may also be necessary prior to the final analyte-free water rinse. It is considered acceptable to use methanol or acetone as a rinse for sampling utensils, as these solvents pose less of a threat to the environment. If trace metals analysis is to be performed on samples, a weak dilution of nitric acid (1 percent  $\text{HNO}_3$ ) may be used as a rinse. All solvent and acid rinses should be followed by thor-

ough rinses with analyte-free water. A tiered approach may be taken to equipment decontamination for sediment sampling when the expected level of contamination is known in advance.

- If the sediment represents ambient conditions, cleaning may consist of merely scrubbing the sampling equipment to remove residual sediment followed by a thorough rinsing with *in situ* water.
- If the sediment is slightly contaminated, cleaning may consist of scrubbing with a water and phosphate-free detergent mixture, followed by rinses with *in situ* water and analyte-free water.
- If the sediment is heavily contaminated, cleaning may consist of scrubbing with a water and phosphate-free detergent mixture, a rinse with *in situ* water, rinses with solvents and/or acids, and a final rinse with analyte-free water.

All cleaning fluids that include solvents or acid rinses should be properly contained and not allowed to enter the environment. Evaporation of small amounts of residual solvent into the air is acceptable.

#### 2.4.3 Laboratory cleaning of sample containers

Sample containers and lids used for conventional analysis should first be washed with a phosphate-free detergent solution, followed by thorough rinses with hot tap water and analyte-free water. For oil and grease analysis, an additional rinse with dichloromethane and drying at 105°C for 30 minutes should be added to the procedure.

For trace metals analysis, new sample containers should always be used. Sample containers and lids should be thoroughly cleaned with a phosphate-free detergent solution, thoroughly rinsed with metal-free water, soaked for 24

hours in 2 percent HNO<sub>3</sub> and rinsed with metal-free water. The acids used should be of at least reagent-grade purity.

Sample containers and lids used for semi-volatile organics analysis should first be washed with a phosphate-free detergent solution, followed by thorough rinses with hot tap water and analyte-free water. The last step should be an acetone rinse, then a final rinse using high-purity dichloromethane. The lids should be in place on the container during this rinse step (solvent in the container with the lid tightly screwed down) because the solvents may rinse plastic from the interior screw threads onto the Teflon lining. As a substitute for the solvent rinse glass containers may be heated at approximately 350°C for 4 hours. For analysis of volatile organic compounds, sample containers, screw caps, and cap septa (silicone vapour barriers) should be washed with a phosphate-free detergent, rinsed once with tap water, rinsed at least twice with analyte-free water, then dried at 105°C. A solvent rinse should generally be avoided because it may interfere with the analysis, although a methanol rinse may be acceptable.

### 3. Sampling procedures for surface water

#### 3.1 Sampler types and operation

Typical water bottle samplers are the Kemmerer bottle and the Bacon bomb sampler. Both consist of a cylindrical tube with stoppers at one or both ends, and a closing device that is activated from the surface by a messenger or an electrical signal. During deployment, the stoppers are open. After the sampler is lowered to a designated depth it should be allowed to equilibrate to ambient conditions for approximately 1 minute before it is closed. Avoid bottom disturbance and avoid deploying water bottles in obvious surface slicks as these can

contaminate samples with organic compounds. Be aware that not all surface micro-layer contamination will be in the form of visible slicks. If contamination by the surface micro-layer is of concern, use samplers that are designed to remain closed until they have descended below the micro-layer

As the water samplers are being retrieved, each bottle should be checked immediately for leakage of sample water around the seals, there should be no sample loss from any orifice. A visual inspection is usually sufficient, as the weight of the water with the bottle suspended in air will force its way around a weak seal. If the sample has been compromised a new sample should be collected.

For streams, rivers, lakes, and other surface waters, the direct method may be utilized to collect water samples from the surface directly into the sample bottle. Collect the sample under the water surface while pointing the sample container upstream; the container must be upstream of the collector. In shallow streams avoid disturbing the substrate and surface debris. When using the direct method, do not use pre-preserved sample bottles as the collection method may dilute the concentration of the preservative. Add the preservative after the sample is collected.

### **3.2 Sample collection and preservation**

The following sections describe sample collection procedures for conventionals, metals and organic parameters. Recommended sample volumes, containers, preservation techniques, and holding times for water samples are summarized in table 1 in the appendix.

#### **3.2.1 Conventional**

Water samples should be sub-sampled as soon as possible (i.e., within 15 minutes), as appreciable delay may result in unrepresentative sub-samples. For example, measurement of variables sensitive to biological alteration (e.g., dissolved oxygen, colour, nutrients, etc.), or settlement within the water sampler (e.g., suspended solids, turbidity, etc.) can be biased substantially by sub-sampling delays. Dissolved oxygen should be the first parameter collected, followed in order of priority by those parameters which would be the most affected by sub-sampling delays. It may be allowable to gently invert the sampling bottles end-over-end to homogenize the contents, but only after the dissolved oxygen sample aliquots have first been collected.

#### **3.2.2 Metals**

The recommended method for metals sample preservation depends on the type of analysis that will be conducted. Samples that will be analyzed for total metals should be acidified to pH<2 using ultra pure HNO<sub>3</sub>. Samples that will be analyzed for both dissolved and particulate metals should be filtered (0.45-µm filter) as soon as possible, within 24 hours of collection is recommended. The filtrate, which contains the dissolved fraction, should be preserved by acidifying to pH<2 using ultra pure HNO<sub>3</sub>. The particulate fraction, which is retained on the filter, is frozen for preservation.

Note that marine and estuarine water samples have high ionic strength resulting in a buffering capacity that impacts the amount of acid required for preservation. The pH of these samples should be confirmed and documented to be less than 2 at the time of preservation by pouring off a small amount of sample and checking it with short range pH paper. Excess acid should be avoided because pre-



concentration techniques for some metals analyses are strongly dependent on pH.

### **3.2.3 Organics**

For the collection of surface water, or water column samples for organics analyses the following basic guidelines are included:

- Collect samples for the analysis of volatile organic compounds first. Samples should be collected in 100 ml glass vials leaving no head space.
- Preserve water samples collected for organics analysis as soon as possible, according to the guidelines summarized in table 1 and 1a.

## **3.3 Field quality control samples**

Collection of one or more field QC samples may be required during a sampling exercise. The type and frequency of QC sample collection should be specified during the project planning process. A list of the various types of QC samples follows:

### **3.3.1 Container blank**

A container blank is prepared at the analytical laboratory by filling one of the project's sample containers with analyte-free water. The blank is retained at the laboratory and analyzed along with samples collected in the same batch of containers. Container blank results are used to evaluate any contamination present in the sample containers.

### **3.3.2 Field blank**

A field blank is a sample of analyte-free water that is supplied by the laboratory. The field blank is generated by opening the analyte-free water container at the sampling location and transferring an aliquot to another laboratory-

supplied container. The field blank may be analyzed for any or all of the analytes for which associated samples are being analyzed. Field blank results are used to measure and document any possible on-site contamination.

### **3.3.3 Preservation blank**

A preservation blank is a sample of analyte-free water that contains the same preservative used for associated samples and is analyzed for the same parameters. Analysis of the preservation blank is used to measure and document any contamination present in the preservative.

### **3.3.4 Rinsate (equipment) blank**

A rinsate blank is a sample of analyte-free water that has been used to rinse sampling equipment after prescribed cleaning procedures. The analyte-free water is supplied by the laboratory. The rinsate blank may be analyzed for any or all of the analytes for which the samples are being analyzed. Analysis of the rinsate blank is used to measure and document the effectiveness of field cleaning of sampling equipment and possible carry-over of contamination to samples collected after the rinsate blank.

### **3.3.5 Trip blank**

A trip blank is a sample of analyte-free water plus preservative that is prepared by the laboratory in a 100- ml volatile organic analysis vial. It is transported to the sampling location, remains unopened during sampling, and accompanies the samples back to the laboratory. A trip blank is submitted only when sample analysis includes volatile organic compounds. Analysis of the trip blank is used to indicate sample contamination during transport, or from bottle or sample storage, both before and after sampling.

### **3.3.6 Temperature blank**

A temperature blank is a plastic container of water that is kept in the sample cooler with analytical samples between sample collection and delivery. The temperature of this water is measured and recorded directly after receipt of the samples at the analytical laboratory. Measurement of the temperature blank is used to indicate whether proper sample temperature was maintained between sample collection and delivery to the analytical laboratory.

### **3.3.7 Field split sample**

A field split sample consists of an actual sample for which twice as much volume as necessary to fill the sample containers has been collected. Aliquots of this sample are equally distributed in two sets of sample containers. This division results in two (theoretically) equivalent samples collected from one sampling location. The field split sample is generally analyzed for the same set of analytes for which the original sample is being analyzed. Analysis of a field split sample may be performed by a second analytical laboratory; it is used to measure and document repeatability of sample handling procedures, heterogeneity of the sample matrix, and the standardization of analytical procedures.

### **3.3.8 Field replicate**

A field replicate consists of a second sample that is collected using the same sampling methodology used to obtain the first sample. It is collected at the same sampling location and as soon after the original sample as possible. The field replicate is generally analyzed for the same set of analytes as the original sample. Analysis of the field replicate is used to measure and document the repeatability of field sampling methodologies as well as the hetero-

geneity of the sample matrix. Any number of field replicates may be collected at a particular sampling location. Statistical analysis of numerical analytical results (mean and standard deviation) of the original sample and multiple replicates may also be performed to calculate the likely range of analyte concentrations at a given sampling location.

### **3.3.9 Background sample**

A background sample is collected from an area outside, but near to, the area of suspected contamination.

It should be collected using the same sampling methodology during the same time period as the other samples. The background sample may be analyzed for any or all of the chemical analytes as the regular samples. Analysis of the background sample is used to measure background concentrations of analytes of interest in the general sampling area.

## **4. Sampling procedures for sediment**

### **4.1 Sampler types and operation**

#### **4.1.1 Sediment grabs**

Grab samplers are used to collect surface sediments. In some cases, not all of the sample material within the sampler is utilized. For instance, source control and ambient monitoring sampling programs might be interested in performing trend analyses for recently deposited sediments, in which case only the top 2 cm might be required for analysis. For sediment cleanup efforts, it is a standard practice for all sampling programs to require that the top 10 cm be retained for evaluation.

There are several kinds of grab sampling devices that could be used to sample (marine)

sediments. The primary criterion for selection of an adequate sampler is that it consistently collects undisturbed samples to the required depth below the sediment surface without compromising the sample material. Stainless steel is considered to be the material of choice for the main body of the grab sampler. For actual sampling follow the vendor's instruction for the specific type of grab sampler.

The grab sampler should be cleaned between sampling locations. If information regarding contamination levels within the sampling area is available, it is recommended that samples be collected from stations starting from the least contaminated and ending with the most contaminated.

#### **4.1.2 Hand collection**

When the water is not too deep, or with a favourable tide, sediment samples may be collected by hand. Care should be taken when collecting samples by hand that sediments are not transported from one station to another on boots, gloves, or sampling implements.

Sediment samples may be collected by hand with a variety of sampling implements such as spoons or trowels for surface sediments, or with hand augers or corers for collecting sediments at discrete depths. Any sampling implement that comes into contact with the sample should be constructed of stainless steel or Teflon. Sampling equipment should be thoroughly cleaned between sampling locations

#### **4.1.3 Suspended matter traps**

Sampling and analysis of suspended particulate matter (SPM) provides useful data for studies of sedimentation rates and re-suspension of bottom sediments. SPM may be collected successfully through the use of sediment traps.

Sediment traps for the collection of small samples (typically <1 g) include flat containers, bottles, jars, plastic bags, funnels, and cylinders (often containing lids or collars). When larger sample sizes (typically >10 g) are needed special centrifuges are used to separate the SPM from the water.

#### **4.2 Field sample handling**

After the sample is retrieved, overlying water (grab sampler) is carefully siphoned off. During or before the sample material is removed, field measurements and observations should be noted and recorded, if required. Field measurements may include pH, redox, specific conductivity, pore water salinity and field screening for grain size. Observations may include a determination of visual/textural soil characteristics and descriptions of visible fauna, the presence of debris, and evidence suggesting the presence of contaminants such as oil sheen, paint chips, etc.

Sample material for volatile organic or sulphide compound analysis must be collected out of the grab sampler from the first successful deployment and sample containers must be filled immediately, prior to any homogenization. Sample containers for volatile analyses should have no headspace. To avoid leaving headspace in the containers, sample containers can be filled in one of two ways. If there is adequate water in the sediment, the container should be filled to overflowing so that a convex meniscus forms at the top. Once sealed, the bottle should be inverted; no headspace will be demonstrated by the absence of air bubbles. If there is little or no water in the sediment, jars should be filled as tightly as possible, eliminating obvious air pockets. With the cap liner's PTFE side down, the cap should be carefully placed on the opening of the vial, displacing any excess material.

Once the volatile sub-samples have been removed, the sample is thoroughly homogenized with a stainless steel utensil until a uniform colour and texture are achieved. Homogenization is important, especially when the contents from several sediment samplers must be combined to provide sufficient material for testing. After homogenization, the remaining sub-samples are transferred to appropriate containers and preserved as required. Samples that are to be stored frozen require a minimum of 2 cm of head space in the sample container. If these procedures are not feasible in the field, the entire sample should be transported to the laboratory in ice chests as soon after collection as possible. The sample should be kept in a tightly closed, inert glass container (or plastic if no organics are to be analyzed) and be maintained at approximately 4°C until received by the analytical laboratory.

SPM samples are collected by retrieving the traps and removing the overlying water in the collection cylinders using a peristaltic pump. The water immediately overlying the trapped sediment is analyzed to determine the salinity and the presence of preservative to determine if the trap was disturbed during deployment. The SPM is transferred to sample containers and taken to an analytical laboratory for processing. The particulate fraction of the SPM is removed by centrifuge and split into sample aliquots for chemical analysis.

#### **4.3 Sample storage and preservation**

Preservation of sediment samples is generally limited to specified storage conditions such as refrigeration or freezing. Depending on the parameter to be analyzed, some samples will require addition of chemical preservatives. Preservation techniques are summarized in table 2. Care should be taken to avoid exposure to acid gases which might be released

when chemical preservatives are added to sediment samples in the field.

#### **4.4 Field quality control samples**

Collection of one or more field QC samples may be required during a sediment sampling exercise. The type and frequency of QC sample collection should be specified during the project planning process. In general, the same QC samples as in the water sampling can be used in sediment sampling.

### **5. Sampling procedures for tissue**

#### **5.1 Sample collection**

The methods used to obtain tissue specimens will vary, based upon the species of interest, since most taxonomic groups are habitat specific. For example, it is usually most practical to collect salmon and other free-swimming species through the use of some type of commercial fishing gear. One common problem with these kinds of species is that, due to their mobility, it is hard to determine if the individuals collected are truly representative of the population. Shellfish and other intertidal taxa can be hand-collected using a large size grab sampler or on a favourable tide. Only intact specimens should be retained for analysis.

To avoid contamination wrap whole samples (e.g., molluscs in shell, whole fish) in aluminium foil (dull side in) and place in watertight plastic bags in a covered ice chest, with ice. Organisms should not be frozen prior to resection if internal organs are included in the analysis, as freezing may cause some internal organs to rupture and contaminate other tissues. If organisms are eviscerated in the field, the remaining tissue may be wrapped as previously described and frozen. The aluminium foil may be pre-cleaned with acetone or heat-

treated prior to use if low-level trace organic analyses are to be performed. If low-level trace metals analysis (especially of aluminium) will be performed on the tissue sample, it is recommended that an alternative to aluminium foil be considered such as pre-cleaned polypropylene sheets.

## **5.2 Sample processing**

### ***5.2.1 Sample resection and sub-sampling***

Organisms should not be frozen prior to resection if internal organs are included in the analysis, as freezing may cause some internal organs to rupture and contaminate other tissues. Tissue resection and any sub-sampling of specimens should be conducted in a dust free environment. In most cases, this requires that organisms be transported on ice to a laboratory, rather than being dissected in the field. Resection must be conducted by or under the supervision of a knowledgeable biologist. For fish samples, special care must be taken to avoid contaminating target tissues (especially muscle) with slime and sediment from the fish skin during resection. The incision troughs are subject to such contamination and should not be included in the sample. In the case of muscle, a core of tissue is taken from within the area bordered by the incision troughs, without contacting them.

### ***5.2.2 Metals***

The best equipment to use on tissue samples intended for trace metal analyses is made of quartz, polypropylene, polyethylene, fluoropolymers or ceramics. Stainless steel that is resistant to corrosion may be used if necessary. Stainless steel scalpels have been found not to contaminate mussel samples but other biological tissues (e.g. fish muscle) may be contaminated by exposure to stainless steel. To mini-

mize contamination when dissecting tissue, separate sets of utensils should be used for removing outer tissue vs. removing tissue intended for analysis.

Tissue samples intended for metals analysis should be stored in pre-cleaned polyethylene or glass containers. Container lids must not have aluminium or cardboard liners. The recommended material for container lid liners is PTFE.

### ***5.2.3 Organics***

To avoid cross-contamination, all equipment used in sample handling should be thoroughly cleaned before each sample is processed. All instruments must be of a material that can be easily cleaned (e.g., stainless steel, anodized aluminium, borosilicate glass). Before the next sample is processed, instruments should be cleaned (e.g., washed with a detergent solution, rinsed with tap water, soaked in high-purity acetone or dichloromethane, and finally rinsed with analyte-free water). Work surfaces should be cleaned with 95 percent ethanol or other similar cleaning agent and allowed to dry completely.

The removal of biological tissues should be carried out by skilled persons that have been trained by an experienced biologist. Tissue should be removed with clean stainless steel or quartz instruments (except for external surfaces of the specimen). The specimens should come into contact with pre-cleaned glass surfaces only. The use of polypropylene, polyethylene, and other plastic surfaces are a potential source of contamination and should not be used. To control contamination when dissecting tissue, separate sets of utensils should be used for removing outer tissue and for dissecting tissue for analysis.

The tissue sample should be placed in a clean glass or PTFE container (e.g., containers that have been washed with detergent, rinsed at least once with tap water, rinsed at least twice with analyte-free water, rinsed with acetone, and, finally, rinsed with high-purity dichloromethane). Heating of the glass jar at 350°C for 4 hours may be substituted for the final solvent rinse. Jars used to store samples intended for volatile organic analysis should not be solvent rinsed but instead, should be heated to a temperature of 105°C as a final preparation step.

### 5.3 Sample storage

Recommended sample storage conditions for metal and organic analyses are summarized in Table 3. Dissected tissues should be stored frozen at -18°C until analysis. Tissue samples intended for analysis of both metals and organic compounds can be stored in glass containers. Because of the potential rupture of tissue cells upon freezing, liquid associated with the sample when thawed must be maintained as part of the sample or extracted separately and combined with the tissue extract.

No holding time criteria for frozen tissue samples are specified but a 1-year maximum holding time (similar to the sediment holding time) is recommended by the American EPA. Extracts should be analyzed within 40 days. At a minimum, the samples should be kept frozen at -18°C until extraction. This temperature will slow biological decomposition of the sample and decrease loss of moisture.

### 5.4 Field quality control samples

Field QC procedures for tissue sampling and processing are limited to minimization of contamination described in previous sections. Field QC samples collected as a check for contamination may include equipment and con-

tainer blanks. Field replicate samples are generally specified in the project planning and may be included as a check of sample variability rather than a check of sampling methodology.

## 6. Sample handling

### 6.1 Sample shipment

All samples should be shipped or delivered to the analytical laboratory as soon as possible after completion of sampling. This minimizes the number of people handling samples and protects sample quality and security. The following guidelines apply to water and sediment samples. Shipping protocols for tissue samples will most likely be project specific and should be stated in the project planning document. As samples are prepared for shipping, the following guidelines should be observed.

- Shipping containers should be in good shape and capable of withstanding rough treatment during shipping.
- Samples should be packed tightly with dividers separating all glass containers and empty space within shipping boxes filled so that jars are held securely.
- Sample coolers should be packed with ice to maintain an ambient sample temperature of approximately 4°C until delivery to the analytical laboratory. Either “water” ice or synthetic “blue” ice may be used in shipping. Both types of ice should be packaged in a manner that will preclude leaking inside the sample cooler. A temperature blank (see 3.3.6) or temperature data logger may be placed in the sample cooler along with the analytical samples.
- All coolers must be leak proof.
- All samples should be accompanied by a sample registration form.

- The analysis request form should be protected from damage and placed inside the shipping box. A copy should be retained by the shipping party.
- For shipping containers carrying glass sample containers a "This End Up" label should be attached to each side to ensure that jars are transported in an upright position and a "Fragile-Glass" label should be attached to the top of box to minimize agitation of samples.
- Shipping containers should be sent by a carrier that will provide a delivery receipt. This will confirm that the contract laboratory received the samples and serve as a backup to the chain of custody record.

## 6.2 Sample registration form

Many projects will require some kind of a "chain of custody" procedure. Chain of custody in this case is defined as "*an unbroken trail of accountability that ensures the physical security of samples, data, and records*". Field chain of custody procedures should be followed from the time a sample is collected until it is received by the analytical laboratory (either in person or to a shipper). To maintain this chain of custody, sample registration forms should be prepared starting when the first sample is collected and updated continuously through the sampling event. A new form should be used for each day of field sampling. Information to be entered on the form should include sample number, date, time and location of sampling, names of sampling personnel. The form may also include type of sample container and requested analyses.

When samples are prepared for shipment to the laboratory, the sample registration form should be completed by the sample deliverer. It should include the printed and signed name of the deliverer, the organization that person represents, date and time of sample transport, and method of shipment, if appropriate.

Upon receipt of samples, a designated laboratory employee should fill out the sample registration form, indicating time and date of reception, number of samples and condition of samples including sample size, container type and preservation. All irregularities indicating that sample security or quality may have been jeopardized (e.g., evidence of tampering, loose lids, cracked jars) should be noted on the sample registration form. In addition, the laboratory should initiate and maintain the sample tracking log that will follow each sample through all stages of laboratory processing and analysis.

An example of a Sample registration form is given in figure 1 in the appendix.

## 6.3 Holding times and conditions

Observance of proper holding times and conditions during sample shipment and prior to laboratory analysis is critical to obtaining quality data from a sampling effort. As soon as possible after collection, samples should be stored in refrigerators (if available) or ice filled, insulated coolers to maintain an ambient temperature of approximately 4°C until receipt by the analytical laboratory. Sample holding times and conditions for specific matrices and analyses are outlined in Tables 1, 1a, 2 and 3.

## 7. Documentation and reporting

### 7.1 Field notes

Field notes should be maintained for all field activities, whether the collection of samples or the gathering of environmental data. Information recorded in field notes for water samples may include, but not be limited to:

- Name of recorder
- Date and time of sample or data collection

- Sample location
- Sample elevation (water depth above the surface of the sediment) and sampling interval (i.e., 0 to 10 cm)
- Record of splits, replicates and subsamples taken
- Physical characteristics such as gross particle size distribution, debris, odour or evidence of contamination such as a visible sheen or discoloration
- Physical measurements such as temperature, salinity, transparency, pH, and redox
- Ambient climatological characteristics such as air temperature, cloud cover, and precipitation.

Other information that may be recorded in field notes includes sampling methodology and any deviations from established sampling protocols. Additional anecdotal information pertaining to observations of unusual sampling events or circumstances may be recorded in field notes. A field book should be unique to the project or, at the very least, to a class of field events, such as sediment sampling.

## 7.2 Field analyses records

Some parameters, like dissolved oxygen and a few others are best measured in the field. These field analyses provide project information that is as important as data generated by laboratory analyses. Results of field analyses or measurements should be recorded in a manner that provides easy identification of the information as analytical results. This information should be kept in a section of a field book separate from general field notes. In addition to field analytical results or measurements, field instrument calibration records provide critical information to allow data users to judge the validity of field measurements and analyses.

## 8. Health and safety

In some areas, contact with sediment may present a health hazard from chemical and/or biological constituents of the sediment. Possible routes of exposure to chemical/biological hazards include inhalation, skin and mucous membrane absorption, ingestion, and injection. Potentially hazardous chemical/biological sediment constituents may include cyanide, hydrogen sulphide, mercury and other heavy metals, poly aromatic hydrocarbons, polychlorinated biphenyls, solvents, and various types of bacteria and viruses. Other potentially hazardous substances may include chemicals used as sample preservative agents or sampler cleaning agents.

## 9. Import restrictions and legislation

The importation of biota, sediment and soil samples from countries outside the European Union is prohibited. The receiving analytical laboratory must be inspected by the Dutch Plantenziektenkundige Dienst of the Ministry of Agriculture and have an accreditation according to 95/44/EU. Each sample shipment should be accompanied by a valid import licence that is provided by the Plantenkundige Dienst to the analytical laboratory. The dated and signed licence should be sent to the commissioner or project manager who is sending in the samples, and should be part of the shipping documents included with the samples. This licence is necessary for customs clearance upon arrival in the Netherlands.

The Plantenkundige Dienst can be reached at the following address:

Ministerie van Landbouw, Natuur en Voedselkwaliteit  
Plantenziektenkundige Dienst  
Engelsekamp 6  
9722 AX Groningen  
telefoon: 050 5201750



fax: 050-5201780

**Guidelines for sampling surface water, sediment and tissue**

Procedure : ORG-220  
Version/date : 1 2004/08/01  
Page no. : 15 of 19

**Table 1: Recommended sample sizes, containers, preservation techniques, and holding times for water.**

Parameter	Minimum Sample Size (ml) <sup>A</sup>	Container	Preservation technique	Holding time
Alkalinity	100	Glass or polyethylene	Refrigerate, 4°C	14 days
Total Hardness	100	Glass or polyethylene	Refrigerate, 4°C HNO <sub>3</sub> to pH<2	6 months
Total Phosphorous	50	Glass or polyethylene	Refrigerate, 4°C H <sub>2</sub> SO <sub>4</sub> to pH<2	28 days
Orthophosphate	50	Glass or polyethylene	Refrigerate, 4°C filter on site	7 days
Total nitrogen	50	Glass or polyethylene	Refrigerate, 4°C	7 days
TOC	100	Glass or polyethylene	Refrigerate, 4°C	7 days
BOD	100	Glass or polyethylene	Refrigerate, 4°C	7 days
COD	100	Glass or polyethylene	Refrigerate, 4°C	7 days
Electrical conductivity	25	Glass or polyethylene	none	analyze immediately <sup>B</sup>
pH	25	Glass or polyethylene	none	analyze immediately <sup>B</sup>
Salinity	200	Glass or polyethylene	none	28 days
Turbidity	100	Glass or polyethylene	none	analyze immediately <sup>B</sup>
Suspended solids	1000	Glass or polyethylene	Refrigerate, 4°C	14 days
Dissolved oxygen	125	Glass	none	analyze immediately <sup>B</sup>
Ammonia	100	Glass or polyethylene	Refrigerate, 4°C H <sub>2</sub> SO <sub>4</sub> to pH<2	28 days
Nitrite	100	Glass or polyethylene	Refrigerate, 4°C	7 days
Nitrate	100	Glass or polyethylene	Refrigerate, 4°C	7 days
Volatile organics	100	Glass vials, no headspace	Refrigerate, 4°C	14 days <sup>C</sup>
Semivolatile organics	1000	Glass	Refrigerate, 4°C	14 days <sup>C, D</sup>
Metals	250	Polyethylene	Refrigerate, 4°C HNO <sub>3</sub> to pH<2 <sup>E</sup>	6 months <sup>F</sup>

<sup>A</sup>: Minimum sample size for one analysis. If additional QC analyses are required, the sample size should be adjusted accordingly

<sup>B</sup>: Immediately means as soon as possible after the sample is collected, generally within 30 minutes. These parameters should ideally be measured in the field

<sup>C</sup>: Holding time to extraction. After extraction, holding time is 40 days to analysis

<sup>D</sup>: Pesticides do need specific types of preservation techniques apart from refrigeration

<sup>E</sup>: Samples for total metals should be preserved within 24 hours of sample collection. Samples for dissolved metals must be preserved **after** filtration

<sup>F</sup>: Holding time for mercury is 28 days since it is volatile

**Guidelines for sampling surface water, sediment and tissue**

Procedure : ORG-220  
Version/date : 1 2004/08/01  
Page no. : 16 of 19

***Table 1a: Recommended sample sizes, containers, preservation techniques, and holding times for pesticides in water.***

Parameter	Minimum Sample Size (ml) <sup>A</sup>	Container	Preservation technique	Holding time
Pesticides general	1000	Glass	Refrigerate, 4°C: add 1 ml of glacial acetic acid per litre sample	14 days <sup>B</sup>
Glyphosate, gluphosinate, AMPA	50	Polypropylene or polyethylene	Refrigerate, 4°C	14 days <sup>B</sup>
Paraquat, diquat	50	Polypropylene or polyethylene	Refrigerate, 4°C	14 days <sup>B</sup>

<sup>A</sup>: Minimum sample size for one analysis of resected, homogenized tissue. If additional QC analyses are required, the sample size should be adjusted accordingly

<sup>B</sup>: Holding time to extraction. After extraction, holding time is 40 days to analysis

**Guidelines for sampling surface water, sediment and tissue**

Procedure : ORG-220  
Version/date : 1 2004/08/01  
Page no. : 17 of 19

**Table 2: Recommended sample sizes, containers, preservation techniques, and holding times for sediment.**

Parameter	Minimum Sample Size (g) <sup>A</sup> (wet wt.)	Container	Preservation technique	Holding time
Particle size	100 <sup>B</sup>	Glass or polyethylene	Refrigerate, 4°C	6 months
Dry weight	10	Glass or polyethylene	Freeze, -18°C	6 months
			Refrigerate, 4°C	14 days
TOC	25	Glass or polyethylene	Freeze, -18°C	6 months
			Refrigerate, 4°C	14 days
Total sulfides	50	Glass or polyethylene	Refrigerate, 4°C	14 days
Total nitrogen	25	Glass or polyethylene	Refrigerate, 4°C	28 days
Volatile organics	50	Glass (no headspace)	Refrigerate, 4°C	14 days <sup>C</sup>
Semivolatile organics	200	Glass	Freeze, -18°C	1 year <sup>C</sup>
			Refrigerate, 4°C	14 days <sup>C</sup>
Organotins	100	Glass	Freeze, -18°C	1 year <sup>C</sup>
			Refrigerate, 4°C	14 days <sup>C</sup>
Metals	50	Polyethylene	Freeze, -18°C	2 years
			Refrigerate, 4°C	6 months <sup>D</sup>

<sup>A</sup>: Minimum sample size for one analysis. If additional QC analyses are required, the sample size should be adjusted accordingly

<sup>B</sup>: Sandier sediments require larger sample sizes than do muddier sediments

<sup>C</sup>: Holding time to extraction. After extraction, holding time is 40 days to analysis

<sup>D</sup>: Holding time for mercury is 28 days since it is volatile

**Guidelines for sampling surface water, sediment and tissue**

Procedure : ORG-220  
Version/date : 1 2004/08/01  
Page no. : 18 of 19

***Table 3: Recommended sample sizes, containers, preservation techniques, and holding times for tissue.***

Parameter	Minimum Sample Size (g) <sup>A</sup>	Container	Preservation technique	Holding time
Volatile organics	10	Glass	Freeze, -18°C <sup>B</sup>	14 days <sup>C</sup>
Semivolatile organics	50	Glass	Freeze, -18°C <sup>B</sup>	1 year <sup>C</sup>
Organotins	50	Glass	Freeze, -18°C <sup>B</sup>	1 year <sup>C</sup>
Metals	25	Polyethylene	Freeze, -18°C <sup>B</sup>	2 years <sup>D</sup>

<sup>A</sup>: Minimum sample size for one analysis of resected, homogenized tissue. If additional QC analyses are required, the sample size should be adjusted accordingly

<sup>B</sup>: Freeze after resection

<sup>C</sup>: Holding time to extraction. After extraction, holding time is 40 days to analysis

<sup>D</sup>: Holding time for mercury is 28 days since it is volatile



Page \_\_\_\_\_ of \_\_\_\_\_

### SAMPLE REGISTRATION FORM

[illegible]

Relinquished by: (Signature)	Received by: (Signature)	Date	Time	Relinquished by: (Signature)	Received by: (Signature)	Date	Time
Matrix codes: A = Air            BI = Biota S = Soil          SD = Sediment W = Water       M = Materials		Container Type: G = Glass P = Plastic Z = Ziplock		Remarks:  Shipping Company:                      Way Bill:			

## **2 Procedure CC-SERBD, “Sample requirements**

For Carlow County SERBD Project”, version 1,  
Date 2005/02/10, TNO Environmental, Energy and Process Innovation, Department of  
Environmental Quality

---

**Sampling/ sample requirements for Carlow County SERBD Project**

Procedure : CC-SERBD  
Version/date : 1 2005/02/10  
Page no. : 1 of 9

---

**Prepared by** R.J.B. Peters  
**Authorized by** M.P. Keuken  
Head of Department  
**Date** 2005/02/10  
**Replaces** n.a.

---

**Verboden kopieën van dit werkvoorschrift te maken. Extra exemplaren kunnen worden aangevraagd bij de functionaris kwaliteitszorg van de divisie. Alleen geldig indien genummerd en met kwaliteitsstempel in rood gewaarmerkt**

---

Dutch title Richtlijnen voor monsters in het Carlow County SERBD Project

## Contents

1. Introduction
2. Samples for General components
  - 2.1 Water
  - 2.2 Sediment
  - 2.3 Biota
3. Samples for Priority/Relevant components
  - 3.1 Water samples
  - 3.2 Sampling water
  - 3.3 Sediment samples
  - 3.4 Sampling sediment
  - 3.5 Biota
4. Sample handling
  - 4.1 Sample conservation
  - 4.2 Holding time and conditions
  - 4.3 Sample shipment
  - 4.4 Sample registration form
5. Health and safety

Appendix: Tables 1, 2, 3 and 4. Figure 1

## 1. Introduction

This protocol describes the samples that should be collected within the Carlow County SERBD Project. Sample sizes, type of containers and

conservation, holding times and sample container labels are described.

## 2. Samples for General components

### 2.1 Water samples

A list of samples and the parameters that should be determined is given in table 1 in the appendix. The following parameters are best measured in the field:

- dissolved oxygen
- temperature
- pH
- electrical conductivity
- salinity
- transparency
- turbidity

Alternatively, turbidity may be measured in the laboratory within 48 hours after re-homogenization of the sample.

The other parameters in table 1 will be measured in the Kilkenny laboratory. Sample sizes are estimated but may be different for the Kilkenny laboratory.

### 2.2 Sediments samples



---

**Sampling/ Sample requirements for Carlow County SERBD Project**

Procedure : CC-SERBD  
Version/date : 1 2005/02/10  
Page no. : 2 of 9

---

There is no need to collect separate samples for the Sediment General components. These determinations are carried out using the samples collected for the Priority/Relevant components.

### **2.3 Biota samples**

There is no need to collect separate samples for the Biota General components. These determinations are carried out using the samples collected for the Priority/Relevant components.

## **3. Samples for Priority/Relevant components**

### **3.1 Water samples**

A list of samples and the parameters groups that should be determined is given in table 2 in the appendix. Note that the sample for dissolved metals should be filtered (0.45 µm) prior to conservation. The filtration can be combined with the determination of suspended solids (see 2.1) in the Kilkenny laboratory.

A letter code, A to H, is used for identification of the parameter groups that should be determined in the samples. This letter code corresponds with the letters on the sample bottles. Mark the appropriate letter on the sample bottle label with a permanent marker.

### **3.2 Sampling water**

For sampling deep water the Bacon bomb sampler is used. The sampler consist of a cylindrical tube with stoppers at both ends and a closing device that is activated manually by the operator. During deployment the stoppers are open. After the sampler is lowered to a depth of about half the water column it should be allowed to equilibrate for approximately 1 minute before it is closed. Avoid bottom disturbance as they can contaminate samples with organic compounds. After finishing the sam-

pling the sample is transferred to the final sample bottle (see for further sample handling, section 4 and table 1 and 2). For shallow streams ,rivers, and other surface water, the direct method may be utilised to collect water samples from the surface directly into the sampling bottles. Collect the sample under the water surface while pointing the sample container upstream: the bottle must be upstream of the technician. In shallow streams avoid disturbing the surface layer. When using the direct method, do not use pre preserved sample bottles as the collection method may dilute the concentration of the preservative. Ad the preservative after the sample is collected.

### **3.3 Sediment samples**

A list of samples and the parameters groups that should be determined is given in table 3 in the appendix.

A letter code, A to C, is used for identification of the parameter groups that should be determined in the samples. This letter code corresponds with the letters on the sample bottles. Mark the appropriate letter on the sample bottle label with a permanent marker.

### **3.4 Sampling sediment**

For sampling of sediment the van Veen grab samplers is used. For sampling the sediment only 0-10 cm of the toplayer has to be sampled. The Grab sampler is self operating when lowered to the sediment, they will close automatically when lifted. The sampler consists of 2 hinged grabs with arms. By means of a lock mechanism the grab is in open condition transported to the ground surface of the sediment. When the grab is in contact with the sediment the lock mechanism is uncoupled and by pulling up the grab both cups are closed and the sample has been collected. When stones are

trapped between the jaws, it is possible that the sampler didn't penetrate far enough into the sediment, in this case it is advisable to collect a new sample. When the water is not too deep Sediment samples may be collected by hand with hand augers. Sampling equipment should be thoroughly cleaned between (river water) different sampling locations. To obtain a representative sample, take three sub samples on close distance to each other and homogenize the sub samples in a box and mix the sample until a homogenize colour of the mixture is obtained. Transfer the sediment to the final bottles ((see for further sample handling section 4 and table 3).

### 3.5 Biota samples

A list of samples and the parameters groups that should be determined is given in table 3 in the appendix.

A letter code, A to C, is used for identification of the parameter groups that should be determined in the samples. This letter code corresponds with the letters on the sample bottles. Mark the appropriate letter on the sample bottle label with a permanent marker.

## 4. Sample handling

### 4.1 Sample conservation

Sample conservation should take place as early as possible. Sample conservation chemicals may be added to the sampling bottles prior to collection of the samples, but this is often not very practical. Most times conservation chemicals are added directly after collection of the samples. Note that for dissolved metals conservation should take place after filtration of the samples. The method of conservation for each type of sample is given in the tables in the appendix.

### 4.2 Holding times and conditions

Observance of proper holding times and conditions during sample shipment and prior to laboratory analysis is critical to obtaining quality data from a sampling effort. As soon as possible after collection, samples should be stored in refrigerators (if available) or ice filled, insulated coolers to maintain an ambient temperature of approximately 4°C until receipt by the analytical laboratory. Sample holding times and conditions for specific matrices and analyses are outlined in the tables in the appendix.

### 4.3 Sample shipment

All samples should be shipped or delivered to the analytical laboratory as soon as possible after completion of sampling. This minimizes the number of people handling samples and protects sample quality and security. As samples are prepared for shipping, the following guidelines should be observed.

- Shipping containers should be in good shape and capable of withstanding rough treatment during shipping.
- Samples should be packed tightly with dividers separating all glass containers and empty space within shipping boxes filled so that jars are held securely.
- Sample should be cool (4°C) prior to packing and additional coolers should be added in order to maintain an ambient sample temperature of approximately 4°C until delivery to the analytical laboratory.
- All coolers must be leak proof.
- All samples should be accompanied by a sample registration form placed inside the shipping box. A copy should be retained by the shipping party.
- For shipping containers carrying glass sample containers a "This End Up" label should be attached to each side to ensure

---

**Sampling/ Sample requirements for Carlow County SERBD Project**

Procedure : CC-SERBD  
Version/date : 1 2005/02/10  
Page no. : 4 of 9

---

that jars are transported in an upright position and a "Fragile-Glass" label should be attached to the top of box to minimize agitation of samples.

- Shipping containers should be sent by a carrier that will provide a delivery receipt. This will confirm that the contract laboratory received the samples and serve as a backup to the chain of custody record.

#### **4.4 Sample registration form**

When samples are prepared for shipment to the laboratory, the sample registration form should be completed by the sample deliverer. It should include the printed and signed name of the deliverer, the organization that person represents, date and time of sample transport, and method of shipment, if appropriate.

Upon receipt of samples, a designated laboratory employee should fill out the sample registration form, indicating time and date of reception, number of samples and condition of samples including sample size, container type and preservation. All irregularities indicating that sample security or quality may have been jeopardized (e.g., evidence of tampering, loose lids, cracked jars) should be noted on the sample registration form. In addition, the laboratory should initiate and maintain the sample tracking log that will follow each sample through all stages of laboratory processing and analysis.

An example of a Sample registration form is given in figure 1 in the appendix.

#### **5. Health and safety**

In some areas, contact with sediment may present a health hazard from chemical and/or biological constituents of the sediment. Possible routes of exposure to chemical/biological hazards include inhalation, skin and mucous mem-

brane absorption, ingestion, and injection. Potentially hazardous chemical/biological sediment constituents may include cyanide, hydrogen sulphide, mercury and other heavy metals, poly aromatic hydrocarbons, polychlorinated biphenyls, solvents, and various types of bacteria and viruses. Other potentially hazardous substances may include chemicals used as sample preservative agents or sampler cleaning agents.

**Sampling/ sample requirements for Carlow County SERBD Project**

Procedure : CC-SERBD  
Version/date : 1 2005/02/10  
Page no. : 4 of 8

***Table 1: Water, General components: Sample sizes, containers, preservation techniques, and holding times.***

Parameters	Sample size (ml)	Container	Conservation	Holding time
Dissolved oxygen, temperature, pH, electrical conductivity, salinity, (transparency)	field measurements	na	na	analyze immediately
Turbidity (best in the field, but may be done in the lab)	100	Glass or PE	refrigerate 4°C	48 hours, homogenize before analyses
Suspended solids	1000	Glass or PE	refrigerate 4°C	14 days, homogenize before analyses
Alkalinity, nitrate, nitrite, BOD, COD	1000	Glass or PE	refrigerate 4°C	7 days
Ammonia	100	Glass or PE	pH<2 using H2SO4, refrigerate 4°C	7 days
Soluble reactive phosphorous	100	Glass or PE	filter on site, refrigerate 4°C	7 days

**Sampling/ sample requirements for Carlow County SERBD Project**

Procedure : CC-SERBD  
Version/date : 1 2005/02/10  
Page no. : 4 of 8

**Table 2: Water, Priority/Relevant components: Sample sizes, containers, preservation techniques, and holding times.**

Parameters	Sample size (ml)	Container	Conservation	Holding time	Sample label
					<b>W-</b>
BFR, Dioxine, PCB en PCT, PCA, PCN	1000	Glass	refrigerate 4°C	28 days	<b>A</b>
Amines, Dithiocarbamates, Industry chem., Organotin	1000	Glass	refrigerate 4°C	14 days	<b>A</b>
Spare water sample	1000	Glass	refrigerate 4°C	14 days	<b>A</b>
Volatile organics	100	Glass (vial)	no headspace, regrigerate 4°C	14 days	<b>B</b>
Metals (dissolved)	100	Polyethylene	filter on site, pH<2 using HNO <sub>3</sub> , refrigerate 4°C or freeze	6 months	<b>C</b>
PAH, Pesticides, (alkyl)Phenols, Phthalates	1000	Glass	add 1 ml of glacial acetic acid, refrigerate 4°C	14 days	<b>D</b>
Glyphosate, Paraquat, Estrogens	250	Polypropylene (or polyethylene)	refrigerate 4°C	14 days	<b>E</b>
TOC, Total nitrogen	500	Polyethylene	refrigerate 4°C	7 days	<b>F</b>
Total phosphorous	100	Polyethylene	pH<2 using H <sub>2</sub> SO <sub>4</sub> , refrigerate 4°C	7 days	<b>G</b>
Cyanide	100	Polyethylene	pH>8 using NaOH, refrigerate 4°C	7 days	<b>H</b>

**Sampling/ sample requirements for Carlow County SERBD Project**

Procedure : CC-SERBD  
Version/date : 1 2005/02/10  
Page no. : 4 of 8

***Table 3: Sediment, Priority/Relevant components: Sample sizes, containers, preservation techniques, and holding times.***

Parameters	Sample size (g wet weight)	Container	Conservation	Holding time	Sample label
					S-
Particle size, semivolatile organics, TOC	400	Glass	refrigerate 4°C	14 days	A
Volatile organics	100	Glass	no headspace or as small as possible, refrigerate 4°C	14 days	B
Metals	100	Polyethylene	refrigerate 4°C or freeze	6 months	C

**Sampling/ sample requirements for Carlow County SERBD Project**

Procedure : CC-SERBD  
Version/date : 1 2005/02/10  
Page no. : 4 of 8

*Table 4. Biota, Priority/Relevant components: Sample sizes, containers, preservation techniques, and holding times.*

Parameters	Sample size (g wet weight)	Container	Conservation	Holding time	Sample label
					<b>B-</b>
Semivolatile organics	200	Glass	freeze -18°C	1 year	<b>A</b>
Volatile organics	50	Glass	freeze -18°C	14 days	<b>B</b>
Metals	100	Polyethylene	freeze -18°C	1 year	<b>C</b>

Note: dissection if necessary should take place before freezing

**Sampling/ sample requirements for Carlow County SERBD Pro-  
ject**

Procedure : CC-SERBD  
Version/date : 1 2005/02/10  
Page no. : 4 of 8

**Figure 1. Example of a Sample registration form**

**TNO ENVIRONMENT, ENERGY AND PROCESS INNOVATION  
DEPARTMENT OF ENVIRONMENTAL QUALITY**



Laan van Westenenk 501, 7334 DT, Apeldoorn, The Netherlands

Tel: +31 55 5493811

Fax: +31 55 5493252

Page \_\_\_\_\_ of \_\_\_\_\_

**SAMPLE REGISTRATION FORM**

Client name:		Project name:		Preservative	Number / Type of Container	Matrix Code	Test Required					Comments / Remarks
Contact name:		Sampler's signature:										
Collection		Sample Identification / Description										
Date	Time											

Relinquished by: (Signature)		Received by: (Signature)		Date	Time	Relinquished by: (Signature)		Received by: (Signature)		Date	Time
Matrix codes: A = Air      BI = Biota S = Soil      SD = Sediment W = Water      M = Materials				Container Type: G = Glass P = Plastic Z = Ziplock		Remarks: Shipping Company:      Way Bill:					



### **3 Full results of all water, sediment samples and samples from the forestry and sheep dipping sites**

The tables in this appendix show all results of the analysis of the received water samples of series 21 to 29, sediment series 9, biota samples series 3 and 4 and water samples of the forestry and sheep dipping sites, series 1 to 7. The results are grouped per series of samples, e.g. water series 21 to 29. The parameters are listed in the same order as in the electronic reports. Results below the detection limit are indicated as a “<”sign. Values that exceed the target EQS values are printed bold. The method detection limits and the target EQS values (as provided by the commissioner) are given in the left columns of each table.

Unless specified otherwise, results for all parameters are expressed in µg/l for water samples and µg/kg dw for biota and sediment samples. When reading the tables in this appendix please note that while results are always rounded to the correct decimal number, they are not always rounded to the correct number of significant units. Due to analytical uncertainty in the results the number of significant units is limited. This is especially true when concentrations of several hundreds (or thousands) of µg/l or µg/kg are reported. In general no more than two significant numbers apply.

### Full results of water samples target sites, series 21 to 29

Table 24      Total results of water samples series 21 – 24.

SERIES 21 to 24				CC 0597-	6-2052	6-2072	6-2074	6-2075	6-2084	6-2085	6-2100	6-2101	5-2111
Parameter	No.	EQS	LOD	TNO 52005008-	268	285	287	288	297	298	313	314	321
naphthalene	P001	1.0	1.0	µg/l	<	<	<	<	<	<	<	<	<
anthracene	P006	0.010	0.002	µg/l	<	<	0.002	<	<	0.003	0.002	<	<
fluoranthene	P007	0.025	0.005	µg/l	<	<	0.009	<	0.006	0.005	0.011	0.013	<
benzo[b]fluoranthene	P011	n/a	0.005	µg/l	<	<	<	<	<	<	<	<	<
benzo[k]fluoranthene	P012	0.040	0.005	µg/l	<	<	<	<	<	<	<	<	<
benzo[a]pyrene	P013	0.010	0.005	µg/l	0.006	<	<	<	<	<	<	<	<
indeno[1,2,3-cd]pyrene	P014	0.040	0.005	µg/l	<	<	<	<	<	<	<	<	<
benzo[g,h,i]perylene	P016	0.030	0.005	µg/l	<	<	<	<	<	<	<	<	<
pentachlorophenol	P041	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
1,3,5-trichlorobenzene	P048	0.10	0.010	µg/l	<	<	<	<	<	<	0.015	0.014	<
1,2,4-trichlorobenzene	P049	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
1,2,3-trichlorobenzene	P050	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
pentachlorobenzene	P053	1.0	0.002	µg/l	<	<	<	<	<	<	<	<	<
hexachlorobenzene	P054	0.010	0.002	µg/l	<	<	<	<	<	<	<	<	<
dichloromethane	P103	10	0.10	µg/l	<	<	<	<	<	<	<	0.21	<
trichloromethane	P109	1.0	0.10	µg/l	<	0.84	0.21	<	<	0.17	<	0.15	0.44
tetrachloromethane	P111	n/a	0.10	µg/l	<	<	<	<	<	<	<	<	<
1,2-dichloroethane	P112	2.0	0.10	µg/l	<	<	<	<	<	<	<	<	<
benzene	P113	1.0	0.10	µg/l	<	<	<	<	<	<	<	<	<
trichloroethene	P114	n/a	0.10	µg/l	<	<	<	<	<	<	<	<	<
tetrachloroethene	P120	n/a	0.10	µg/l	<	<	<	<	<	<	<	<	<
hexachlorobutadiene	P202	0.10	0.002	µg/l	<	<	<	<	<	<	<	<	<
trifluralin	P214	0.037	0.005	µg/l	<	<	<	<	<	<	<	<	<
atrazine	P218	0.10	0.010	µg/l	<	<	<	0.018	<	0.027	0.14	0.11	<
lindane	P219	0.010	0.005	µg/l	<	<	<	<	<	<	<	<	<
alachlor	P225	0.035	0.010	µg/l	<	<	<	<	<	<	<	<	<
aldrin	P232	0.010	0.005	µg/l	<	<	<	<	<	<	<	<	<
chlorpyrifos(-ethyl)	P233	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
isodrin	P238	0.005	0.005	µg/l	<	<	<	<	<	<	<	<	<
chlorfenvinphos	P241	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
endosulfan-alpha	P243	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
dieldrin	P244	0.005	0.005	µg/l	<	<	<	<	<	<	<	<	<
endrin	P246	0.005	0.005	µg/l	<	<	<	<	<	<	<	<	<
endosulfan-beta	P247	0.10	0.010	µg/l	<	<	<	<	<	0.025	<	<	<
2,4'-DDT	P248	0.010	0.002	µg/l	<	<	<	<	<	<	<	<	<
4,4'-DDT	P250	0.010	0.002	µg/l	<	<	<	<	<	<	<	<	<
di-(2-ethylhexyl)-phthalate (DEHP)	P251	0.50	1.00	µg/l	<	<	<	<	<	<	1.5	1.6	<
simazine	P306	0.020	0.010	µg/l	<	<	<	<	<	0.016	0.017	0.021	<
isoproturon	P308	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
diuron	P309	0.050	0.010	µg/l	<	<	<	<	<	0.014	0.023	0.017	0.016
nonylphenols	P358	n/a	0.010	µg/l	<	<	<	<	<	<	<	<	<

Table 24 (continued). Total results of water samples series 21 – 24.

SERIES 21 to 24				CC 0597-	6-2052	6-2072	6-2074	6-2075	6-2084	6-2085	6-2100	6-2101	5-2111
Parameter	No.	EQS	LOD	TNO 52005008-	268	285	287	288	297	298	313	314	321
4-tert-octylphenol	P357	0.30	0.010	µg/l	<	<	<	<	<	<	<	<	<
cadmium	P500	0.40	0.10	µg/l	n/a	<	<	<	<	<	<	<	<
lead	P501	2.0	1.0	µg/l	n/a	<	<	<	<	<	<	<	<
mercury	P502	0.20	0.10	µg/l	n/a	<	<	<	<	<	<	<	<
nickel	P503	1.8	1.0	µg/l	n/a	<	1.4	1.9	<	1.7	2.5	1.8	<
diphenyl ether, decabromo	P914	n/a	0.020	µg/l	<	<	<	<	<	<	<	<	<
C10-C13 (PCA)	P917	n/a	0.10	µg/l	<	<	<	<	<	<	<	<	<
sum diphenyl ether, pentabromo	P920	0.53	0.001	µg/l	<	<	<	<	<	<	<	<	<
sum diphenyl ether, octabromo	P921	n/a	0.002	µg/l	<	<	<	<	<	<	<	<	<
tributyltin	P930	0.014	0.005	µg/l	<	<	<	<	<	<	<	<	<
PCB 28	R017	0.50	0.005	µg/l	<	<	<	<	<	<	<	<	<
PCB 52	R018	0.50	0.002	µg/l	<	<	<	<	<	<	<	<	<
PCB 101	R019	0.50	0.002	µg/l	<	<	<	<	<	<	0.002	<	<
PCB 118	R020	0.50	0.002	µg/l	<	<	<	<	<	<	<	<	<
PCB 153	R021	0.50	0.002	µg/l	<	<	<	<	<	<	<	<	<
PCB 138	R022	0.50	0.002	µg/l	<	<	<	<	<	<	<	<	<
PCB 180	R023	0.50	0.002	µg/l	<	<	<	<	<	<	<	<	<
2,4/2,5-dichlorophenol	R028	10	0.010	µg/l	<	<	<	<	<	<	<	<	<
mono-chlorophenol	R042	10	0.050	µg/l	<	<	<	<	<	<	<	<	<
trichlorophenols	R043	1.0	0.010	µg/l	<	<	<	<	<	<	<	<	0.010
mono-chlorobenzene	R044	1.0	0.10	µg/l	<	<	<	<	<	<	<	<	<
1,2,4,5-tetrachlorobenzene	R051	n/a	0.10	µg/l	<	<	<	<	<	<	<	<	<
dichlorobenzenes	R055	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
sum PCB	R060	0.50	0.50	µg/l	<	<	<	<	<	<	<	<	<
vinylchloride	R100	0.50	0.10	µg/l	<	<	<	<	<	<	<	<	<
bromomethane	R101	0.10	0.50	µg/l	<	<	<	<	<	<	<	<	<
1,1-dichloroethene	R102	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
carbon disulphide	R104	n/a	0.10	µg/l	<	<	<	<	<	<	<	<	<
MTBE	R105	n/a	0.10	µg/l	<	<	<	<	<	<	<	<	<
1,2-dichloroethene	R106	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
1,1-dichloroethane	R107	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
1,1,1-trichloroethane	R110	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
1,2-dichloropropane	R115	0.10	0.10	µg/l	<	<	<	<	<	<	<	<	<
1,3-dichloropropene	R116	0.10	0.10	µg/l	<	<	<	<	<	<	<	<	<
toluene	R117	10	0.20	µg/l	<	<	<	<	<	<	<	<	<
1,1,2-trichloroethane	R119	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
1,2-dibromoethane	R121	2.0	0.10	µg/l	<	<	<	<	<	<	<	<	<
ethylbenzene	R122	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
p,m-xylene	R123	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
o-xylene	R124	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
styrene	R125	50	0.10	µg/l	<	<	<	<	<	<	<	0.13	<

Table 24 (continued). Total results of water samples series 21 – 24.

SERIES 21 to 24				CC 0597-	6-2052	6-2072	6-2074	6-2075	6-2084	6-2085	6-2100	6-2101	5-2111
Parameter	No.	EQS	LOD	TNO 52005008-	268	285	287	288	297	298	313	314	321
iso-propylbenzene	R126	4.2	0.10	µg/l	<	<	<	<	<	<	<	<	<
1,1,2,2-tetrachloroethane	R127	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
chloroprene	R134	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
3-chloropropene	R135	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
dichloro-di-isopropylether	R136	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
2,3-dichloropropene	R137	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
epichlorohydrin	R138	0.10	0.10	µg/l	<	<	<	<	<	<	<	<	<
hexachloroethane	R139	10	0.10	µg/l	<	<	<	<	<	<	<	<	<
1,1,2-trichloro-1,2,2-trifluoroethane	R140	3.7	0.10	µg/l	<	<	<	<	<	<	<	<	<
cyanuric chloride	R200	0.10	0.050	µg/l	<	<	<	<	<	<	<	<	<
oxydemeton-methyl	R201	0.50	0.10	µg/l	<	<	<	<	<	<	<	<	<
dichlobenil	R203	n/a	0.010	µg/l	<	<	<	<	<	<	<	<	0.012
tribenuron-methyl	R204	0.10	0.020	µg/l	<	<	<	<	<	<	<	<	<
biphenyl	R205	1.0	0.010	µg/l	<	<	<	<	<	<	<	<	<
mecoprop	R206	0.020	0.020	µg/l	<	<	<	<	<	0.10	0.042	0.066	<
MCPA	R207	0.10	0.010	µg/l	<	0.015	<	<	<	0.20	0.095	0.014	0.014
propachlor	R208	1.3	0.010	µg/l	<	<	<	<	<	<	<	<	<
dichlorprop	R209	0.40	0.020	µg/l	<	<	<	<	<	0.023	<	<	<
bromoxynil	R210	100	0.020	µg/l	<	<	<	<	<	<	<	<	<
2,4-D	R211	0.10	0.020	µg/l	<	<	<	<	<	<	<	<	<
ethoprophos	R212	0.010	0.010	µg/l	<	<	<	<	<	<	<	<	<
chlorpropham	R213	10	0.020	µg/l	<	<	<	<	<	<	<	<	<
dimethoate	R215	0.10	0.020	µg/l	<	<	<	<	<	<	<	<	<
carbofuran	R216	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
triclopyr		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
propyzamide	R220	100	0.020	µg/l	<	<	<	<	<	<	<	<	<
triallate	R221	0.019	0.005	µg/l	<	<	<	<	<	<	<	<	<
pirimicarb	R222	0.090	0.020	µg/l	<	<	<	<	<	<	<	<	<
bentazon	R223	0.10	0.020	µg/l	<	<	<	<	<	<	<	<	<
tolclofos-methyl	R224	0.80	0.020	µg/l	<	<	<	<	<	<	<	<	<
ioxynil	R226	10	0.050	µg/l	<	<	<	<	<	<	<	<	<
diazinon		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
pirimiphos-methyl	R227	0.050	0.010	µg/l	<	<	<	<	<	<	<	<	<
ethofumesate	R228	0.10	0.020	µg/l	<	<	<	<	<	<	<	<	<
fenitrothion	R229	0.010	0.010	µg/l	<	<	<	<	<	<	<	<	<
di-n-butylphthalate	R230	0.10	1.0	µg/l	<	<	<	<	<	<	<	<	<
malathion	R231	0.010	0.010	µg/l	<	<	<	<	<	<	<	<	<
fenpropimorf	R234	0.10	0.020	µg/l	<	<	<	<	<	<	<	<	<
pendimethalin	R239	1.5	0.010	µg/l	<	<	<	<	<	<	<	<	<
metazachlor	R240	0.34	0.020	µg/l	<	<	<	<	<	<	<	<	<
captan	R242	0.10	0.10	µg/l	<	<	<	<	<	<	<	<	<

Table 24 (continued). Total results of water samples series 21 – 24.

SERIES 21 to 24				CC 0597- TNO 52005008-	6-2052 268	6-2072 285	6-2074 287	6-2075 288	6-2084 297	6-2085 298	6-2100 313	6-2101 314	5-2111 321
Parameter	No.	EQS	LOD										
kresoxim-methyl	R245	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
butylbenzylphthalate	R249	n/a	0.050	µg/l	<	<	<	<	<	<	<	<	0.055
permethrin	R252	0.010	0.020	µg/l	<	<	<	<	<	<	<	<	<
diisononylester DINP	R254	n/a	2.0	µg/l	<	2.7	<	<	5.1	<	<	<	<
prochloraz	R255	4.0	0.020	µg/l	<	<	<	<	<	<	<	<	<
cyfluthrin	R256	0.020	0.020	µg/l	<	<	<	<	<	<	<	<	<
cypermethrin	R257	0.10	0.020	µg/l	<	<	<	<	<	<	<	<	<
deltamethrin	R258	0.020	0.020	µg/l	<	<	<	<	<	<	<	<	<
oxamyl	R300	1.8	0.050	µg/l	<	<	<	<	<	<	<	<	<
trichlorofon	R301	0.020	0.020	µg/l	<	<	<	<	<	<	<	<	<
metamitron	R302	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
carbendazim	R303	0.11	0.010	µg/l	<	<	<	<	<	<	<	<	<
chloridazon	R304	0.10	0.020	µg/l	<	<	<	<	<	<	<	<	<
thiabendazole	R305	5.0	0.050	µg/l	<	<	<	<	<	<	<	<	<
chlorotoluron	R307	0.40	0.020	µg/l	<	<	<	<	<	<	<	<	<
monolinuron	R310	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
methiocarb	R311	0.010	0.010	µg/l	<	<	<	<	<	<	<	<	<
linuron	R312	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
epoxiconazole	R313	0.10	0.010	µg/l	<	<	<	<	<	<	<	<	<
diflubenzuron	R314	0.015	0.010	µg/l	<	<	<	<	<	<	<	<	<
glyphosate	R350	0.10	0.10	µg/l	<	<	<	<	<	<	<	0.16	<
amitraz		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
dimethylamine	R352	7.5	1.0	µg/l	<	<	<	<	<	<	<	<	<
diethylamine	R353	10	1.0	µg/l	<	<	<	<	<	<	<	<	<
nonylphenol ethoxylates	R355	0.10	0.050	µg/l	<	<	<	<	<	<	<	<	<
bisphenol-A	R356	n/a	0.010	µg/l	<	<	<	<	<	<	<	<	<
chlormequat	R358	n/a	0.10	µg/l	<	<	<	<	<	<	<	<	<
paraquat	R359	0.10	0.50	µg/l	<	<	<	<	<	<	<	<	<
arsenic	R504	1.0	0.10	µg/l	n/a	< 0.28	< 0.39	< 0.47	< 0.33	0.54	0.54	< 0.45	< 0.27
zinc	R505	2.3	0.10	µg/l	n/a	7.6	3.1	2.6	4.6	7.4	2.8	6.5	5.0
copper	R506	0.50	0.10	µg/l	n/a	<	1.2	2.0	<	1.8	7.2	1.7	<
chromium	R507	0.30	0.10	µg/l	n/a	< 0.27	< 0.35	< 0.36	< 0.22	0.52	< 0.44	< 0.34	< 0.22
selenium	R508	5.3	0.10	µg/l	n/a	<	< 0.18	<	<	<	<	<	<
antimony	R509	0.40	0.10	µg/l	n/a	<	0.11	0.11	<	<	0.13	0.12	<
molybdenum	R510	4.3	0.10	µg/l	n/a	<	0.30	0.24	<	0.11	0.27	0.33	0.11
titanium	R511	20	0.10	µg/l	n/a	< 0.71	< 0.28	< 0.47	< 0.29	< 0.95	< 0.89	< 0.64	< 0.74
tin	R512	0.20	0.10	µg/l	n/a	<	<	<	<	<	<	<	<
barium	R513	75	0.10	µg/l	n/a	8.5	89	28	3.6	6.9	29	71	9.9
beryllium	R514	0.20	0.10	µg/l	n/a	<	<	<	<	<	<	<	<
boron	R515	6.5	0.10	µg/l	n/a	8.6	20	10	8.8	13	13	19	10
uranium	R516	1.0	0.10	µg/l	n/a	<	0.51	0.12	<	0.11	0.11	0.43	<

Table 24 (continued). Total results of water samples series 21 – 24.

[illegible]

Tabel 25 Total results of water samples series 25.

SERIES 25				CC 0597- TNO 52005008-	5-2119 328	5-2120 329	5-2121 330	5-2125 331	5-2126 332	6-2127 333
Parameter	No.	EQS	LOD							
naphthalene	P001	1.0	1.0	µg/l	<	<	<	<	<	<
anthracene	P006	0.010	0.002	µg/l	<	<	<	<	<	<
fluoranthene	P007	0.025	0.005	µg/l	0.012	0.009	0.008	0.010	0.011	0.010
benzo[b]fluoranthene	P011	n/a	0.005	µg/l	<	<	<	<	<	<
benzo[k]fluoranthene	P012	0.040	0.005	µg/l	<	<	<	<	<	<
benzo[a]pyrene	P013	0.010	0.005	µg/l	<	<	<	<	<	<
indeno[1,2,3-cd]pyrene	P014	0.040	0.005	µg/l	<	<	<	<	<	<
benzo[g,h,i]perylene	P016	0.030	0.005	µg/l	<	<	<	<	<	<
pentachlorophenol	P041	0.10	0.010	µg/l	<	<	<	<	<	<
1,3,5-trichlorobenzene	P048	0.10	0.010	µg/l	<	<	<	<	<	<
1,2,4-trichlorobenzene	P049	0.10	0.010	µg/l	<	<	<	<	<	<
1,2,3-trichlorobenzene	P050	0.10	0.010	µg/l	<	<	<	<	<	<
pentachlorobenzene	P053	1.0	0.002	µg/l	<	<	<	<	<	<
hexachlorobenzene	P054	0.010	0.002	µg/l	<	<	<	<	<	<
dichloromethane	P103	10	0.10	µg/l	<	<	<	<	<	<
trichloromethane	P109	1.0	0.10	µg/l	<	<	<	<	0.18	0.21
tetrachloromethane	P111	n/a	0.10	µg/l	<	<	<	<	<	<
1,2-dichloroethane	P112	2.0	0.10	µg/l	<	<	<	<	<	<
benzene	P113	1.0	0.10	µg/l	<	<	<	<	<	<
trichloroethene	P114	n/a	0.10	µg/l	<	<	<	<	<	<
tetrachloroethene	P120	n/a	0.10	µg/l	<	<	<	<	<	<
hexachlorobutadiene	P202	0.10	0.002	µg/l	<	<	<	<	<	<
trifluralin	P214	0.037	0.005	µg/l	<	<	<	<	<	<
atrazine	P218	0.10	0.010	µg/l	<	<	<	0.050	<	<
lindane	P219	0.010	0.005	µg/l	<	<	<	<	<	<
alachlor	P225	0.035	0.010	µg/l	<	<	<	<	<	<
aldrin	P232	0.010	0.005	µg/l	<	<	<	<	<	<
chlorpyrifos(-ethyl)	P233	0.10	0.010	µg/l	<	<	<	<	<	<
isodrin	P238	0.005	0.005	µg/l	<	<	<	<	<	<
chlorfenvinphos	P241	0.10	0.010	µg/l	<	<	<	<	<	<
endosulfan-alpha	P243	0.10	0.010	µg/l	<	<	<	<	<	<
dieldrin	P244	0.005	0.005	µg/l	<	<	<	<	<	<
endrin	P246	0.005	0.005	µg/l	<	<	<	<	<	<
endosulfan-beta	P247	0.10	0.010	µg/l	<	<	<	<	<	<
2,4'-DDT	P248	0.010	0.002	µg/l	<	<	<	<	<	<
4,4'-DDT	P250	0.010	0.002	µg/l	<	<	<	<	<	<
di-(2-ethylhexyl)-phthalate (DEHP)	P251	0.50	1.00	µg/l	1.24	<	<	<	<	<
simazine	P306	0.020	0.010	µg/l	<	<	<	0.022	0.022	<
isoproturon	P308	0.10	0.010	µg/l	<	<	<	<	<	<
diuron	P309	0.050	0.010	µg/l	<	<	<	<	0.033	<
nonylphenols	P358	n/a	0.010	µg/l	0.026	0.030	<	<	<	<

Table 25 (continued). Total results of water samples series 25.

SERIES 25				CC 0597-	5-2119	5-2120	5-2121	5-2125	5-2126	6-2127
Parameter	No.	EQS	LOD	TNO 52005008-	328	329	330	331	332	333
4-tert-octylphenol	P357	0.30	0.010	µg/l	<	<	<	<	<	<
cadmium	P500	0.40	0.10	µg/l	<	<	<	<	<	<
lead	P501	2.0	1.0	µg/l	<	<	1.1	<	<	<
mercury	P502	0.20	0.10	µg/l	0.10	<	<	<	<	0.10
nickel	P503	1.8	1.0	µg/l	1.5	<	1.3	4.0	3.2	1.4
diphenyl ether, decabromo	P914	n/a	0.020	µg/l	<	<	<	<	<	<
C10-C13 (PCA)	P917	n/a	0.10	µg/l	<	<	<	<	0.22	<
sum diphenyl ether, pentabromo	P920	0.53	0.001	µg/l	0.008	0.002	<	0.003	<	<
sum diphenyl ether, octabromo	P921	n/a	0.002	µg/l	<	<	<	<	<	<
tributyltin	P930	0.014	0.005	µg/l	<	<	<	<	<	<
PCB 28	R017	0.50	0.005	µg/l	<	<	<	<	<	0.005
PCB 52	R018	0.50	0.002	µg/l	<	<	<	<	<	0.003
PCB 101	R019	0.50	0.002	µg/l	0.003	<	<	<	<	<
PCB 118	R020	0.50	0.002	µg/l	0.004	<	<	<	<	<
PCB 153	R021	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 138	R022	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 180	R023	0.50	0.002	µg/l	<	<	<	<	<	<
2,4/2,5-dichlorophenol	R028	10	0.010	µg/l	<	<	<	<	<	<
mono-chlorophenol	R042	10	0.050	µg/l	<	<	<	<	<	<
trichlorophenols	R043	1.0	0.010	µg/l	<	<	<	<	0.013	0.011
mono-chlorobenzene	R044	1.0	0.10	µg/l	<	<	<	<	<	<
1,2,4,5-tetrachlorobenzene	R051	n/a	0.10	µg/l	<	<	<	<	<	<
dichlorobenzenes	R055	10	0.10	µg/l	<	<	<	<	<	<
sum PCB	R060	0.50	0.50	µg/l	<	<	<	<	<	<
vinylchloride	R100	0.50	0.10	µg/l	<	<	<	<	<	<
bromomethane	R101	0.10	0.50	µg/l	<	<	<	<	<	<
1,1-dichloroethene	R102	10	0.10	µg/l	<	<	<	<	<	<
carbon disulphide	R104	n/a	0.10	µg/l	<	<	<	<	<	<
MTBE	R105	n/a	0.10	µg/l	<	<	<	<	<	<
1,2-dichloroethene	R106	10	0.10	µg/l	<	<	<	<	<	<
1,1-dichloroethane	R107	10	0.10	µg/l	<	<	<	<	<	<
1,1,1-trichloroethane	R110	10	0.10	µg/l	<	<	<	<	<	<
1,2-dichloropropane	R115	0.10	0.10	µg/l	<	<	<	<	<	<
1,3-dichloropropene	R116	0.10	0.10	µg/l	<	<	<	<	<	<
toluene	R117	10	0.20	µg/l	<	<	<	<	<	<
1,1,2-trichloroethane	R119	10	0.10	µg/l	<	<	<	<	<	<
1,2-dibromoethane	R121	2.0	0.10	µg/l	<	<	<	<	<	<
ethylbenzene	R122	10	0.10	µg/l	<	<	<	<	<	<
p,m-xylene	R123	10	0.10	µg/l	<	<	<	<	<	<
o-xylene	R124	10	0.10	µg/l	<	<	<	<	<	<
styrene	R125	50	0.10	µg/l	<	<	<	<	<	<



Table 25 (continued). Total results of water samples series 25.

SERIES 25				CC 0597-	5-2119	5-2120	5-2121	5-2125	5-2126	6-2127
Parameter	No.	EQS	LOD	TNO 52005008-	328	329	330	331	332	333
iso-propylbenzene	R126	4.2	0.10	µg/l	<	<	<	<	<	<
1,1,2,2-tetrachloroethane	R127	10	0.10	µg/l	<	<	<	<	<	<
chloroprene	R134	10	0.10	µg/l	<	<	<	<	<	<
3-chloropropene	R135	10	0.10	µg/l	<	<	<	<	<	<
dichloro-di-isopropylether	R136	10	0.10	µg/l	<	<	<	<	<	<
2,3-dichloropropene	R137	10	0.10	µg/l	<	<	<	<	<	<
epichlorohydrin	R138	0.10	0.10	µg/l	<	<	<	<	<	<
hexachloroethane	R139	10	0.10	µg/l	<	<	<	<	<	<
1,1,2-trichloro-1,2,2-trifluoroethane	R140	3.7	0.10	µg/l	<	<	<	<	<	<
cyanuric chloride	R200	0.10	0.050	µg/l	<	<	<	<	<	<
oxydemeton-methyl	R201	0.50	0.10	µg/l	<	<	<	<	<	<
dichlobenil	R203	n/a	0.010	µg/l	0.014	0.015	0.016	0.016	0.095	0.017
tribenuron-methyl	R204	0.10	0.020	µg/l	<	<	<	<	<	<
biphenyl	R205	1.0	0.010	µg/l	<	<	<	<	<	<
mecoprop	R206	0.020	0.020	µg/l	<	<	<	<	<	<
MCPA	R207	0.10	0.010	µg/l	<	<	<	0.010	<	0.019
propachlor	R208	1.3	0.010	µg/l	<	<	<	<	<	<
dichlorprop	R209	0.40	0.020	µg/l	<	<	<	<	<	<
bromoxynil	R210	100	0.020	µg/l	<	<	<	<	<	<
2,4-D	R211	0.10	0.020	µg/l	<	<	<	<	<	<
ethoprophos	R212	0.010	0.010	µg/l	<	<	<	<	<	<
chlorpropham	R213	10	0.020	µg/l	<	<	<	<	<	<
dimethoate	R215	0.10	0.020	µg/l	<	<	<	<	<	<
carbofuran	R216	0.10	0.010	µg/l	<	<	<	<	<	<
triclopyr		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
propyzamide	R220	100	0.020	µg/l	<	<	<	<	<	<
triallate	R221	0.019	0.005	µg/l	<	<	<	<	<	<
pirimicarb	R222	0.090	0.020	µg/l	<	<	<	<	<	<
bentazon	R223	0.10	0.020	µg/l	<	<	<	<	<	<
tolclofos-methyl	R224	0.80	0.020	µg/l	<	<	<	<	<	<
ioxynil	R226	10	0.050	µg/l	<	<	<	<	<	<
diazinon		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
pirimiphos-methyl	R227	0.050	0.010	µg/l	<	<	<	<	<	<
ethofumesate	R228	0.10	0.020	µg/l	<	<	<	<	<	<
fenitrothion	R229	0.010	0.010	µg/l	<	<	<	<	<	<
di-n-butylphthalate	R230	0.10	1.0	µg/l	<	<	<	<	<	<
malathion	R231	0.010	0.010	µg/l	<	<	<	<	<	<
fenpropimorf	R234	0.10	0.020	µg/l	<	<	<	<	<	<
pendimethalin	R239	1.5	0.010	µg/l	<	<	<	<	<	<
metazachlor	R240	0.34	0.020	µg/l	<	<	<	<	<	<
captan	R242	0.10	0.10	µg/l	<	<	<	<	<	<

Table 25 (continued). Total results of water samples series 25.

SERIES 25				CC 0597-	5-2119	5-2120	5-2121	5-2125	5-2126	6-2127
Parameter	No.	EQS	LOD	TNO 52005008-	328	329	330	331	332	333
kresoxim-methyl	R245	0.10	0.010	µg/l	<	<	<	<	<	<
butylbenzylphthalate	R249	n/a	0.050	µg/l	<	<	<	<	<	<
permethrin	R252	0.010	0.020	µg/l	<	<	<	<	<	<
diisononylester DINP	R254	n/a	2.0	µg/l	<	<	<	<	<	<
prochloraz	R255	4.0	0.020	µg/l	<	<	<	<	<	<
cyfluthrin	R256	0.020	0.020	µg/l	<	<	<	<	<	<
cypermethrin	R257	0.10	0.020	µg/l	<	<	<	<	<	<
deltamethrin	R258	0.020	0.020	µg/l	<	<	<	<	<	<
oxamyl	R300	1.8	0.050	µg/l	<	<	<	<	<	<
trichlorofon	R301	0.020	0.020	µg/l	<	<	<	<	<	<
metamitron	R302	0.10	0.010	µg/l	<	<	<	<	<	<
carbendazim	R303	0.11	0.010	µg/l	<	<	<	<	<	<
chloridazon	R304	0.10	0.020	µg/l	<	<	<	<	<	<
thiabendazole	R305	5.0	0.050	µg/l	<	<	<	<	<	<
chlorotoluron	R307	0.40	0.020	µg/l	<	<	<	<	<	<
monolinuron	R310	0.10	0.010	µg/l	<	<	<	<	<	<
methiocarb	R311	0.010	0.010	µg/l	<	<	<	<	<	<
linuron	R312	0.10	0.010	µg/l	<	<	<	<	<	<
epoxiconazole	R313	0.10	0.010	µg/l	<	<	<	<	0.068	<
diflubenzuron	R314	0.015	0.010	µg/l	<	<	<	<	<	<
glyphosate	R350	0.10	0.10	µg/l	<	<	<	<	<	<
amitraz		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
dimethylamine	R352	7.5	1.0	µg/l	<	<	<	<	<	<
diethylamine	R353	10	1.0	µg/l	<	<	<	<	<	<
nonylphenol ethoxylates	R355	0.10	0.050	µg/l	<	<	<	<	<	<
bisphenol-A	R356	n/a	0.010	µg/l	<	<	<	<	<	<
chlormequat	R358	n/a	0.10	µg/l	<	<	<	<	<	<
paraquat	R359	0.10	0.50	µg/l	<	<	<	<	<	<
arsenic	R504	1.0	0.10	µg/l	0.73	0.54	0.54	1.2	1.0	0.52
zinc	R505	2.3	0.10	µg/l	50	88	21	233	31	87
copper	R506	0.50	0.10	µg/l	1.2	1.3	2.4	3.0	2.1	1.2
chromium	R507	0.30	0.10	µg/l	< 0,33	< 0,31	< 0,26	< 0,35	< 0,39	< 0,34
selenium	R508	5.3	0.10	µg/l	< 0,11	<	<	<	< 0,11	<
antimony	R509	0.40	0.10	µg/l	<	<	<	0.17	0.17	<
molybdenum	R510	4.3	0.10	µg/l	0.16	0.17	0.15	0.58	0.66	0.15
titanium	R511	20	0.10	µg/l	< 0,55	< 0,52	< 0,48	< 0,79	< 1,00	1.73
tin	R512	0.20	0.10	µg/l	<	<	<	<	<	<
barium	R513	75	0.10	µg/l	8.9	5.6	5.4	29	90	8.3
beryllium	R514	0.20	0.10	µg/l	<	<	<	<	<	<
boron	R515	6.5	0.10	µg/l	18	12	14	18	66	14
uranium	R516	1.0	0.10	µg/l	0.51	<	<	0.22	0.46	<

Table 25 (continued). Total results of water samples series 25.

SERIES 25				CC 0597-	5-2119	5-2120	5-2121	5-2125	5-2126	6-2127
Parameter	No.	EQS	LOD	TNO 52005008-	328	329	330	331	332	333
vanadium	R517	0.90	0.10	µg/l	0.27	0.20	0.19	0.71	0.46	0.26
cobalt	R518	0.20	0.10	µg/l	<b>0.33</b>	0.12	<	<b>0.44</b>	<b>0.45</b>	<b>0.29</b>
thallium	R519	1.6	0.10	µg/l	<	<	<	<	<	<
tellurium	R520	100	0.10	µg/l	<	<	<	<	<	<
silver	R521	1.2	0.10	µg/l	<	<	<	<	<	<
cyanide	R522	0.001	0.002	mg/l	<	<	<	<	<	<
fluoride	R523	0.001	0.10	mg/l	<	<	<	<	<b>0.17</b>	<
chloride	R524	250	1.0	mg/l	21	12	12	15	36	18
HBCD	R915	n/a	0.020	µg/l	<	<	<	<	<	<
polychloronaphthalenes	R918	0.77	0.10	µg/l	<	<	<	<	<	<
PCT	R919	0.50	0.10	µg/l	<	<	<	<	<	<
dibutyltin	R931	0.010	0.005	µg/l	<	<	<	<	<	<
tetrabutyltin	R932	0.016	0.005	µg/l	<	<	<	<	<	<
triphenyltin	R933	0.005	0.005	µg/l	<	<	<	<	<	<
tri-n-propyltin	R934	n/a	0.005	µg/l	<	<	<	<	<	<
maneb/zineb/thiram/mancozeb	R940	0.10	0.10	µg/l	<	<	<	<	<	<
4-chloor-3-methylfenol	R950	10	0.010	µg/l	<	<	<	<	<	<
tetrabromobisphenol-A	R951	n/a	0.001	µg/l	<	<	<	<	<	<
total phosphorus	R970	n/a	0.050	mg/l	<	<	<	0.11	0.22	<
total nitrogen	R971	n/a	0.50	mg/l	<	<	0.57	0.68	1.0	0.61
nitrate	R972	n/a	0.050	mg/l	11.0	1.50	1.50	1.10	11.0	0.380
total organic carbon	R973	n/a	5.0	mg/l	<	<	<	9.70	8.20	6.80
phenols	R974	0.030	0.030	mg/l	<	<	<	<	<	<

Table 26. Total results of water samples series 26.

SERIES 26				CC 0597-	6-2136	6-2137	5-2138	6-2139	6-2140	6-2141
Parameter	No.	EQS	LOD	TNO 52005008-	337	338	339	340	341	342
naphthalene	P001	1.0	0.10	µg/l	<	<	<	<	<	<
anthracene	P006	0.010	0.002	µg/l	<	<	<	<	<	<
fluoranthene	P007	0.025	0.005	µg/l	<	<	<	<	<	<
benzo[b]fluoranthene	P011	n/a	0.005	µg/l	<	<	<	<	<	<
benzo[k]fluoranthene	P012	0.040	0.005	µg/l	<	<	<	<	<	<
benzo[a]pyrene	P013	0.010	0.005	µg/l	<	<	<	<	<	<
indeno[1,2,3-cd]pyrene	P014	0.040	0.005	µg/l	<	<	<	<	<	<
benzo[g,h,i]perylene	P016	0.030	0.005	µg/l	<	<	<	<	<	<
pentachlorophenol	P041	0.10	0.010	µg/l	<	<	<	<	<	<
1,3,5-trichlorobenzene	P048	0.10	0.010	µg/l	<	<	<	0.038	<	<
1,2,4-trichlorobenzene	P049	0.10	0.010	µg/l	<	<	<	0.053	<	<
1,2,3-trichlorobenzene	P050	0.10	0.010	µg/l	<	<	<	0.049	<	<
pentachlorobenzene	P053	1.0	0.002	µg/l	<	<	<	<	<	<
hexachlorobenzene	P054	0.010	0.002	µg/l	<	<	<	0.004	<	<
dichloromethane	P103	10	0.10	µg/l	<	<	<	0.554	<	<
trichloromethane	P109	1.0	0.10	µg/l	<	<	0.188	0.372	<	<
tetrachloromethane	P111	n/a	0.10	µg/l	<	<	<	<	<	<
1,2-dichloroethane	P112	2.0	0.10	µg/l	<	<	<	0.106	<	<
benzene	P113	1.0	0.10	µg/l	<	<	<	<	<	<
trichloroethene	P114	n/a	0.10	µg/l	<	<	<	0.351	<	<
tetrachloroethene	P120	n/a	0.10	µg/l	<	<	0.158	0.220	<	<
hexachlorobutadiene	P202	0.10	0.002	µg/l	<	<	<	0.002	<	<
trifluralin	P214	0.037	0.005	µg/l	<	<	<	<	<	<
atrazine	P218	0.10	0.010	µg/l	0.011	0.057	0.023	0.278	<	<
lindane	P219	0.010	0.005	µg/l	<	<	<	<	<	<
alachlor	P225	0.035	0.010	µg/l	<	<	<	<	<	<
aldrin	P232	0.010	0.005	µg/l	<	<	<	0.071	<	<
chlorpyrifos(-ethyl)	P233	0.10	0.010	µg/l	<	<	<	0.257	<	<
isodrin	P238	0.005	0.005	µg/l	<	<	<	<	<	<
chlorfenvinphos	P241	0.10	0.010	µg/l	<	<	<	0.514	<	<
endosulfan-alpha	P243	0.10	0.010	µg/l	<	<	<	<	<	<
dieldrin	P244	0.005	0.005	µg/l	<	<	<	<	<	<
endrin	P246	0.005	0.005	µg/l	<	<	<	<	<	<
endosulfan-beta	P247	0.10	0.010	µg/l	<	<	<	<	<	<
2,4'-DDT	P248	0.010	0.002	µg/l	<	<	<	0.004	<	<
4,4'-DDT	P250	0.010	0.002	µg/l	<	<	<	<	<	<
di-(2-ethylhexyl)-phthalate (DEHP)	P251	0.50	1.00	µg/l	<	<	<	<	<	<
simazine	P306	0.020	0.010	µg/l	0.033	0.024	<	0.153	<	<
isoproturon	P308	0.10	0.010	µg/l	<	<	<	<	<	<
diuron	P309	0.050	0.010	µg/l	0.025	<	<	<	<	<
nonylphenols	P358	n/a	0.010	µg/l	<	<	<	<	<	<

Table 26 (continued). Total results of water samples series 26.

SERIES 26				CC 0597-	6-2136	6-2137	5-2138	6-2139	6-2140	6-2141
Parameter	No.	EQS	LOD	TNO 52005008-	337	338	339	340	341	342
4-tert-octylphenol	P357	0.30	0.010	µg/l	<	<	<	<	<	<
cadmium	P500	0.40	0.10	µg/l	<	<	<	<	<	<
lead	P501	2.0	1.0	µg/l	<	<	<	<	<	<
mercury	P502	0.20	0.10	µg/l	<	<	<	<	<	<
nickel	P503	1.8	1.0	µg/l	<b>2.0</b>	<b>2.2</b>	<	<	<	<
diphenyl ether, decabromo	P914	n/a	0.020	µg/l	<	<	<	<	<	<
C10-C13 (PCA)	P917	n/a	0.10	µg/l	0.23	0.31	<	<	<	<
sum diphenyl ether, pentabromo	P920	0.53	0.001	µg/l	0.003	0.001	0.002	<	0.002	0.004
sum diphenyl ether, octabromo	P921	n/a	0.002	µg/l	<	<	<	<	<	<
tributyltin	P930	0.014	0.005	µg/l	<	<	<	<	<	<
PCB 28	R017	0.50	0.005	µg/l	<	<	<	<	<	<
PCB 52	R018	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 101	R019	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 118	R020	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 153	R021	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 138	R022	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 180	R023	0.50	0.002	µg/l	<	<	<	<	<	<
2,4/2,5-dichlorophenol	R028	10	0.010	µg/l	<	<	<	<	<	<
mono-chlorophenol	R042	10	0.050	µg/l	<	<	<	<	<	<
trichlorophenols	R043	1.0	0.010	µg/l	<	<	<	<	<	<
mono-chlorobenzene	R044	1.0	0.10	µg/l	<	<	<	<	<	<
1,2,4,5-tetrachlorobenzene	R051	n/a	0.10	µg/l	<	<	<	<	<	<
dichlorobenzenes	R055	10	0.10	µg/l	<	<	<	<	<	<
sum PCB	R060	0.50	0.50	µg/l	<	<	<	<	<	<
vinylchloride	R100	0.50	0.10	µg/l	<	<	<	<	<	<
bromomethane	R101	0.10	0.50	µg/l	<	<	<	<	<	<
1,1-dichloroethene	R102	10	0.10	µg/l	<	<	<	<	<	<
carbon disulphide	R104	n/a	0.10	µg/l	<	<	<	<	<	<
MTBE	R105	n/a	0.10	µg/l	<	<	<	<	<	<
1,2-dichloroethene	R106	10	0.10	µg/l	<	<	<	1.4	<	<
1,1-dichloroethane	R107	10	0.10	µg/l	<	<	<	<	<	<
1,1,1-trichloroethane	R110	10	0.10	µg/l	<	<	<	0.31	<	<
1,2-dichloropropane	R115	0.10	0.10	µg/l	<	<	<	<b>2.17</b>	<	<
1,3-dichloropropene	R116	0.10	0.10	µg/l	<	<	<	<b>5.57</b>	<	<
toluene	R117	10	0.20	µg/l	<	<	<	<	<	<
1,1,2-trichloroethane	R119	10	0.10	µg/l	<	<	<	0.80	<	<
1,2-dibromoethane	R121	2.0	0.10	µg/l	<	<	<	<	<	<
ethylbenzene	R122	10	0.10	µg/l	<	<	<	<	<	<
p,m-xylene	R123	10	0.10	µg/l	<	<	<	<	<	<
o-xylene	R124	10	0.10	µg/l	<	<	<	<	<	<
styrene	R125	50	0.10	µg/l	<	<	<	<	<	<

Table 26 (continued). Total results of water samples series 26.

SERIES 26				CC 0597-	6-2136	6-2137	5-2138	6-2139	6-2140	6-2141
Parameter	No.	EQS	LOD	TNO 52005008-	337	338	339	340	341	342
iso-propylbenzene	R126	4.2	0.10	µg/l	<	<	<	<	<	<
1,1,2,2-tetrachloroethane	R127	10	0.10	µg/l	<	<	<	<	<	<
chloroprene	R134	10	0.10	µg/l	<	<	<	<	<	<
3-chloropropene	R135	10	0.10	µg/l	<	<	<	<	<	<
dichloro-di-isopropylether	R136	10	0.10	µg/l	<	<	<	<	<	<
2,3-dichloropropene	R137	10	0.10	µg/l	<	<	<	<	<	<
epichlorohydrin	R138	0.10	0.10	µg/l	<	<	<	<	<	<
hexachloroethane	R139	10	0.10	µg/l	<	<	<	<	<	<
1,1,2-trichloro-1,2,2-trifluoroethane	R140	3.7	0.10	µg/l	<	<	<	<	<	<
cyanuric chloride	R200	0.10	0.050	µg/l	<	<	<	<	<	<
oxydemeton-methyl	R201	0.50	0.10	µg/l	<	<	<	<	<	<
dichlobenil	R203	n/a	0.010	µg/l	0.058	<	<	<	<	<
tribenuron-methyl	R204	0.10	0.020	µg/l	<	<	<	<	<	<
biphenyl	R205	1.0	0.010	µg/l	<	<	<	<	<	<
mecoprop	R206	0.020	0.020	µg/l	<	<	<	<	<	<
MCPA	R207	0.10	0.010	µg/l	<	0.030	<	0.011	<	<
propachlor	R208	1.3	0.010	µg/l	<	<	<	<	<	<
dichlorprop	R209	0.40	0.020	µg/l	<	<	<	<	<	<
bromoxynil	R210	100	0.020	µg/l	<	<	<	<	<	<
2,4-D	R211	0.10	0.020	µg/l	<	<	<	<	<	<
ethoprophos	R212	0.010	0.010	µg/l	<	<	<	<	<	<
chlorpropham	R213	10	0.020	µg/l	<	<	<	<	<	<
dimethoate	R215	0.10	0.020	µg/l	<	<	<	<	<	<
carbofuran	R216	0.10	0.010	µg/l	<	<	<	<	<	<
triclopyr		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
propyzamide	R220	100	0.020	µg/l	<	<	<	<	<	<
triallate	R221	0.019	0.005	µg/l	<	<	<	<	<	<
pirimicarb	R222	0.090	0.020	µg/l	<	<	<	<	<	<
bentazon	R223	0.10	0.020	µg/l	<	<	<	<	<	<
tolclofos-methyl	R224	0.80	0.020	µg/l	<	<	<	<	<	<
ioxynil	R226	10	0.050	µg/l	<	<	<	<	<	<
diazinon		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
pirimiphos-methyl	R227	0.050	0.010	µg/l	<	<	<	<	<	<
ethofumesate	R228	0.10	0.020	µg/l	<	<	<	<	<	<
fenitrothion	R229	0.010	0.010	µg/l	<	<	<	0.36	<	<
di-n-butylphthalate	R230	0.10	1.0	µg/l	1.1	<	<	<	<	<
malathion	R231	0.010	0.010	µg/l	<	<	<	0.24	<	<
fenpropimorf	R234	0.10	0.020	µg/l	<	<	<	<	<	<
pendimethalin	R239	1.5	0.010	µg/l	<	<	<	<	<	<
metazachlor	R240	0.34	0.020	µg/l	<	<	<	<	<	<
captan	R242	0.10	0.10	µg/l	<	<	<	<	<	<

Table 26 (continued). Total results of water samples series 26.

SERIES 26				CC 0597-	6-2136	6-2137	5-2138	6-2139	6-2140	6-2141
Parameter	No.	EQS	LOD	TNO 52005008-	337	338	339	340	341	342
kresoxim-methyl	R245	0.10	0.010	µg/l	<	<	<	<	<	<
butylbenzylphthalate	R249	n/a	0.050	µg/l	<	<	<	<	<	<
permethrin	R252	0.010	0.020	µg/l	<	<	<	<	<	<
diisononylester DINP	R254	n/a	2.0	µg/l	<	<	<	<	<	<
prochloraz	R255	4.0	0.020	µg/l	<	<	<	<	<	<
cyfluthrin	R256	0.020	0.020	µg/l	<	<	<	<	<	<
cypermethrin	R257	0.10	0.020	µg/l	<	<	<	<	<	<
deltamethrin	R258	0.020	0.020	µg/l	<	<	<	<	<	<
oxamyl	R300	1.8	0.050	µg/l	<	<	<	<	<	<
trichlorofon	R301	0.020	0.020	µg/l	<	<	<	<	<	<
metamitron	R302	0.10	0.010	µg/l	<	<	<	<	<	<
carbendazim	R303	0.11	0.010	µg/l	<	<	<	<	<	<
chloridazon	R304	0.10	0.020	µg/l	<	<	<	<	<	<
thiabendazole	R305	5.0	0.050	µg/l	<	<	<	<	<	<
chlorotoluron	R307	0.40	0.020	µg/l	<	<	<	<	<	<
monolinuron	R310	0.10	0.010	µg/l	<	<	<	<	<	<
methiocarb	R311	0.010	0.010	µg/l	<	<	<	<	<	<
linuron	R312	0.10	0.010	µg/l	<	<	<	<	<	<
epoxiconazole	R313	0.10	0.010	µg/l	<	<	<	<	<	<
diflubenzuron	R314	0.015	0.010	µg/l	<	<	<	<	<	<
glyphosate	R350	0.10	0.10	µg/l	<	<	<	<	<	<
amitraz		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
dimethylamine	R352	7.5	1.0	µg/l	<	<	<	<	<	<
diethylamine	R353	10	1.0	µg/l	<	<	<	<	<	<
nonylphenol ethoxylates	R355	0.10	0.050	µg/l	<	<	<	<	<	<
bisphenol-A	R356	n/a	0.010	µg/l	<	<	<	<	0.020	<
chlormequat	R358	n/a	0.10	µg/l	<	<	<	<	<	<
paraquat	R359	0.10	0.50	µg/l	<	<	<	<	<	<
arsenic	R504	1.0	0.10	µg/l	0.67	0.89	< 0,41	< 0,44	< 0,38	0.59
zinc	R505	2.3	0.10	µg/l	<b>13</b>	<b>67</b>	<b>15</b>	<b>6.1</b>	<b>84</b>	<b>20</b>
copper	R506	0.50	0.10	µg/l	<b>1.5</b>	<b>1.7</b>	< 1,0	< 1,0	< 1,0	< 1,0
chromium	R507	0.30	0.10	µg/l	< 0,22	< 0,25	< 0,16	< 0,16	< 0,18	< 0,24
selenium	R508	5.3	0.10	µg/l	< 0,14	< 0,11	<	<	<	< 0,17
antimony	R509	0.40	0.10	µg/l	0.22	0.14	<	<	<	<
molybdenum	R510	4.3	0.10	µg/l	0.95	0.49	0.11	0.10	0.11	0.23
titanium	R511	20	0.10	µg/l	< 0,39	< 0,44	< 0,69	< 0,72	< 0,33	< 0,44
tin	R512	0.20	0.10	µg/l	<	<	<	<	<	<
barium	R513	75	0.10	µg/l	<b>82</b>	26	7.1	7.1	3.9	10
beryllium	R514	0.20	0.10	µg/l	<	<	<	<	<	<
boron	R515	6.5	0.10	µg/l	<b>67</b>	<b>19</b>	<b>8.7</b>	<b>8.8</b>	<b>9.4</b>	<b>14</b>
uranium	R516	1.0	0.10	µg/l	0.462	0.153	<	<	<	0.468

Table 26 (continued). Total results of water samples series 26.

SERIES 26				CC 0597-	6-2136	6-2137	5-2138	6-2139	6-2140	6-2141
Parameter	No.	EQS	LOD	TNO 52005008-	337	338	339	340	341	342
vanadium	R517	0.90	0.10	µg/l	0.47	0.59	0.25	0.38	0.34	0.39
cobalt	R518	0.20	0.10	µg/l	<b>0.31</b>	<b>0.20</b>	0.14	0.15	<	0.14
thallium	R519	1.6	0.10	µg/l	<	<	<	<	<	<
tellurium	R520	100	0.10	µg/l	<	<	<	<	<	<
silver	R521	1.2	0.10	µg/l	<	<	<	<	<	<
cyanide	R522	0.001	0.002	mg/l	<	<	<	<	<	<
fluoride	R523	0.001	0.10	mg/l	<b>0.24</b>	<	<	<	<	<
chloride	R524	250	1.0	mg/l	45	17	17	17	12	23
HBCD	R915	n/a	0.020	µg/l	<	<	<	<	<	<
polychloronaphthalenes	R918	0.77	0.10	µg/l	<	<	<	<	<	<
PCT	R919	0.50	0.10	µg/l	<	<	<	<	<	<
dibutyltin	R931	0.010	0.005	µg/l	<	<	<	<	<	<
tetrabutyltin	R932	0.016	0.005	µg/l	<	<	<	<	<	<
triphenyltin	R933	0.005	0.005	µg/l	<	<	<	<	<	<
tri-n-propyltin	R934	n/a	0.005	µg/l	<	<	<	<	<	<
maneb/zineb/thiram/mancozeb	R940	0.10	0.10	µg/l	<	<	<	<	<	<
4-chloor-3-methylfenol	R950	10	0.010	µg/l	<	<	<	<	<	<
tetrabromobisphenol-A	R951	n/a	0.001	µg/l	<	<	<	<	<	<
total phosphorus	R970	n/a	0.050	mg/l	0.190	0.110	0.100	0.100	<	0.060
total nitrogen	R971	n/a	0.50	mg/l	1.10	0.740	0.500	<	0.500	<
nitrate	R972	n/a	0.050	mg/l	12.0	0.810	0.260	0.240	1.20	12.0
total organic carbon	R973	n/a	5.0	mg/l	6.9	21	6.2	15.0	8.5	<
phenols	R974	0.030	0.030	mg/l	<	<	<	<	<	<



Table 27 Total results of water samples series 27.

SERIES 27				CC 0597-	5-2153	5-2154	5-2158	5-2159	5-2160	6-2161
Parameter	No.	EQS	LOD	TNO 52005008-	355	356	357	358	359	360
naphthalene	P001	1.0	0.10	µg/l	<	<	<	<	<	<
anthracene	P006	0.010	0.002	µg/l	<	0.003	0.003	0.004	0.003	<
fluoranthene	P007	0.025	0.005	µg/l	0.012	0.018	0.015	0.016	<b>0.025</b>	0.010
benzo[b]fluoranthene	P011	n/a	0.005	µg/l	<	<	<	<	0.007	<
benzo[k]fluoranthene	P012	0.040	0.005	µg/l	<	<	<	<	<	<
benzo[a]pyrene	P013	0.010	0.005	µg/l	<	<	<	<	0.006	<
indeno[1,2,3-cd]pyrene	P014	0.040	0.005	µg/l	<	<	<	<	<	<
benzo[g,h,i]perylene	P016	0.030	0.005	µg/l	<	<	<	<	0.008	<
pentachlorophenol	P041	0.10	0.010	µg/l	<	<	<	<	<	<
1,3,5-trichlorobenzene	P048	0.10	0.010	µg/l	<	<	<	<	<	<
1,2,4-trichlorobenzene	P049	0.10	0.010	µg/l	<	<	<	<	<	<
1,2,3-trichlorobenzene	P050	0.10	0.010	µg/l	<	<	<	<	<	<
pentachlorobenzene	P053	1.0	0.002	µg/l	<	<	<	<	<	<
hexachlorobenzene	P054	0.010	0.002	µg/l	<	<	<	<	<	<
dichloromethane	P103	10	0.10	µg/l	<	<	<	<	<	<
trichloromethane	P109	1.0	0.10	µg/l	<	<	<	<	<	<b>0.230</b>
tetrachloromethane	P111	n/a	0.10	µg/l	<	<	<	<	<	<
1,2-dichloroethane	P112	2.0	0.10	µg/l	<	<	<	<	<	<
benzene	P113	1.0	0.10	µg/l	<	<	<	<	<	<
trichloroethene	P114	n/a	0.10	µg/l	<	<	<	<	<	<
tetrachloroethene	P120	n/a	0.10	µg/l	<	<	<	<	<	<
hexachlorobutadiene	P202	0.10	0.002	µg/l	<	<	<	<	<	<
trifluralin	P214	0.037	0.005	µg/l	<	<	<	<	<	<
atrazine	P218	0.10	0.010	µg/l	<	0.099	0.050	0.045	<	<
lindane	P219	0.010	0.005	µg/l	<	<	<	<	<	<
alachlor	P225	0.035	0.010	µg/l	<	<	<	<	<	<
aldrin	P232	0.010	0.005	µg/l	<	<	<	<	<	<
chlorpyrifos(-ethyl)	P233	0.10	0.010	µg/l	<	<	<	<	<	<
isodrin	P238	0.005	0.005	µg/l	<	<	<	<	<	<
chlorfenvinphos	P241	0.10	0.010	µg/l	<	<	<	<	<	<
endosulfan-alpha	P243	0.10	0.010	µg/l	<	<	<	<	<	<
dieldrin	P244	0.005	0.005	µg/l	<	<	<	<	<	<
endrin	P246	0.005	0.005	µg/l	<	<	<	<	<	<
endosulfan-beta	P247	0.10	0.010	µg/l	<	<	<	<	<	<
2,4'-DDT	P248	0.010	0.002	µg/l	<	<	<	<	<	<
4,4'-DDT	P250	0.010	0.002	µg/l	<	<	<	<	<	<
di-(2-ethylhexyl)-phthalate (DEHP)	P251	0.50	1.00	µg/l	<	<	<	<	<	<
simazine	P306	0.020	0.010	µg/l	<	<	<b>0.044</b>	<b>0.046</b>	0.016	<b>0.031</b>
isoproturon	P308	0.10	0.010	µg/l	<	<	<	<	<	<
diuron	P309	0.050	0.010	µg/l	<	<	0.033	0.035	0.020	0.033
nonylphenols	P358	n/a	0.010	µg/l	<	<	<	<	<	<

Table 27 (continued). Total results of water samples series 27.

SERIES 27				CC 0597-	5-2153	5-2154	5-2158	5-2159	5-2160	6-2161
Parameter	No.	EQS	LOD	TNO 52005008-	355	356	357	358	359	360
4-tert-octylphenol	P357	0.30	0.010	µg/l	<	<	<	<	<	<
cadmium	P500	0.40	0.10	µg/l	<	<	<	<	<	<
lead	P501	2.0	1.0	µg/l	<	<	<	<	<	<
mercury	P502	0.20	0.10	µg/l	<	<	<	<	<	<
nickel	P503	1.8	1.0	µg/l	<	1.9	2.7	2.6	2.6	<
diphenyl ether, decabromo	P914	n/a	0.020	µg/l	<	<	<	<	<	<
C10-C13 (PCA)	P917	n/a	0.10	µg/l	<	<	<	<	0.30	<
sum diphenyl ether, pentabromo	P920	0.53	0.001	µg/l	<	<	0.002	0.005	0.002	<
sum diphenyl ether, octabromo	P921	n/a	0.002	µg/l	<	<	<	0.009	<	<
tributyltin	P930	0.014	0.005	µg/l	<	<	<	<	<	<
PCB 28	R017	0.50	0.005	µg/l	0.006	0.010	0.010	0.007	0.006	<
PCB 52	R018	0.50	0.002	µg/l	0.004	0.006	0.006	0.006	0.007	0.003
PCB 101	R019	0.50	0.002	µg/l	0.002	0.002	0.003	0.003	0.003	<
PCB 118	R020	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 153	R021	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 138	R022	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 180	R023	0.50	0.002	µg/l	<	<	<	<	<	<
2,4/2,5-dichlorophenol	R028	10	0.010	µg/l	<	<	<	<	<	<
mono-chlorophenol	R042	10	0.050	µg/l	<	<	<	<	<	<
trichlorophenols	R043	1.0	0.010	µg/l	<	<	<	<	<	<
mono-chlorobenzene	R044	1.0	0.10	µg/l	<	<	<	<	<	<
1,2,4,5-tetrachlorobenzene	R051	n/a	0.10	µg/l	<	<	<	<	<	<
dichlorobenzenes	R055	10	0.10	µg/l	<	<	<	<	<	<
sum PCB	R060	0.50	0.50	µg/l	<	<	<	<	<	<
vinylchloride	R100	0.50	0.10	µg/l	<	<	<	<	<	<
bromomethane	R101	0.10	0.50	µg/l	<	<	<	<	<	<
1,1-dichloroethene	R102	10	0.10	µg/l	<	<	<	<	<	<
carbon disulphide	R104	n/a	0.10	µg/l	<	<	<	<	<	<
MTBE	R105	n/a	0.10	µg/l	<	<	<	<	<	<
1,2-dichloroethene	R106	10	0.10	µg/l	<	<	<	<	<	<
1,1-dichloroethane	R107	10	0.10	µg/l	<	<	<	<	<	<
1,1,1-trichloroethane	R110	10	0.10	µg/l	<	<	<	<	<	<
1,2-dichloropropane	R115	0.10	0.10	µg/l	<	<	<	<	<	<
1,3-dichloropropene	R116	0.10	0.10	µg/l	<	<	<	<	<	<
toluene	R117	10	0.20	µg/l	<	<	<	<	<	<
1,1,2-trichloroethane	R119	10	0.10	µg/l	<	<	<	<	<	<
1,2-dibromoethane	R121	2.0	0.10	µg/l	<	<	<	<	<	<
ethylbenzene	R122	10	0.10	µg/l	<	<	<	<	<	<
p,m-xylene	R123	10	0.10	µg/l	<	<	<	<	<	<
o-xylene	R124	10	0.10	µg/l	<	<	<	<	<	<
styrene	R125	50	0.10	µg/l	<	<	<	<	<	<

Table 27 (continued). Total results of water samples series 27.

SERIES 27				CC 0597-	5-2153	5-2154	5-2158	5-2159	5-2160	6-2161
Parameter	No.	EQS	LOD	TNO 52005008-	355	356	357	358	359	360
iso-propylbenzene	R126	4.2	0.10	µg/l	<	<	<	<	<	<
1,1,2,2-tetrachloroethane	R127	10	0.10	µg/l	<	<	<	<	<	<
chloroprene	R134	10	0.10	µg/l	<	<	<	<	<	<
3-chloropropene	R135	10	0.10	µg/l	<	<	<	<	<	<
dichloro-di-isopropylether	R136	10	0.10	µg/l	<	<	<	<	<	<
2,3-dichloropropene	R137	10	0.10	µg/l	<	<	<	<	<	<
epichlorohydrin	R138	0.10	0.10	µg/l	<	<	<	<	<	<
hexachloroethane	R139	10	0.10	µg/l	<	<	<	<	<	<
1,1,2-trichloro-1,2,2-trifluoroethane	R140	3.7	0.10	µg/l	<	<	<	<	<	<
cyanuric chloride	R200	0.10	0.050	µg/l	<	<	<	<	<	<
oxydemeton-methyl	R201	0.50	0.10	µg/l	<	<	<	<	<	<
dichlobenil	R203	n/a	0.010	µg/l	<	<	<	<	<	<
tribenuron-methyl	R204	0.10	0.020	µg/l	<	<	<	<	<	<
biphenyl	R205	1.0	0.010	µg/l	<	<	<	<	<	<
mecoprop	R206	0.020	0.020	µg/l	<b>0.026</b>	<	<b>0.031</b>	<	<	<
MCPA	R207	0.10	0.010	µg/l	<	<	0.029	0.031	0.025	<b>0.11</b>
propachlor	R208	1.3	0.010	µg/l	<	<	<	<	<	<
dichlorprop	R209	0.40	0.020	µg/l	<	<	<	<	<	<
bromoxynil	R210	100	0.020	µg/l	<	<	<	<	<	<
2,4-D	R211	0.10	0.020	µg/l	<	<	<	<	<	<
ethoprophos	R212	0.010	0.010	µg/l	<	<	<	<	<	<
chlorthalopham	R213	10	0.020	µg/l	<	<	<	<	<	<
dimethoate	R215	0.10	0.020	µg/l	<	<	<	<	<	<
carbofuran	R216	0.10	0.010	µg/l	<	<	<	<	<	<
triclopyr		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
propyzamide	R220	100	0.020	µg/l	<	<	<	<	<	<
triallate	R221	0.019	0.005	µg/l	<	<	<	<	<	<
pirimicarb	R222	0.090	0.020	µg/l	<	<	<	<	<	<
bentazon	R223	0.10	0.020	µg/l	<	<	<	<	<	<
tolclofos-methyl	R224	0.80	0.020	µg/l	<	<	<	<	<	<
ioxynil	R226	10	0.050	µg/l	<	<	<	<	<	<
diazinon		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
pirimiphos-methyl	R227	0.050	0.010	µg/l	<	<	<	<	<	<
ethofumesate	R228	0.10	0.020	µg/l	<	<	<	<	<	<
fenitrothion	R229	0.010	0.010	µg/l	<	<	<	<	<	<
di-n-butylphthalate	R230	0.10	1.0	µg/l	<	<	<	<	<	<
malathion	R231	0.010	0.010	µg/l	<	<	<	<	<	<
fenpropimorf	R234	0.10	0.020	µg/l	<	<	<	<	<	<
pendimethalin	R239	1.5	0.010	µg/l	<	<	<	<	<	<
metazachlor	R240	0.34	0.020	µg/l	<	<	<	<	<	<
captan	R242	0.10	0.10	µg/l	<	<	<	<	<	<

Table 27 (continued). Total results of water samples series 27.

SERIES 27				CC 0597-	5-2153	5-2154	5-2158	5-2159	5-2160	6-2161
Parameter	No.	EQS	LOD	TNO 52005008-	355	356	357	358	359	360
kresoxim-methyl	R245	0.10	0.010	µg/l	<	<	<	<	<	<
butylbenzylphthalate	R249	n/a	0.050	µg/l	<b>0.062</b>	<	<b>0.18</b>	<	<	<
permethrin	R252	0.010	0.020	µg/l	<	<	<	<	<	<
diisononylester DINP	R254	n/a	2.00	µg/l	<b>2.7</b>	<	<b>5.0</b>	<	<	<
prochloraz	R255	4.0	0.020	µg/l	<	<	<	<	<	<
cyfluthrin	R256	0.020	0.020	µg/l	<	<	<	<	<	<
cypermethrin	R257	0.10	0.020	µg/l	<	<	<	<	<	<
deltamethrin	R258	0.020	0.020	µg/l	<	<	<	<	<	<
oxamyl	R300	1.8	0.050	µg/l	<	<	<	<	<	<
trichlorofon	R301	0.020	0.020	µg/l	<	<	<	<	<	<
metamitron	R302	0.10	0.010	µg/l	<	<	<	<	<	<
carbendazim	R303	0.11	0.010	µg/l	<	<	<	<	<	<
chloridazon	R304	0.10	0.020	µg/l	<	<	<	<	<	<
thiabendazole	R305	5.0	0.050	µg/l	<	<	<	<	<	<
chlorotoluron	R307	0.40	0.020	µg/l	<	<	<	<	<	<
monolinuron	R310	0.10	0.010	µg/l	<	<	<	<	<	<
methiocarb	R311	0.010	0.010	µg/l	<	<	<	<	<	<
linuron	R312	0.10	0.010	µg/l	<	<	<	<	<	<
epoxiconazole	R313	0.10	0.010	µg/l	<	<	<	<	<	<
diflubenzuron	R314	0.015	0.010	µg/l	<	<	<	<	<	<
glyphosate	R350	0.10	0.10	µg/l	<	<b>0.20</b>	<	<	<	<
amitraz		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
dimethylamine	R352	7.5	1.0	µg/l	<	<	<	<	<	<
diethylamine	R353	10	1.0	µg/l	<	<	<	<	<	<
nonylphenol ethoxylates	R355	0.10	0.050	µg/l	<	<	<	0.070	0.070	<
bisphenol-A	R356	n/a	0.010	µg/l	<	<	<	<	0.010	<
chlormequat	R358	n/a	0.10	µg/l	<	<	<	<	<	<
paraquat	R359	0.10	0.50	µg/l	<	<	<	<	<	<
arsenic	R504	1.0	0.10	µg/l	< 0,45	0.72	<b>1.0</b>	< 1,0	0.74	< 0,42
zinc	R505	2.3	0.10	µg/l	<b>16</b>	<b>26</b>	<b>283</b>	<b>14</b>	<b>39</b>	<b>43</b>
copper	R506	0.50	0.10	µg/l	<b>1.1</b>	<b>5.2</b>	<b>2.4</b>	< 2,4	<b>3.1</b>	<b>2.0</b>
chromium	R507	0.30	0.10	µg/l	< 0,23	< 0,33	< 0,30	< 0,36	<b>0.62</b>	< 0,26
selenium	R508	5.3	0.10	µg/l	<	<	<	<	<	<
antimony	R509	0.40	0.10	µg/l	<	0.14	0.25	0.21	0.22	<
molybdenum	R510	4.3	0.10	µg/l	0.27	0.25	0.74	0.68	0.48	0.11
titanium	R511	20	0.10	µg/l	< 0,35	< 0,38	< 0,50	< 0,60	3.5	1.4
tin	R512	0.20	0.10	µg/l	<	<	<	<	<	<
barium	R513	75	0.10	µg/l	3.8	8.5	28	27	31	6.2
beryllium	R514	0.20	0.10	µg/l	<	<	<	<	<	<
boron	R515	6.5	0.10	µg/l	<b>16</b>	<b>22</b>	<b>25</b>	<b>28</b>	<b>30</b>	<b>8.8</b>
uranium	R516	1.0	0.10	µg/l	<	0.48	0.19	0.18	<	0.10

Table 27 (continued). Total results of water samples series 27.

SERIES 27				CC 0597-	5-2153	5-2154	5-2158	5-2159	5-2160	6-2161
Parameter	No.	EQS	LOD	TNO 52005008-	355	356	357	358	359	360
vanadium	R517	0.90	0.10	µg/l	0.18	0.25	0.55	0.69	0.58	0.22
cobalt	R518	0.20	0.10	µg/l	<	<b>0.31</b>	<b>0.65</b>	< 0,26	<b>0.52</b>	<b>0.20</b>
thallium	R519	1.6	0.10	µg/l	<	<	<	<	<	<
tellurium	R520	100	0.10	µg/l	<	<	<	<	<	<
silver	R521	1.2	0.10	µg/l	<	<	<	<	<	<
cyanide	R522	0.001	0.002	mg/l	<	<	<	<	<	<
fluoride	R523	0.001	0.10	mg/l	<	<	<	<	<	<
chloride	R524	250	1.0	mg/l	13	25	18	18	12	14
HBCD	R915	n/a	0.020	µg/l	<	<	<	<	<	<
polychloronaphthalenes	R918	0.77	0.10	µg/l	<	<	<	<	<	<
PCT	R919	0.50	0.10	µg/l	<	<	<	<	<	<
dibutyltin	R931	0.010	0.005	µg/l	<	<	<	<	<	<
tetrabutyltin	R932	0.016	0.005	µg/l	<	<	<	<b>0.017</b>	<	<
triphenyltin	R933	0.005	0.005	µg/l	<	<	<	<	<	<
tri-n-propyltin	R934	n/a	0.005	µg/l	<	<	<	<	<	<
maneb/zineb/thiram/mancozeb	R940	0.10	0.10	µg/l	<	<	<	<	<	<
4-chloor-3-methylfenol	R950	10	0.010	µg/l	<	<	<	<	<	<
tetrabromobisphenol-A	R951	n/a	0.001	µg/l	<	<	<	<	<	<
total phosphorus	R970	n/a	0.050	mg/l	<	<	0.090	0.070	0.220	<
total nitrogen	R971	n/a	0.50	mg/l	<	<	0.93	0.94	1.9	0.78
nitrate	R972	n/a	0.050	mg/l	1.30	9.00	45.0	44.0	2.40	0.47
total organic carbon	R973	n/a	5.0	mg/l	<	<	11	11	20	12
phenols	R974	0.030	0.030	mg/l	<	<	<	<	<	<

Table 28 Total results of water samples series 28.

SERIES 28				CC 0597-	6-2192	6-2193	5-2194	6-2195	6-2196	6-2197
Parameter	No.	EQS	LOD	TNO 52005008-	364	365	366	367	368	369
naphthalene	P001	1.0	0.10	µg/l	<	<	<	<	<	<
anthracene	P006	0.010	0.002	µg/l	0.003	0.006	0.010	0.008	0.009	<
fluoranthene	P007	0.025	0.005	µg/l	0.009	0.020	0.018	0.023	0.019	0.017
benzo[b]fluoranthene	P011	n/a	0.005	µg/l	<	<	0.009	<	<	<
benzo[k]fluoranthene	P012	0.040	0.005	µg/l	<	<	<	<	<	<
benzo[a]pyrene	P013	0.010	0.005	µg/l	<	<	0.008	<	<	<
indeno[1,2,3-cd]pyrene	P014	0.040	0.005	µg/l	<	<	<	<	<	<
benzo[g,h,i]perylene	P016	0.030	0.005	µg/l	<	<	0.007	<	<	<
pentachlorophenol	P041	0.10	0.010	µg/l	<	<	<	<	<	<
1,3,5-trichlorobenzene	P048	0.10	0.010	µg/l	<	<	<	<	<	<
1,2,4-trichlorobenzene	P049	0.10	0.010	µg/l	<	<	<	<	<	<
1,2,3-trichlorobenzene	P050	0.10	0.010	µg/l	<	<	<	<	<	<
pentachlorobenzene	P053	1.0	0.002	µg/l	<	<	<	<	<	<
hexachlorobenzene	P054	0.010	0.002	µg/l	<	<	<	<	<	<
dichloromethane	P103	10	0.10	µg/l	<	<	<	<	<	<
trichloromethane	P109	1.0	0.10	µg/l	<	<	0.72	<	<	<
tetrachloromethane	P111	n/a	0.10	µg/l	<	<	<	<	<	<
1,2-dichloroethane	P112	2.0	0.10	µg/l	<	<	<	<	<	<
benzene	P113	1.0	0.10	µg/l	<	<	<	<	<	<
trichloroethene	P114	n/a	0.10	µg/l	<	<	<	<	<	<
tetrachloroethene	P120	n/a	0.10	µg/l	<	<	0.86	<	<	<
hexachlorobutadiene	P202	0.10	0.002	µg/l	<	<	<	<	<	<
trifluralin	P214	0.037	0.005	µg/l	<	<	<	<	<	<
atrazine	P218	0.10	0.010	µg/l	<	0.010	<	0.039	<	<
lindane	P219	0.010	0.005	µg/l	<	<	<	<	<	<
alachlor	P225	0.035	0.010	µg/l	<	<	<	<	<	<
aldrin	P232	0.010	0.005	µg/l	<	<	<	<	<	<
chlorpyrifos(-ethyl)	P233	0.10	0.010	µg/l	<	<	<	<	<	<
isodrin	P238	0.005	0.005	µg/l	<	<	<	<	<	<
chlorfenvinphos	P241	0.10	0.010	µg/l	<	<	<	<	<	<
endosulfan-alpha	P243	0.10	0.010	µg/l	<	<	<	<	<	<
dieldrin	P244	0.005	0.005	µg/l	<	<	<	<	<	<
endrin	P246	0.005	0.005	µg/l	<	<	<	<	<	<
endosulfan-beta	P247	0.10	0.010	µg/l	<	<	<	<	<	<
2,4'-DDT	P248	0.010	0.002	µg/l	<	<	<	<	<	<
4,4'-DDT	P250	0.010	0.002	µg/l	<	<	<	<	<	<
di-(2-ethylhexyl)-phthalate (DEHP)	P251	0.50	1.00	µg/l	<	<	<	<	<	<
simazine	P306	0.020	0.010	µg/l	<	<	<	0.029	0.027	0.027
isoproturon	P308	0.10	0.010	µg/l	<	<	<	<	<	<
diuron	P309	0.050	0.010	µg/l	<	<	0.028	0.036	0.031	0.031
nonylphenols	P358	n/a	0.010	µg/l	<	<	<	<	0.074	<

Table 28 (continued). Total results of water samples series 28.

SERIES 28				CC 0597-	6-2192	6-2193	5-2194	6-2195	6-2196	6-2197
Parameter	No.	EQS	LOD	TNO 52005008-	364	365	366	367	368	369
4-tert-octylphenol	P357	0.30	0.010	µg/l	<	<	<	<	<	<
cadmium	P500	0.40	0.10	µg/l	<	<	<	<	<	<
lead	P501	2.0	1.0	µg/l	<	<	<	<	<	<
mercury	P502	0.20	0.10	µg/l	<	<	<	<	<	<
nickel	P503	1.8	1.0	µg/l	<	<	1.0	2.6	2.1	2.1
diphenyl ether, decabromo	P914	n/a	0.020	µg/l	<	<	<	<	<	<
C10-C13 (PCA)	P917	n/a	0.10	µg/l	<	<	<	<	<	<
sum diphenyl ether, pentabromo	P920	0.53	0.001	µg/l	<	<	<	<	<	<
sum diphenyl ether, octabromo	P921	n/a	0.002	µg/l	<	<	<	<	<	<
tributyltin	P930	0.014	0.005	µg/l	<	<	<	<	<	<
PCB 28	R017	0.50	0.005	µg/l	0.005	0.009	0.006	0.007	0.006	0.007
PCB 52	R018	0.50	0.002	µg/l	0.006	0.008	0.005	0.005	0.005	0.004
PCB 101	R019	0.50	0.002	µg/l	<	0.004	0.002	<	<	0.002
PCB 118	R020	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 153	R021	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 138	R022	0.50	0.002	µg/l	<	<	<	<	<	<
PCB 180	R023	0.50	0.002	µg/l	<	<	<	<	<	<
2,4/2,5-dichlorophenol	R028	10	0.010	µg/l	<	<	<	<	<	<
mono-chlorophenol	R042	10	0.050	µg/l	<	<	<	<	<	<
trichlorophenols	R043	1.0	0.010	µg/l	<	<	<	<	<	<
mono-chlorobenzene	R044	1.0	0.10	µg/l	<	<	<	<	<	<
1,2,4,5-tetrachlorobenzene	R051	n/a	0.10	µg/l	<	<	<	<	<	<
dichlorobenzenes	R055	10	0.10	µg/l	<	<	<	<	<	<
sum PCB	R060	0.50	0.50	µg/l	<	<	<	<	<	<
vinylchloride	R100	0.50	0.10	µg/l	<	<	<	<	<	<
bromomethane	R101	0.10	0.50	µg/l	<	<	<	<	<	<
1,1-dichloroethene	R102	10	0.10	µg/l	<	<	<	<	<	<
carbon disulphide	R104	n/a	0.10	µg/l	<	<	<	<	<	<
MTBE	R105	n/a	0.10	µg/l	<	<	<	<	<	<
1,2-dichloroethene	R106	10	0.10	µg/l	<	<	<	<	<	<
1,1-dichloroethane	R107	10	0.10	µg/l	<	<	<	<	<	<
1,1,1-trichloroethane	R110	10	0.10	µg/l	<	<	<	<	<	<
1,2-dichloropropane	R115	0.10	0.10	µg/l	<	<	<	<	<	<
1,3-dichloropropene	R116	0.10	0.10	µg/l	<	<	<	<	<	<
toluene	R117	10	0.20	µg/l	<	<	<	<	<	<
1,1,2-trichloroethane	R119	10	0.10	µg/l	<	<	<	<	<	<
1,2-dibromoethane	R121	2.0	0.10	µg/l	<	<	<	<	<	<
ethylbenzene	R122	10	0.10	µg/l	<	<	<	<	<	<
p,m-xylene	R123	10	0.10	µg/l	<	<	<	<	<	<
o-xylene	R124	10	0.10	µg/l	<	<	<	<	<	<
styrene	R125	50	0.10	µg/l	<	<	<	<	<	<

Table 28 (continued). Total results of water samples series 28.

SERIES 28				CC 0597-	6-2192	6-2193	5-2194	6-2195	6-2196	6-2197
Parameter	No.	EQS	LOD	TNO 52005008-	364	365	366	367	368	369
iso-propylbenzene	R126	4.2	0.10	µg/l	<	<	<	<	<	<
1,1,2,2-tetrachloroethane	R127	10	0.10	µg/l	<	<	<	<	<	<
chloroprene	R134	10	0.10	µg/l	<	<	<	<	<	<
3-chloropropene	R135	10	0.10	µg/l	<	<	<	<	<	<
dichloro-di-isopropylether	R136	10	0.10	µg/l	<	<	<	<	<	<
2,3-dichloropropene	R137	10	0.10	µg/l	<	<	<	<	<	<
epichlorohydrin	R138	0.10	0.10	µg/l	<	<	<	<	<	<
hexachloroethane	R139	10	0.10	µg/l	<	<	<	<	<	<
1,1,2-trichloro-1,2,2-trifluoroethane	R140	3.7	0.10	µg/l	<	<	<	<	<	<
cyanuric chloride	R200	0.10	0.050	µg/l	<	<	<	<	<	<
oxydemeton-methyl	R201	0.50	0.10	µg/l	<	<	<	<	<	<
dichlobenil	R203	n/a	0.010	µg/l	<	0.018	0.095	<	0.044	0.043
tribenuron-methyl	R204	0.10	0.020	µg/l	<	<	<	<	<	<
biphenyl	R205	1.0	0.010	µg/l	<	<	<	<	<	<
mecoprop	R206	0.020	0.020	µg/l	<	<	<	<	<b>0.070</b>	<b>0.083</b>
MCPA	R207	0.10	0.010	µg/l	<	0.036	0.036	0.021	<	0.023
propachlor	R208	1.3	0.010	µg/l	<	<	<	<	<	<
dichlorprop	R209	0.40	0.020	µg/l	<	<	<	<	<	<
bromoxynil	R210	100	0.020	µg/l	<	<	<	<	<	<
2,4-D	R211	0.10	0.020	µg/l	<	<	<	<	<	<
ethoprophos	R212	0.010	0.010	µg/l	<	<	<	<	<	<
chlorpropham	R213	10	0.020	µg/l	<	<	<	<	<	<
dimethoate	R215	0.10	0.020	µg/l	<	<	<	<	<	<
carbofuran	R216	0.10	0.010	µg/l	<	<	<	<	<	<
triclopyr		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
propyzamide	R220	100	0.020	µg/l	<	<	<	<	<	<
triallate	R221	0.019	0.005	µg/l	<	<	<	<	<	<
pirimicarb	R222	0.090	0.020	µg/l	<	<	<	<	<	<
bentazon	R223	0.10	0.020	µg/l	<	<	<	<	<	<
tolclofos-methyl	R224	0.80	0.020	µg/l	<	<	<	<	<	<
ioxynil	R226	10	0.050	µg/l	<	<	<	<	<	<
diazinon		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
pirimiphos-methyl	R227	0.050	0.010	µg/l	<	<	<	<	<	<
ethofumesate	R228	0.10	0.020	µg/l	<	<	<	<	<	<
fenitrothion	R229	0.010	0.010	µg/l	<	<	<	<	<	<
di-n-butylphthalate	R230	0.10	1.0	µg/l	<	<	<	<	<b>1.2</b>	<
malathion	R231	0.010	0.010	µg/l	<	<	<	<	<	<
fenpropimorf	R234	0.10	0.020	µg/l	<	<	<	<	<	<
pendimethalin	R239	1.5	0.010	µg/l	<	<	<	<	<	<
metazachlor	R240	0.34	0.020	µg/l	<	<	<	<	<	<
captan	R242	0.10	0.10	µg/l	<	<	<	<	<	<



Table 28 (continued). Total results of water samples series 28.

SERIES 28				CC 0597- TNO 52005008-	6-2192 364	6-2193 365	5-2194 366	6-2195 367	6-2196 368	6-2197 369
Parameter	No.	EQS	LOD							
kresoxim-methyl	R245	0.10	0.010	µg/l	<	<	<	<	<	<
butylbenzylphthalate	R249	n/a	0.050	µg/l	0.052	0.018	<	<	<	<
permethrin	R252	0.010	0.020	µg/l	<	<	<	<	<	<
diisononylester DINP	R254	n/a	2.00	µg/l	<	<	<	<	<	<
prochloraz	R255	4.0	0.020	µg/l	<	<	<	<	<	<
cyfluthrin	R256	0.020	0.020	µg/l	<	<	<	<	<	<
cypermethrin	R257	0.10	0.020	µg/l	<	<	<	<	<	<
deltamethrin	R258	0.020	0.020	µg/l	<	<	<	<	<	<
oxamyl	R300	1.8	0.050	µg/l	<	<	<	<	<	<
trichlorofon	R301	0.020	0.020	µg/l	<	<	<	<	<	<
metamitron	R302	0.10	0.010	µg/l	<	<	<	<	<	<
carbendazim	R303	0.11	0.010	µg/l	<	<	<	<	<	<
chloridazon	R304	0.10	0.020	µg/l	<	<	<	<	<	<
thiabendazole	R305	5.0	0.050	µg/l	<	<	<	<	<	<
chlorotoluron	R307	0.40	0.020	µg/l	<	<	<	<	<	<
monolinuron	R310	0.10	0.010	µg/l	<	<	<	<	<	<
methiocarb	R311	0.010	0.010	µg/l	<	<	<	<	<	<
linuron	R312	0.10	0.010	µg/l	<	<	<	<	<	<
epoxiconazole	R313	0.10	0.010	µg/l	<	<	0.049	<	0.040	0.040
diflubenzuron	R314	0.015	0.010	µg/l	<	<	<	<	<	<
glyphosate	R350	0.10	0.10	µg/l	<	<	<b>0.12</b>	<	<	<
amitraz		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a
dimethylamine	R352	7.5	1.0	µg/l	<	<	<	<	<	<
diethylamine	R353	10	1.0	µg/l	<	<	<	<	<	<
nonylphenol ethoxylates	R355	0.10	0.050	µg/l	<	<	<	<	0.067	<
bisphenol-A	R356	n/a	0.010	µg/l	<	<	0.015	<	<	<
chlormequat	R358	n/a	0.10	µg/l	<	<	<	<	<	<
paraquat	R359	0.10	0.50	µg/l	<	<	<	<	<	<
arsenic	R504	1.0	0.10	µg/l	< 0,42	0.68	0.51	0.89	0.69	0.70
zinc	R505	2.3	0.10	µg/l	<b>14</b>	<b>6.5</b>	<b>17</b>	<b>11</b>	<b>8</b>	<b>3.2</b>
copper	R506	0.50	0.10	µg/l	<b>0.61</b>	<b>0.90</b>	<b>1.1</b>	<b>1.8</b>	<b>1.4</b>	<b>2.2</b>
chromium	R507	0.30	0.10	µg/l	< 0,23	< 0,31	< 0,32	< 0,28	< 0,31	< 0,29
selenium	R508	5.3	0.10	µg/l	<	<	<	<	<	0.11
antimony	R509	0.40	0.10	µg/l	<	<	0.18	0.16	0.16	0.16
molybdenum	R510	4.3	0.10	µg/l	<	0.13	0.21	0.48	0.47	0.45
titanium	R511	20	0.10	µg/l	< 0,20	< 0,51	1.3	< 0,56	< 0,84	< 0,83
tin	R512	0.20	0.10	µg/l	<	<	<	<	<	<
barium	R513	75	0.10	µg/l	3.5	6.6	9.3	29	<b>82</b>	<b>81</b>
beryllium	R514	0.20	0.10	µg/l	<	<	<	<	<	<
boron	R515	6.5	0.10	µg/l	<b>13</b>	<b>15</b>	<b>18</b>	<b>19</b>	<b>43</b>	<b>46</b>
uranium	R516	1.0	0.10	µg/l	<	0.21	0.15	0.17	0.34	0.34

Table 28 (continued). Total results of water samples series 28.

SERIES 28				CC 0597-	6-2192	6-2193	5-2194	6-2195	6-2196	6-2197
Parameter	No.	EQS	LOD	TNO 52005008-	364	365	366	367	368	369
vanadium	R517	0.90	0.10	µg/l	0.12	0.24	0.27	0.42	0.35	0.36
cobalt	R518	0.20	0.10	µg/l	<	0.13	<b>0.22</b>	<b>0.20</b>	<b>0.27</b>	<b>0.26</b>
thallium	R519	1.6	0.10	µg/l	<	<	<	<	<	<
tellurium	R520	100	0.10	µg/l	<	<	<	<	<	<
silver	R521	1.2	0.10	µg/l	<	<	<	<	<	<
cyanide	R522	0.001	0.002	mg/l	<	<	<	<	<	<
fluoride	R523	0.001	0.10	mg/l	<	<	<	<	<b>0.12</b>	<b>0.19</b>
chloride	R524	250	1.0	mg/l	12	17	16	18	26	26
HBCD	R915	n/a	0.020	µg/l	<	<	<	<	<	<
polychloronaphthalenes	R918	0.77	0.10	µg/l	<	<	<	<	<	<
PCT	R919	0.50	0.10	µg/l	<	<	<	<	<	<
dibutyltin	R931	0.010	0.005	µg/l	<	<	<	<	<	<
tetrabutyltin	R932	0.016	0.005	µg/l	<	<	<	<	<	<
triphenyltin	R933	0.005	0.005	µg/l	<	<	<	<	<	<
tri-n-propyltin	R934	n/a	0.005	µg/l	<	<	<	<	<	<
maneb/zineb/thiram/mancozeb	R940	0.10	0.10	µg/l	<	<	<	<	<	<
4-chloor-3-methylfenol	R950	10	0.010	µg/l	<	<	<	<	<	<
tetrabromobisphenol-A	R951	n/a	0.001	µg/l	<	<	<	<	<	<
total phosphorus	R970	n/a	0.050	mg/l	<	<	0.15	0.060	0.16	0.12
total nitrogen	R971	n/a	0.50	mg/l	<	0.6	1.4	1.1	0.84	0.73
nitrate	R972	n/a	0.050	mg/l	1.2	6.2	2.2	1.3	9.1	8.8
total organic carbon	R973	n/a	5.0	mg/l	<	6.6	10	11	11	11
phenols	R974	0.030	0.030	mg/l	<	<	<	<	<	<







Table 29 (continued). Total results of water samples series 29.

SERIES 29				CC 0597-	5-2237	5-2238	5-2239	5-2244	5-2245	6-2246	6-2247
Parameter	No.	EQS	LOD	TNO 52005008-	379	380	381	382	383	384	385
kresoxim-methyl	R245	0.10	0.010	µg/l	<	<	<	<	<	<	<
butylbenzylphthalate	R249	n/a	0.050	µg/l	<	<	<	<	<	<	<
permethrin	R252	0.010	0.020	µg/l	<	<	<	<	<	<	<
diisononylester DINP	R254	n/a	2.00	µg/l	<	<	<	<	<	<	<
prochloraz	R255	4.0	0.020	µg/l	<	<	<	<	<	<	<
cyfluthrin	R256	0.020	0.020	µg/l	<	<	<	<	<	<	<
cypermethrin	R257	0.10	0.020	µg/l	<	<	<	<	<	<	<
deltamethrin	R258	0.020	0.020	µg/l	<	<	<	<	<	<	<
oxamyl	R300	1.8	0.050	µg/l	<	<	<	<	<	<	<
trichlorofon	R301	0.020	0.020	µg/l	<	<	<	<	<	<	<
metamitron	R302	0.10	0.010	µg/l	<	<	<	<	<	<	<
carbendazim	R303	0.11	0.010	µg/l	<	<	<	<	<	<	<
chloridazon	R304	0.10	0.020	µg/l	<	<	<	<	<	<	<
thiabendazole	R305	5.0	0.050	µg/l	<	<	<	<	<	<	<
chlorotoluron	R307	0.40	0.020	µg/l	<	<	<	<	<	<	<
monolinuron	R310	0.10	0.010	µg/l	<	<	<	<	<	<	<
methiocarb	R311	0.010	0.010	µg/l	<	<	<	<	<	<	<
linuron	R312	0.10	0.010	µg/l	<	<	<	<	<	<	<
epoxiconazole	R313	0.10	0.010	µg/l	<	<	<	<	<	<	<
diflubenzuron	R314	0.015	0.010	µg/l	<	<	<	<	<	<	<
glyphosate	R350	0.10	0.10	µg/l	<	<	<	<	<	<	<
amitraz		n/a	0.020	µg/l	n/a	n/a	n/a	n/a	n/a	n/a	n/a
dimethylamine	R352	7.5	1.0	µg/l	<	<	<	<	<	<	<
diethylamine	R353	10	1.0	µg/l	<	<	<	<	<	<	<
nonylphenol ethoxylates	R355	0.10	0.050	µg/l	<	<	<	<	<	<	<
bisphenol-A	R356	n/a	0.010	µg/l	<	<	<	<	<	<	<
chlormequat	R358	n/a	0.10	µg/l	<	<	<	<	<	<	<
paraquat	R359	0.10	0.50	µg/l	<	<	<	<	<	<	<
arsenic	R504	1.0	0.10	µg/l	0.24	0.22	< 0,18	0.23	0.25	0.22	< 0,20
zinc	R505	2.3	0.10	µg/l	<b>8.5</b>	<b>5.5</b>	<b>6.1</b>	<b>4.9</b>	<b>3.1</b>	<b>9.5</b>	<b>8.3</b>
copper	R506	0.50	0.10	µg/l	<b>0.87</b>	<b>0.65</b>	<b>0.55</b>	<b>0.68</b>	<b>0.83</b>	<b>0.74</b>	<b>0.61</b>
chromium	R507	0.30	0.10	µg/l	< 0,13	< 0,18	< 0,14	<	< 0,15	< 0,15	< 0,11
selenium	R508	5.3	0.10	µg/l	<	<	<	<	<	<	<
antimony	R509	0.40	0.10	µg/l	<	<	<	<	<	<	<
molybdenum	R510	4.3	0.10	µg/l	<	<	<	0.15	0.18	<	0.14
titanium	R511	20	0.10	µg/l	< 0,16	< 0,29	< 0,23	< 0,19	< 0,35	< 0,92	< 0,73
tin	R512	0.20	0.10	µg/l	<	<	<	<	<	<	<
barium	R513	75	0.10	µg/l	2.6	4.7	4.2	15	42	4.8	4.1
beryllium	R514	0.20	0.10	µg/l	<	<	<	<	<	<	<
boron	R515	6.5	0.10	µg/l	< 4,2	< 2,9	< 1,7	< 2,4	6.3	< 3,9	< 1,7
uranium	R516	1.0	0.10	µg/l	<	<	<	<	0.34	<	<

Table 29 (continued). Total results of water samples series 29

SERIES 29 Parameter	No.	EQS	LOD	CC 0597- TNO 52005008-	5-2237 379	5-2238 380	5-2239 381	5-2244 382	5-2245 383	6-2246 384	6-2247 385
vanadium	R517	0.90	0.10	µg/l	<	0.13	0.10	<	0.12	<	<
cobalt	R518	0.20	0.10	µg/l	<	<	<	<	<	0.14	0.12
thallium	R519	1.6	0.10	µg/l	<	<	<	<	<	<	<
tellurium	R520	100	0.10	µg/l	<	<	<	<	<	<	<
silver	R521	1.2	0.10	µg/l	<	<	<	<	<	<	<
cyanide	R522	0.001	0.002	mg/l	<	<	<	<	<	<	<
fluoride	R523	0.001	0.10	mg/l	<	<	<	<	<	<	<
chloride	R524	250	1.0	mg/l	11	16	16	17	15	7.7	7.7
HBCD	R915	n/a	0.020	µg/l	<	<	<	<	<	<	<
polychloronaphthalenes	R918	0.77	0.10	µg/l	<	<	<	<	<	<	<
PCT	R919	0.50	0.10	µg/l	<	<	<	<	<	<	<
dibutyltin	R931	0.010	0.005	µg/l	<	<	<	<	<	<	<
tetrabutyltin	R932	0.016	0.005	µg/l	<	<	<	<	<	<	<
triphenyltin	R933	0.005	0.005	µg/l	<	<	<	<	<	<	<
tri-n-propyltin	R934	n/a	0.005	µg/l	<	<	<	<	<	<	<
maneb/zineb/thiram/mancozeb	R940	0.10	0.10	µg/l	<	<	<	<	<	<	<
4-chloor-3-methylfenol	R950	10	0.010	µg/l	<	<	<	<	<	<	<
tetrabromobisphenol-A	R951	n/a	0.001	µg/l	<	<	<	<	<	<	<
total phosphorus	R970	n/a	0.050	mg/l	<	0.050	0.050	0.070	0.070	<	<
total nitrogen	R971	n/a	0.50	mg/l	0.59	0.82	1.1	1.1	1.3	0.98	1.1
nitrate	R972	n/a	0.050	mg/l	1.50	9.70	9.80	3.30	5.30	<	<
total organic carbon	R973	n/a	5.0	mg/l	6.6	10	10	12	14	19	19

## Full results of sediment samples target sites, serie 9

Table 30 Total results of sediment samples series 9.

Sediment Parameter	No.	EQS	LOD	CC 0597- TNO 52005008-	5-2189 373	5-2191 374	6-2192 375	6-2195 376	6-2196 377	5-2194 378	5-2238 391
naphthalene	P001	n/a	1.0	µg/kg dw	6.2	6.6	5.8	9.8	7.9	5.5	13
anthracene	P006	n/a	0.50	µg/kg dw	<	<	<	13	7.6	<	8.3
fluoranthene	P007	n/a	0.50	µg/kg dw	0.7	2.1	1.5	105	54	2.4	29
benzo[b]fluoranthene	P011	n/a	0.50	µg/kg dw	<	1.6	1.1	101	30	1.7	22
benzo[k]fluoranthene	P012	n/a	0.50	µg/kg dw	<	0.52	<	26	8.8	0.61	13
benzo[a]pyrene	P013	n/a	0.50	µg/kg dw	<	1.0	0.91	88	24	1.5	24
indeno[1,2,3-cd]pyrene	P014	n/a	0.50	µg/kg dw	<	0.73	0.66	48	14	0.91	12
benzo[g,h,i]perylene	P016	n/a	0.50	µg/kg dw	<	0.66	0.69	53	14	0.93	13
pentachlorophenol	P041	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
1,3,5-trichlorobenzene	P048	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
1,2,4-trichlorobenzene	P049	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
1,2,3-trichlorobenzene	P050	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
pentachlorobenzene	P053	n/a	0.20	µg/kg dw	<	<	<	<	<	<	<
hexachlorobenzene	P054	n/a	0.20	µg/kg dw	<	<	<	<	<	<	<
dichloromethane	P103	n/a	1.0	µg/kg dw	85	41	82	96	219	37	15
trichloromethane	P109	n/a	1.0	µg/kg dw	3.8	1.2	<	1.0	2.9	1.2	<
tetrachloromethane	P111	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
1,2-dichloroethane	P112	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
benzene	P113	n/a	1.0	µg/kg dw	2.1	<	<	3.0	1.8	<	<
trichloroethene	P114	n/a	1.0	µg/kg dw	1.1	<	<	<	<	<	<
tetrachloroethene	P120	n/a	1.0	µg/kg dw	<	<	<	<	3.1	<	<
hexachlorobutadiene	P202	n/a	0.20	µg/kg dw	<	<	<	<	<	<	<
trifluralin	P214	n/a	0.50	µg/kg dw	<	<	<	<	<	<	<
atrazine	P218	n/a	1.0	µg/kg dw	<	<	<	3.8	<	<	<
lindane	P219	n/a	0.50	µg/kg dw	<	<	<	<	<	<	<
alachlor	P225	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
aldrin	P232	n/a	0.50	µg/kg dw	<	<	<	<	<	<	<
chlorpyrifos(-ethyl)	P233	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
isodrin	P238	n/a	0.50	µg/kg dw	<	<	<	<	<	<	<
chlorfenvinphos	P241	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
endosulfan-alpha	P243	n/a	1.0	µg/kg dw	<	<	<	9.1	<	<	<
dieldrin	P244	n/a	0.50	µg/kg dw	<	<	<	<	<	<	<
endrin	P246	n/a	0.50	µg/kg dw	<	<	<	<	<	<	<
endosulfan-beta	P247	n/a	1.0	µg/kg dw	<	<	6.2	<	13	<	<
2,4'-DDT	P248	n/a	0.20	µg/kg dw	<	<	<	0.68	<	<	0.51
4,4'-DDT	P250	n/a	0.20	µg/kg dw	<	<	<	2.6	<	<	4.3
di-(2-ethylhexyl)-phthalate (DEHP)	P251	n/a	20	µg/kg dw	<	<	36	< 10	<	<	14
simazine	P306	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
isoproturon	P308	n/a	1.0	µg/kg dw	<	<	<	<	<	<	<
diuron	P309	n/a	1.0	µg/kg dw	<	<	<	1.5	< 1	< 1	< 1
4-tert-octylphenol	P357	n/a	1.0	µg/kg dw	<	<	<	< 1	< 1	< 1	< 1





Table 30 (continued). Total results of sediment samples series 9.

[illegible]



Table 30 (continued). Total results of sediment samples series 9.

Sediment					CC 0597-	5-2189	5-2191	6-2192	6-2195	6-2196	5-2194	5-2238
Parameter	No.	EQS	LOD		TNO 52005008-	373	374	375	376	377	378	391
dichloroanelines	R482	n/a	10	µg/kg dw		<	<	<	<	<	<	<
chloronitrobenzenes	R483	n/a	4.0	µg/kg dw		<	<	<	<	<	<	<
dichloronitrobenzenes:	R484	n/a	4.0	µg/kg dw		<	<	<	<	<	<	<
arsenic	R504	29	0.010	mg/kg dw		8.6	6.6	5.2	6.3	4.8	6.9	12
zinc	R505	140	0.010	mg/kg dw		66	81	30	43	40	85	69
copper	R506	36	0.010	mg/kg dw		8.1	9.9	6.5	15	7.6	13	13
chromium	R507	100	0.010	mg/kg dw		29	32	25	26	22	40	38
selenium	R508	0.70	0.14	mg/kg dw		0.46	0.50	0.26	0.45	0.22	0.54	13
antimony	R509	3.0	0.010	mg/kg dw		0.14	0.14	0.52	0.87	0.21	0.40	0.86
molybdenum	R510	3.0	0.010	mg/kg dw		1.1	1.1	0.20	1.1	0.42	1.0	0.62
titanium	R511	n/a	0.010	mg/kg dw		1976	2401	1488	1063	823	3353	2028
tin	R512	n/a	0.010	mg/kg dw		0.81	0.89	0.51	46	1.88	2.9	1.2
barium	R513	160	0.010	mg/kg dw		833	924	111	107	123	509	161
beryllium	R514	1.1	0.010	mg/kg dw		2.0	1.8	0.37	0.45	0.32	2.0	1.0
boron	R515	n/a	1.3	mg/kg dw		4.9	4.7	16	9.13	13	2.3	na
uranium	R516	n/a	0.010	mg/kg dw		1.4	2.3	0.75	0.95	0.55	2.4	1.20
vanadium	R517	42	0.010	mg/kg dw		45	50	20	22	15	53	42
cobalt	R518	9.0	0.010	mg/kg dw		458	162	166	133	143	227	11
thallium	R519	1.0	0.010	mg/kg dw		0.22	0.40	0.024	0.071	0.047	0.48	0.22
tellurium	R520	n/a	0.010	mg/kg dw		0.048	0.048	0.020	0.033	0.019	0.066	0.037
silver	R521	5.5	0.010	mg/kg dw		0.10	0.12	0.087	0.096	0.092	0.12	0.14
cyanide	R522	n/a	0.50	mg/kg dw		<	<	<	<	<	<	<
fluoride	R523	500	0.20	mg/kg dw		<	<	<	<	<	<	<
chloride	R524	n/a	0.40	mg/kg dw		<	<	<	27	34	<	21
2378 T4CDD	R600	n/a	0.200	ng/kg dw		<	<	<	<	<	<	<
12378 P5CDD	R601	n/a	0.200	ng/kg dw		<	<	<	<	<	<	<
123478 H6CDD	R602	n/a	1.000	ng/kg dw		<	<	<	<	<	<	<
123678 H6CDD	R603	n/a	1.000	ng/kg dw		<	<	<	<	<	<	<
123789 H6CDD	R604	n/a	1.000	ng/kg dw		<	<	<	<	<	<	<
1234678 H7CDD	R605	n/a	1.000	ng/kg dw		1.2	<	<	1.2	<	<	<
12346789 O8CDD	R606	n/a	10.000	ng/kg dw		18	11	10	10	10	10	18
2378 T4CDF	R607	n/a	0.200	ng/kg dw		<	<	<	<	<	<	<
12378 P5CDF	R608	n/a	0.200	ng/kg dw		<	<	<	<	<	<	<
23478 P5CDF	R609	n/a	0.200	ng/kg dw		<	<	<	<	<	<	<
123478 H6CDF	R610	n/a	1.000	ng/kg dw		<	<	<	<	<	<	<
123678 H6CDF	R611	n/a	1.000	ng/kg dw		<	<	<	<	<	<	<
123789 H6CDF	R612	n/a	1.000	ng/kg dw		<	<	<	<	<	<	<
234678 H6CDF	R613	n/a	1.000	ng/kg dw		<	<	<	<	<	<	<
1234678 H7CDF	R614	n/a	1.000	ng/kg dw		<	<	<	<	<	<	<
1234789 H7CDF	R615	n/a	1.000	ng/kg dw		<	<	<	<	<	<	<

Table 30 (continued). Total results of sediment samples series 9.

Sediment				CC 0597-	5-2189	5-2191	6-2192	6-2195	6-2196	5-2194	5-2238
Parameter	No.	EQS	LOD	TNO 52005008-	373	374	375	376	377	378	391
12346789 O8CDF	R616	n/a	10.000	ng/kg dw	<	<	<	<	<	<	<
sum PCDDF TEQ	R620	n/a	2.000	ng/kg dw	<	<	<	<	<	<	<
sum dioxins	R621	n/a	10.000	ng/kg dw	20	11	10	11	10	10	18
sum furans	R622	n/a	10.000	ng/kg dw	<	<	<	<	<	<	<
HBCD	R915	n/a	4.0	µg/kg dw	<	<	<	<	<	<	<
polychloronaphthalenes	R918	n/a	20	µg/kg dw	<	<	<	<	<	<	<
PCT	R919	n/a	0.40	µg/kg dw	<	<	<	<	<	<	<
dibutyltin	R931	n/a	0.500	µg/kg dw	<	<	<	<	<	<	<
tetrabutyltin	R932	0.800	0.500	µg/kg dw	<	<	<	<	<	<	<
triphenyltin	R933	n/a	0.500	µg/kg dw	<	<	<	<	<	<	<
tri-n-propyltin	R934	n/a	0.500	µg/kg dw	<	<	<	<	<	<	<
maneb/zineb/thiram/mancozeb	R940	n/a	4.0	µg/kg dw	<	<	<	<	<	<	<
4-chloor-3-methylfenol	R950	n/a	5.0	µg/kg dw	<	<	<	<	<	<	<
tetrabromobisphenol-A	R951	n/a	0.20	µg/kg dw	<	<	<	<	<	<	<
TOC	R973	n/a	1.0	%	<	<	<	<	<	<	<
phenols	R974	n/a	0,02	mg/kg dw	0.31	0.21	0.22	0.37	2.4	0.27	0.82
Particle Size % >2 µm	R975	n/a	1.0	%	100	100	100	100	100	100	100
Particle Size % <2 µm	R976	n/a	1.0	%	<	<	<	<	<	<	<
Particle Size % > 63 µm	R977	n/a	1.0	%	99.0	99.1	93.9	92.9	95.8	98.1	93.9
Particle Size % <63 µm	R978	n/a	1.0	%	<	<	5.3	6.6	3.6	1.6	6.1
moisture content	R979	n/a	1.0	%	15.0	2.7	18.6	8.7	31.0	7.2	14.3
Aluminium	R980	n/a	0.010	mg/kg dw	53534	55272	14402	16354	11584	61211	27893

## Full results of biota samples, series 3 and 4

Table 31 Total results of biota samples series 3 and 4.

SERIES 3en4: BIOTA				CC 0957- TNO 52005008-	5-2243 389	6-2248 390	5-2258 393	2-2262 394
Parameter	No.	EQS	LOD					
naphthalene	P001	n/a	1.0	µg/kg dw	9.0	62	5.6	3.3
anthracene	P006	n/a	0.50	µg/kg dw	<	1.1	<	0.58
fluoranthene	P007	n/a	0.50	µg/kg dw	0.6	< 0,5	0.60	0.74
benzo[b]fluoranthene	P011	n/a	0.50	µg/kg dw	<	<	<	<
benzo[k]fluoranthene	P012	n/a	0.50	µg/kg dw	<	<	<	<
benzo[a]pyrene	P013	n/a	0.50	µg/kg dw	<	<	<	<
indeno[1,2,3-cd]pyrene	P014	n/a	0.50	µg/kg dw	<	<	<	<
benzo[g,h,i]perylene	P016	n/a	0.50	µg/kg dw	<	<	<	<
pentachlorophenol	P041	n/a	1.0	µg/kg dw	<	<	<	<
1,3,5-trichlorobenzene	P048	n/a	1.0	µg/kg dw	<	<	<	<
1,2,4-trichlorobenzene	P049	n/a	1.0	µg/kg dw	<	<	<	<
1,2,3-trichlorobenzene	P050	n/a	1.0	µg/kg dw	<	<	<	<
pentachlorobenzene	P053	n/a	0.20	µg/kg dw	0.26	0.50	0.55	0.33
hexachlorobenzene	P054	n/a	0.20	µg/kg dw	2.8	4.1	3.2	2.7
dichloromethane	P103	n/a	1.0	µg/kg dw	<	22	14	14
trichloromethane	P109	n/a	1.0	µg/kg dw	<	<	<	<
tetrachloromethane	P111	n/a	1.0	µg/kg dw	<	<	<	<
1,2-dichloroethane	P112	n/a	1.0	µg/kg dw	<	<	<	<
benzene	P113	n/a	1.0	µg/kg dw	<	<	<	<
trichloroethene	P114	n/a	1.0	µg/kg dw	<	<	<	<
tetrachloroethene	P120	n/a	1.0	µg/kg dw	<	<	<	<
hexachlorobutadiene	P202	n/a	0.20	µg/kg dw	<	<	<	<
trifluralin	P214	n/a	0.50	µg/kg dw	<	<	<	<
atrazine	P218	n/a	1.0	µg/kg dw	<	<	<	<
lindane	P219	n/a	0.50	µg/kg dw	<	<	<	<
alachlor	P225	n/a	1.0	µg/kg dw	<	<	<	<
aldrin	P232	n/a	0.50	µg/kg dw	<	<	<	<
chlorpyrifos(-ethyl)	P233	n/a	1.0	µg/kg dw	<	<	<	<
isodrin	P238	n/a	0.50	µg/kg dw	<	<	<	<
chlorfenvinphos	P241	n/a	1.0	µg/kg dw	<	<	<	<
endosulfan-alpha	P243	n/a	1.0	µg/kg dw	<	<	<	<
dieldrin	P244	n/a	0.50	µg/kg dw	<	<	<	<
endrin	P246	n/a	0.50	µg/kg dw	<	<	<	<
endosulfan-beta	P247	n/a	1.0	µg/kg dw	<	<	<	<
2,4'-DDT	P248	n/a	0.20	µg/kg dw	3.2	2.1	2.1	1.6
4,4'-DDT	P250	n/a	0.20	µg/kg dw	<	4.2	<	<
di-(2-ethylhexyl)-phthalate (DEHP)	P251	n/a	10	µg/kg dw	<	<	<	<
simazine	P306	n/a	1.0	µg/kg dw	<	<	<	<
isoproturon	P308	n/a	1.0	µg/kg dw	<	<	<	<
diuron	P309	n/a	1.0	µg/kg dw	<	<	<	<
nonylphenol	P358	n/a	1.0	µg/kg dw	<	<	<	3.3

Table 31 (continued). Total results of biota samples series 3 and 4.

S SERIES 3en4: BIOTA				CC 0957-	5-2243	6-2248	5-2258	2-2262
Parameter	No.	EQS	LOD	TNO 52005008-	389	390	393	394
4-tert-octylphenol	P357	n/a	1.0	µg/kg dw	<	<	<	<
cadmium	P500	n/a	0.10	mg/kg dw	0.19	0.22	0.10	0.05
lead	P501	n/a	0.10	mg/kg dw	0.31	0.20	0.43	0.23
mercury	P502	n/a	0.10	mg/kg dw	0.47	0.36	0.48	0.34
nickel	P503	n/a	0.10	mg/kg dw	1.4	1.1	1.1	0.86
diphenyl ether, decabromo	P914	n/a	2.0	µg/kg dw	<	<	<	<
C10-C13 (PCA)	P917	n/a	10	µg/kg dw	<	<	<	<
sum diphenyl ether, pentabromo	P920	n/a	0.10	µg/kg dw	1.0	5.4	<	<
sum diphenyl ether, octabromo	P921	n/a	0.20	µg/kg dw	<	<	<	<
tributyltin	P930	n/a	0.005	µg/kg dw	<	<	<	<
PCB 28	R017	n/a	0.40	µg/kg dw	1.7	1.8	2.4	1.8
PCB 52	R018	n/a	0.40	µg/kg dw	1.3	1.2	2.1	1.3
PCB 101	R019	n/a	0.40	µg/kg dw	0.96	1.2	1.5	0.81
PCB 118	R020	n/a	0.40	µg/kg dw	1.6	2.4	2.0	1.0
PCB 153	R021	n/a	0.40	µg/kg dw	4.1	5.2	5.6	2.9
PCB 138	R022	n/a	0.40	µg/kg dw	3.1	4.8	3.9	1.6
PCB 180	R023	n/a	0.40	µg/kg dw	1.5	2.4	1.8	1.1
2,4/2,5-dichlorophenol	R028	n/a	1.0	µg/kg dw	<	<	<	<
mono-chlorophenol	R042	n/a	10	µg/kg dw	<	<	<	<
trichlorophenols	R043	n/a	2.0	µg/kg dw	2.8	9.6	<	<
mono-chlorobenzene	R044	n/a	20	µg/kg dw	<	<	<	<
1,2,4,5-tetrachlorobenzene	R051	n/a	20	µg/kg dw	<	<	<	<
dichlorobenzenes	R055	n/a	20	µg/kg dw	<	<	<	<
sum PCB	R060	n/a	1.0	µg/kg dw	14	19	19	11
vinylchloride	R100	n/a	20	µg/kg dw	<	<	<	<
bromomethane	R101	n/a	20	µg/kg dw	<	<	<	<
1,1-dichloroethene	R102	n/a	20	µg/kg dw	<	<	<	<
carbon disulphide	R104	n/a	20	µg/kg dw	<	<	<	<
MTBE	R105	n/a	20	µg/kg dw	19	11	<	<
1,2-dichloroethene	R106	n/a	20	µg/kg dw	<	<	<	<
1,1-dichloroethane	R107	n/a	20	µg/kg dw	<	<	<	<
1,1,1-trichloroethane	R110	n/a	20	µg/kg dw	<	<	<	<
1,2-dichloropropane	R115	n/a	20	µg/kg dw	<	<	<	<
1,3-dichloropropene	R116	n/a	20	µg/kg dw	<	<	<	<
toluene	R117	n/a	20	µg/kg dw	83	24	17	30
1,1,2-trichloroethane	R119	n/a	20	µg/kg dw	<	<	<	<
1,2-dibromoethane	R121	n/a	20	µg/kg dw	<	<	<	<
ethylbenzene	R122	n/a	20	µg/kg dw	26	41	<	<
p,m-xylene	R123	n/a	20	µg/kg dw	43	49	<	<
o-xylene	R124	n/a	20	µg/kg dw	14	22	<	<
styrene	R125	n/a	20	µg/kg dw	<	<	<	<

Table 31 (continued). Total results of biota samples series 3 and 4.

SERIES 3en4: BIOTA				CC 0957-	5-2243	6-2248	5-2258	2-2262
Parameter	No.	EQS	LOD	TNO 52005008-	389	390	393	394
iso-propylbenzene	R126	n/a	20	µg/kg dw	<	<	<	<
1,1,2,2-tetrachloroethane	R127	n/a	20	µg/kg dw	<	<	<	<
2-chlorotoluene	R128	n/a	20	µg/kg dw	<	<	<	<
3-chlorotoluene	R129	n/a	20	µg/kg dw	<	<	<	<
4-chlorotoluene	R130	n/a	20	µg/kg dw	<	<	<	<
chloroprene	R134	n/a	20	µg/kg dw	<	<	<	<
3-chloropropene	R135	n/a	20	µg/kg dw	<	<	<	<
dichloro-di-isopropylether	R136	n/a	20	µg/kg dw	<	<	<	<
2,3-dichloropropene	R137	n/a	20	µg/kg dw	<	<	<	<
epichlorohydrin	R138	n/a	20	µg/kg dw	<	<	<	<
hexachloroethane	R139	n/a	20	µg/kg dw	<	<	<	<
1,1,2-trichloro-1,2,2-trifluoroethane	R140	n/a	20	µg/kg dw	<	<	<	<
cyanuric chloride	R200	n/a	10	µg/kg dw	<	<	<	<
oxydemeton-methyl	R201	n/a	20	µg/kg dw	<	<	<	<
dichlobenil	R203	n/a	4.0	µg/kg dw	<	<	<	<
tribenuron-methyl	R204	n/a	10	µg/kg dw	<	<	<	<
biphenyl	R205	n/a	2.0	µg/kg dw	<	<	<	<
mecoprop	R206	n/a	2.0	µg/kg dw	<	<	<	<
MCPA	R207	n/a	2.0	µg/kg dw	<	<	<	<
propachlor	R208	n/a	4.0	µg/kg dw	<	<	<	<
dichlorprop	R209	n/a	4.0	µg/kg dw	<	<	<	<
bromoxynil	R210	n/a	4.0	µg/kg dw	<	<	<	<
2,4-D	R211	n/a	4.0	µg/kg dw	<	<	<	<
ethoprophos	R212	n/a	2.0	µg/kg dw	<	<	<	<
chlorpropham	R213	n/a	4.0	µg/kg dw	<	<	<	<
dimethoate	R215	n/a	4.0	µg/kg dw	<	<	<	<
carbofuran	R216	n/a	2.0	µg/kg dw	<	<	<	<
propyzamide	R220	n/a	2.0	µg/kg dw	<	<	<	<
triallate	R221	n/a	1.0	µg/kg dw	<	<	<	<
pirimicarb	R222	n/a	4.0	µg/kg dw	<	<	<	<
bentazon	R223	n/a	4.0	µg/kg dw	<	<	<	<
tolclofos-methyl	R224	n/a	4.0	µg/kg dw	<	<	<	<
ioxynil	R226	n/a	10	µg/kg dw	<	<	<	<
pirimiphos-methyl	R227	n/a	2.0	µg/kg dw	<	<	<	<
ethofumesate	R228	n/a	4.0	µg/kg dw	<	<	<	<
fenitrothion	R229	n/a	2.0	µg/kg dw	<	<	<	<
di-n-butylphthalate	R230	n/a	1.0	µg/kg dw	176	51	<	<
malathion	R231	n/a	2.0	µg/kg dw	<	<	<	<
fenpropimorf	R234	n/a	4.0	µg/kg dw	<	<	<	<
pendimethalin	R239	n/a	5.0	µg/kg dw	<	<	<	<
metazachlor	R240	n/a	4.0	µg/kg dw	<	<	<	<

Table 31 (continued). Total results of biota samples series 3 and 4.



SERIES 3en4: BIOTA				CC 0957-	5-2243	6-2248	5-2258	2-2262
Parameter	No.	EQS	LOD	TNO 52005008-	389	390	393	394
captan	R242	n/a	20	µg/kg dw	<	<	<	<
kresoxim-methyl	R245	n/a	2.0	µg/kg dw	<	<	<	<
butylbenzylphthalate	R249	n/a	2.0	µg/kg dw	124	102	6349	6133
permethrin	R252	n/a	4.0	µg/kg dw	<	<	<	<
diisononylester DINP	R254	n/a	2.0	µg/kg dw	<	<	6985	13242
prochloraz	R255	n/a	2.0	µg/kg dw	<	<	<	<
cyfluthrin	R256	n/a	4.0	µg/kg dw	<	<	<	<
cypermethrin	R257	n/a	4.0	µg/kg dw	<	<	<	<
deltamethrin	R258	n/a	4.0	µg/kg dw	<	<	<	<
oxamyl	R300	n/a	10	µg/kg dw	<	<	<	<
trichlorofon	R301	n/a	4.0	µg/kg dw	<	<	<	<
metamitron	R302	n/a	2.0	µg/kg dw	<	<	<	<
carbendazim	R303	n/a	2.0	µg/kg dw	<	<	<	<
chloridazon	R304	n/a	4.0	µg/kg dw	<	<	<	<
thiabendazole	R305	n/a	2.0	µg/kg dw	<	<	<	<
chlorotoluron	R307	n/a	4.0	µg/kg dw	<	<	<	<
monolinuron	R310	n/a	2.0	µg/kg dw	<	<	<	<
methiocarb	R311	n/a	2.0	µg/kg dw	<	<	<	<
linuron	R312	n/a	2.0	µg/kg dw	<	<	<	<
epoxiconazole	R313	n/a	2.0	µg/kg dw	<	<	<	<
diflubenzuron	R314	n/a	2.0	µg/kg dw	<	<	<	<
nonylphenol ethoxylates	R355	n/a	5.0	µg/kg dw	<	<	<	<
bisphenol-A	R356	n/a	1.0	µg/kg dw	<	<	<	<
benzylchloride	R400	n/a	5.0	µg/kg dw	<	<	<	<
nitrobenzene	R401	n/a	1.0	µg/kg dw	<	<	<	<
2-chloroaniline	R402	n/a	5.0	µg/kg dw	<	<	<	<
benzylidenechloride	R403	n/a	5.0	µg/kg dw	<	<	<	<
4-nitrotoluene	R407	n/a	20	µg/kg dw	<	<	<	<
1-chloronaphthalene	R427	n/a	1.0	µg/kg dw	<	<	<	<
1-chloro-2,4-dinitrobenzene	R433	n/a	5.0	µg/kg dw	<	<	<	<
4-chloro-2-nitroaniline	R434	n/a	1.0	µg/kg dw	<	<	<	<
benzidine	R435	n/a	5.0	µg/kg dw	<	<	<	<
3,3'-dichlorobenzidine	R436	n/a	4.0	µg/kg dw	<	<	<	<
monochlorotoluidines:	R480	n/a	20	µg/kg dw	<	<	<	<
chloronitrotoluenes	R481	n/a	10	µg/kg dw	<	<	<	<

Table 31 (continued). Total results of biota samples series 3 and 4.

SERIES 3en4: BIOTA				CC 0957-	5-2243	6-2248	5-2258	2-2262
Parameter	No.	EQS	LOD	TNO 52005008-	389	390	393	394
dichloroanilines	R482	n/a	10	µg/kg dw	<	<	<	<
chloronitrobenzenes	R483	n/a	4.0	µg/kg dw	<	<	<	<
dichloronitrobenzenes:	R484	n/a	4.0	µg/kg dw	<	<	<	<
arsenic	R504	n/a	0.010	mg/kg dw	1.6	1.4	1.7	1.4
zinc	R505	n/a	0.010	mg/kg dw	50	56	65	57
copper	R506	n/a	0.010	mg/kg dw	1.5	1.8	2.4	2.6
chromium	R507	n/a	0.010	mg/kg dw	1.4	0.83	0.82	0.43
selenium	R508	n/a	0.14	mg/kg dw	6.0	7.2	7.5	6.6
antimony	R509	n/a	0.010	mg/kg dw	0.15	<	<	<
molybdenum	R510	n/a	0.010	mg/kg dw	0.046	0.036	0.042	0.020
titanium	R511	n/a	0.010	mg/kg dw	10	8.7	7.2	6.1
tin	R512	n/a	0.010	mg/kg dw	<	<	<	<
barium	R513	n/a	0.010	mg/kg dw	0.91	0.96	17	1.2
beryllium	R514	n/a	0.010	mg/kg dw	<	<	<	<
boron	R515	n/a	1.3	mg/kg dw	n/a	n/a	n/a	n/a
uranium	R516	n/a	0.010	mg/kg dw	<	<	<	<
vanadium	R517	n/a	0.010	mg/kg dw	<	<	1.7	1.2
cobalt	R518	n/a	0.010	mg/kg dw	<	<	<	<
thallium	R519	n/a	0.010	mg/kg dw	<	<	<	<
tellurium	R520	n/a	0.010	mg/kg dw	<	<	<	<
silver	R521	n/a	0.010	mg/kg dw	<	<	<	<
2378 T4CDD	R600	n/a	0.20	ng/kg dw	<	<	<	<
12378 P5CDD	R601	n/a	0.20	ng/kg dw	<	<	<	0.22
123478 H6CDD	R602	n/a	1.0	ng/kg dw	<	<	<	<
123678 H6CDD	R603	n/a	1.0	ng/kg dw	<	<	<	<
123789 H6CDD	R604	n/a	1.0	ng/kg dw	<	<	<	<
1234678 H7CDD	R605	n/a	1.0	ng/kg dw	<	<	<	<
12346789 O8CDD	R606	n/a	10	ng/kg dw	<	<	<	<
2378 T4CDF	R607	n/a	0.20	ng/kg dw	<	<	<	<
12378 P5CDF	R608	n/a	0.20	ng/kg dw	<	<	<	<
23478 P5CDF	R609	n/a	0.20	ng/kg dw	<	<	<	<
123478 H6CDF	R610	n/a	1.0	ng/kg dw	<	4.3	<	<
123678 H6CDF	R611	n/a	1.0	ng/kg dw	<	<	<	<
123789 H6CDF	R612	n/a	1.0	ng/kg dw	<	<	<	<
234678 H6CDF	R613	n/a	1.0	ng/kg dw	<	<	<	<
1234678 H7CDF	R614	n/a	1.0	ng/kg dw	<	<	<	<
1234789 H7CDF	R615	n/a	1.0	ng/kg dw	<	<	<	<
12346789 O8CDF	R616	n/a	10	ng/kg dw	<	<	<	<
sum PCDD TEQ	R620	n/a	2.0	ng/kg dw	<	<	<	<
sum dioxins	R621	n/a	10	ng/kg dw	<	<	<	<
sum furans	R622	n/a	10	ng/kg dw	<	<	<	<

Table 31 (continued). Total results of biota samples series 3 and 4.

SERIES 3en4: BIOTA				CC 0957-	5-2243	6-2248	5-2258	2-2262
Parameter	No.	EQS	LOD	TNO 52005008-	389	390	393	394
HBCD	R915	n/a	4.0	µg/kg dw	<	<	<	<
polychloronaphthalenes	R918	n/a	20	µg/kg dw	<	<	<	<
PCT	R919	n/a	0.40	µg/kg dw	<	<	<	<
dibutyltin	R931	n/a	0.50	µg/kg dw	<	<	<	<
tetrabutyltin	R932	n/a	0.50	µg/kg dw	<	<	<	<
triphenyltin	R933	n/a	0.50	µg/kg dw	<	<	<	<
tri-n-propyltin	R934	n/a	0.50	µg/kg dw	<	<	<	<
4-chloor-3-methylfenol	R950	n/a	5.0	µg/kg dw	<	<	<	<
tetrabromobisphenol-A	R951	n/a	0.20	µg/kg dw	<	<	<	<
lipid content		n/a		%	6.8	7.3	16	22
moisture content	R979	n/a	1.0	%	76	74	66	58

### Full results of the forestry and sheep dipping target sites, series 1 to 7

Table 32 Total results of the forestry and sheep dipping target sites, series 1 to 7.

SERIES 1					CC 0597- TNO 52005008-	6-2061 279	6-2062 280	6-2063 281
Parameter	No.	EQS	LOD					
triclopyr	P218	n/a	0.02	µg/l		<	<	<
atrazine		0.100	0.010	µg/l		<	<	<
diazinon		n/a	0.020	µg/l		<	<	<
alpha-cypermethrin	R257	0.1	0.020	µg/l		<	<	<
cypermethrin		0.1	0.020	µg/l		<	<	<
amitraz		n/a	-	µg/l		<	<	<
AMPA	R350	n/a	0.100	µg/l		-	-	-
glyphosate		0.100	0.100	µg/l		<	<	<
SERIES 2					CC 0597- TNO 52005008-	6-2108 325	6-2109 326	6-2110 327
Parameter	No.	EQS	LOD					
triclopyr	P218	n/a	0.02	µg/l		<	<	<
atrazine		0.100	0.010	µg/l		<	<	0.014
diazinon		n/a	0.020	µg/l		<	<	<
alpha-cypermethrin	R257	0.1	0.020	µg/l		<	<	<
cypermethrin		0.1	0.020	µg/l		<	<	<
amitraz		n/a	-	µg/l		-	-	-
AMPA	R350	n/a	0.100	µg/l		<	<	<
glyphosate		0.100	0.100	µg/l		<	<	<
SERIES 3					CC 0597- TNO 52005008-	6-2122 334	6-2123 335	6-2124 336
Parameter	No.	EQS	LOD					
triclopyr	P218	n/a	0.02	µg/l		<	<	<
atrazine		0.100	0.010	µg/l		<	<	<
diazinon		n/a	0.020	µg/l		<	<	<
alpha-cypermethrin	R257	0.1	0.020	µg/l		<	<	<
cypermethrin		0.1	0.020	µg/l		<	<	<
amitraz		n/a	-	µg/l		-	-	-
AMPA	R350	n/a	0.100	µg/l		<	<	<
glyphosate		0.100	0.100	µg/l		<	<	<
SERIES 4					CC 0597- TNO 52005008-	5-2133 343	5-2134 344	5-2135 345
Parameter	No.	EQS	LOD					
triclopyr	P218	n/a	0.02	µg/l		<	<	<
atrazine		0.100	0.010	µg/l		<	<	<
diazinon		n/a	0.020	µg/l		<	<	<
alpha-cypermethrin	R257	0.1	0.020	µg/l		<	<	<
cypermethrin		0.1	0.020	µg/l		<	<	<
amitraz		n/a	-	µg/l		-	-	-
AMPA	R350	n/a	0.100	µg/l		<	<	<
glyphosate		0.100	0.100	µg/l		<	<	<
SERIES 5					CC 0597- TNO 52005008-	6-2155 361	6-2156 362	6-2157 363
Parameter	No.	EQS	LOD					
triclopyr	P218	n/a	0.02	µg/l		<	<	<
atrazine		0.100	0.010	µg/l		<	<	<
diazinon		n/a	0.020	µg/l		<	<	<
alpha-cypermethrin	R257	0.1	0.020	µg/l		<	<	<
cypermethrin		0.1	0.020	µg/l		<	<	<
amitraz		n/a	-	µg/l		-	-	-
AMPA	R350	n/a	0.100	µg/l		<	<	<
glyphosate		0.100	0.100	µg/l		<	<	<

Table 29 Total results of the forestry and sheep dipping target sites, series 1 to 7, continued.

<b>SERIES 6</b>					<b>CC 0597-</b>	<b>5-2189</b>	<b>5-2190</b>	<b>5-2191</b>
<b>Parameter</b>	<b>No.</b>	<b>EQS</b>	<b>LOD</b>		<b>TNO 52005008-</b>	<b>370</b>	<b>371</b>	<b>372</b>
triclopyr		n/a	0.02	µg/l		<	<	<
atrazine	P218	0.100	0.010	µg/l		<	<	<
alpha-cypermethrin		0.1	0.020	µg/l		<	<	<
diazinon		n/a	0.020	µg/l		<	<	<
cypermethrin	R257	0.1	0.020	µg/l		<	<	<
amitraz		n/a	-	µg/l		-	-	-
AMPA		n/a	0.100	µg/l		<	<	<
glyphosate	R350	0.100	0.100	µg/l		<	<	<

<b>SERIES 7</b>					<b>CC 0597-</b>	<b>6-2240</b>	<b>6-2241</b>	<b>6-2242</b>
<b>Parameter</b>	<b>No.</b>	<b>EQS</b>	<b>LOD</b>		<b>TNO 52005008-</b>	<b>386</b>	<b>387</b>	<b>388</b>
triclopyr		n/a	0.02	µg/l		<	<	<
atrazine	P218	0.100	0.010	µg/l		<	<	<
diazinon		n/a	0.020	µg/l		<	<	<
alpha-cypermethrin		0.1	0.020	µg/l		<	<	<
cypermethrin	R257	0.1	0.020	µg/l		<	<	<
amitraz		n/a	-	µg/l		-	-	-
AMPA		n/a	0.100	µg/l		<	<	<
glyphosate	R350	0.100	0.100	µg/l		<	<	<