

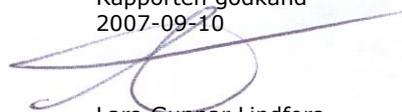
Results from the Swedish National Screening Programme 2006

Subreport 2: 1,5,9-Cyclododecatriene

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<p>Title and subtitle of the report</p> <p>Results from the Swedish National Screening Programme 2006 Subreport 2: 1,5,9-cyklododecatriene</p>	
<p>Summary</p> <p>As an assignment from the Swedish Environmental Protection Agency, IVL has during 2006/2007 performed a "Screening Study" of 1,5,9-cyclododecatriene. The screening programme included measurements in background areas and in the vicinity of potential point sources. Measurements were also done in urban areas reflecting diffuse emission pathways from society. Sample types were air, soil, sediment, sludge and biota (fish). A total of 55 samples were included. CDDT was not found in any of the samples. The reported detection limits were 0.04 - 0.05 ng/m³ in air, 10 ng/g DW in sediment and soil, 20 ng/g DW in sludge and 1-4 ng/g WW in fish. The overall conclusion is that 1,5,9-cyclododecatriene is generally not present in the Swedish environment in concentration that is of environmental concern. The substance is thus not recommended as a candidate to be included in regular monitoring.</p>	
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Sammanfattning

IVL har på uppdrag av Naturvårdsverket genomfört en screening av 1,5,9-cyklododekatrien (CDDT). Det huvudsakliga syftet med studien var att bestämma koncentrationer i olika matriser i miljön, att belysa viktiga transportvägar samt att bedöma sannolikheten för pågående emissioner i Sverige. Ytterligare syften var att utreda förekomsten av atmosfärisk transport samt upptag i biota.

Provtagningsprogrammet omfattade mätningar i bakgrundsområden och i närheten av möjliga punktkällor. Mätningar gjordes också i urbana områden påverkade av diffusa emissioner från samhällets kemikalieanvändning. Analyserade provtyper var luft, jord, sediment, reningsverksslam och fisk. Totalt ingick 55 prov i studien.

CDDT kunde inte påvisas i något av proven. Detektionsgränserna var 0.04 - 0.05 ng/m³ i luft, 10 ng/g TS i sediment och jord, 20 ng/g TS in slam och 1-4 ng/g VV i fisk.

Slutsatsen är att 1,5,9-cyklododekatrien inte finns allmänt spridd i den svenska miljön i koncentrationer som kan innebära en negativ miljöpåverkan. Föreningen rekommenderas inte att ingå i löpande miljöövervakningsprogram.

Summary

As an assignment from the Swedish Environmental Protection Agency, IVL has during 2006/2007 performed a "Screening Study" of 1,5,9-cyclododecatriene. The overall objectives of the screening were to determine the concentrations of the substances in a variety of media in the Swedish environment, to highlight important transport pathways, and to assess the possibility of current emissions in Sweden. A further aim was to investigate the likelihood of atmospheric transport and uptake in biota. The screening programme included measurements in background areas and in the vicinity of potential point sources. Measurements were also done in urban areas reflecting diffuse emission pathways from society. Sample types were air, soil, sediment, sludge and biota (fish). A total of 55 samples were included.

CDDT was not found in any of the samples. The reported detection limits were 0.04 - 0.05 ng/m³ in air, 10 ng/g DW in sediment and soil, 20 ng/g DW in sludge and 1-4 ng/g WW in fish.

The overall conclusion is that 1,5,9-cyclododecatriene is generally not present in the Swedish environment in concentration that is of environmental concern. The substance is thus not recommended as a candidate to be included in regular monitoring.

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1 Introduction

As an assignment from the Swedish Environmental Protection Agency, IVL has during 2006/2007 performed a "Screening Study" of phthalates, 1,5,9-cyclododecatriene, zinc pyrithione, pharmaceuticals and chromium(VI). These substances are emitted and distributed in the environment via a variety of sources, e.g. point sources and via use in consumer products. Pharmaceuticals in particular are frequently spread by domestic use.

The overall objectives of the screening were to determine the concentrations of the selected substances in a variety of media in the Swedish environment, to highlight important transport pathways, and to assess the possibility of current emissions in Sweden. A further aim was to investigate the likelihood of atmospheric transport (phthalates, 1,5,9-cyclododecatriene and chromium) and uptake in biota.

The results are reported in five sub-reports according to Table 1.

Table 1 Substances / substance groups included in the screening

<i>Substance / Substance group</i>	<i>Sub-report #.</i>
Phthalates: Di-isononyl phthalate (DINP) Di-isodecyl phthalate (DIDP)	1
1,5,9-Cyclododecatriene (CDDT)	2
Zinc pyrithione	3
Pharmaceuticals: Fentanyl, Propofol, Dextropropoxyphene, Bromocriptine, Thioridazine, Clozapine, Risperidone, Zolpidem, Sertraline, Fluoxetine, Flunitrazepam, Diazepam, Oxazepam	4
Hexavalent chromium (Cr(VI))	5

This sub-report considers the screening of 1,5,9-cyclododecatriene (CDDT).

2 Chemical properties, fate and toxicity

1,5,9-Cyclododecatriene (CDDT or CDT, CAS 4904-61-4) is a liquid with a yellow tint and pungent odour. Its structure is depicted in Figure 1 and some of its physico-chemical properties are listed in Table 2.



Figure 1 Two representations of the chemical structure of 1,5,9-cyclododecatriene.

Table 2 Physico-chemical properties of 1,5,9-cyclododecatriene (SRC, 2007)

Property	Value
Molecular formula	C ₁₂ H ₁₈
MW (g/mol)	162.3
Melting point (°C)	-17
Boiling point (°C)	240
Water solubility (mg/l)	0.39 (25°C)
log Kow	5.5
Vapour pressure (mm Hg)	0.08 (25°C)
Henry's Law constant (atm·m ³ /mol)	0.5 (25°C)
Atmospheric OH rate constant (cm ³ /[molecule·s])	1.76E-10 (25°C)
Degradation half-lives used for EQC modelling^a	(days)
Air	0.02
Water	15
Soil	30
Sediment	140

^aEPIWIN estimation software (Meylan, 1999)

The physico-chemical properties indicate that 1,5,9-cyclododecatriene is a multimedia chemical, which can be expected to be found in several types of media in the environment. With moderate vapour pressure, moderate to low water solubility and a logKow of 5.5 suggests that partitioning is very much dependent on the mode of release.

A fate modelling exercise was performed for 1,5,9-cyclododecatriene using the evaluative fate model EQC (Equilibrium Criterion Model; Mackay et al., 1996), yielding results according to Table

3. As no experimental data was found on degradation rates of CDDT, these were estimated with the EPIWIN estimation software (Meylan, 1999).

Table 3. Results from EQC modelling of 1,5,9-cyclododecatriene, using emission rates of 1000 kg/h.

Emission medium	Percent at steady state				Residence time (days)
	Air	Water	Soil	Sediment	
Air	98	0.1	1.7	0.2	0.02
Water	<0.1	24	<0.1	76	31
Soil	<0.1	<0.1	100	<0.1	41
All three	0.1	10	57	32	24

The numbers in the table should be regarded as indicative, as they are dependent on model structure as well as chemical property data. However, overall, the modelling results confirm that 1,5,9-cyclododecatriene is a “multimedia chemical” and that the primary receiving media are dependent on the medium of release. When emitted to air, 98 % is predicted to partition to air and only a minor share will be found in soils or aquatic systems. Table 3 also shows that CDDT has relatively low residence times regardless of emission medium, and may thus be expected to rapidly leave the ecosystem via degradation and advection.

A predicted no effect concentration (PNEC) of 1.1 µg/l was derived from ecotoxicological tests on three different trophic levels: algae, daphnia and fish (Table 4). Based on the number of available chronic tests a safety factor of 10 (TGD, 2003) was applied.

The results from the chronic ecotoxicological tests for both fish and daphnia was regarded as very toxic by OSPAR (OSPAR, 2002).

Table 4. Aquatic toxic properties (OSPAR, 2002)

End Point	mg/l	Reference
<i>Acute toxicity algae IC50</i>	140	IuclidAquatox:European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA
<i>Acute toxicity daphnia EC50</i>	5	IuclidAquatox:European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA
<i>Acute toxicity fish LC50</i>	4	Bridie,A.L., C.J.M.Wolff, and M.Winter(1979)The Acute Toxicity of Some Petrochemicals to GoldfishWater Res. 13(7):623-626
	5.5	IuclidAquatox:European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA
	1	Revision of GESAMP Reports and Studies No 17 and 35, London , IMO 1989
	0.116	Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan. Ed. by Chemicals Inspection & Testing Institute Japan, Tokyo, Japan Chemical Industry Ecology-Toxicology & Information Center (JETOC), 1992.
<i>Chronic toxicity daphnia NOEC</i>	0.011	IuclidAquatox:European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA
<i>Chronic toxicity fish NOEC</i>	0.019	IuclidAquatox:European Commission, ECB, Existing chemicals, TP 280, I-21020 ISPRA

3 Production, consumption, emissions and regulation

CDDT, predominantly the cis, trans, trans-1,5,9-isomer, is formed by catalytic trimerization of butadiene. Most of the substance is used on the production site as a chemical intermediate in the synthesis of cyclic and linear compounds with twelve carbon atoms mainly used in the production of polyamides (Degussa, 2007).

A minor use of CDDT is in the production of the brominated flame retardant hexabromocyclododecane, HBCD. In the environment HBCD is successively debrominated to 1,5,9-cyclododecatriene, which does not seem to undergo further degradation (European Chemicals Bureau 2005; Davis et al., 2006).

CDDT is produced by Degussa (formerly Hüls AG) most likely in Germany (Degussa 2007) and in Victoria, Texas, USA by Invista (formerly DuPont Textiles & interiors) (USEPA 2003, Invista 2007). There is no production of CDDT or HBCD in Sweden (Eriksson et al 2005).

On the OSPAR List of Chemicals for Priority Action (Update 2004) CDDT belongs to the category of "chemicals where no background document is being prepared because they are intermediates in closed systems" (table in Posner, 2006).

No previous studies concerning environmental concentrations have been found.

4 Sampling strategy and study sites

A sampling strategy was developed in order to determine the environmental concentrations of CDDT in different environmental matrices in Sweden. The screening programme included measurements in background areas and in the vicinity of potential point sources. Measurements were also done in urban areas reflecting diffuse emission pathways from society. Sample types were air, soil, sediment, sludge and biota (fish). The programme is summarised in Table 5. Individual samples are listed in Appendix 1.

Table 5 Summary of sampling programme for CDDT.

Type	Site	Air	Sediment	Soil	Sludge	Traffic stormwater sludge	Biota	Total
Background	Råö	3						3
	Pallas	2						2
	Background lakes		3				3	6
	Lake Gårdsjön		3	3				6
	Baltic Sea						3	3
Potential point sources	Stenungsund	3	3				3	9
	Gislaved	3		3				6
Diffuse sources	Urban Stockholm	3	3	3		2	3	14
	various STPs				6			6
Total		14	12	9	6	2	12	55

Air sampling was carried out at Råö (Swedish west coast) and Pallas (northern Finland). These stations are part of the national monitoring program for air pollutants. Råö is included in the Co-operative Programme for Monitoring and Evaluation of Long-Range Transmission of Air Pollutants in Europe (EMEP) and Pallas in the Arctic Monitoring and Assessment Programme (AMAP) network. Sediment samples and fish from three background lakes (not influenced by local contamination) and fish from three sites off the Svealand coast (Figure 2), were provided by The Swedish Museum of National History. Sampling in the vicinity of potential point sources was carried out in Stenungsund (petrochemical based industries) and Gislaved (plastics industries). Diffuse emissions from the urban society would reveal itself in samples from the urban area around Stockholm and in sludge from various sewage treatment plants (STPs) in Sweden.

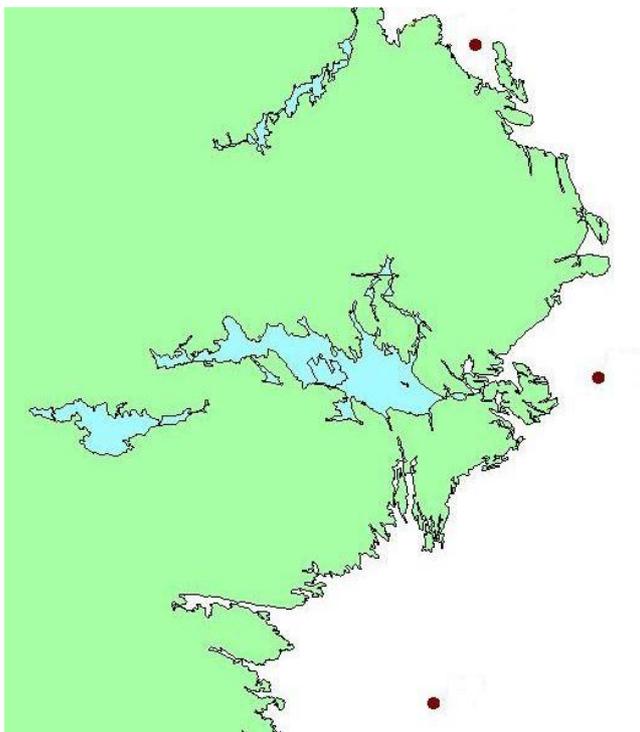


Figure 2 Sampling sites for baltic herring off the Svealand coast of Sweden. From north to south: Ängskär, Ö Möja, Landsort.

5 Methods

5.1 Sampling

Air samples were collected using a low volume air sampler (LVS) with a flow of approximately 1 m³/h. The air was passed through a glass fibre filter (MG160, Munktell) where particles were collected and through a glass column packed with the adsorbents Amberlite XAD2 (Supelco) and polyurethane foam (PUF). Sampling duration was four weeks. Filter and adsorbent were changed every week. Prior to sampling, glass fibre filters were heated to 400°C and the packed adsorbent column was cleaned by Soxhlet extraction with acetone for 24 h. After sampling, the filter and

column were wrapped in aluminium foil and sent to the laboratory where they were stored in a freezer until analysis.

The staff at the different treatment plants collected the **sludge** samples from the anaerobic chambers. The sludge was transferred into plastic jars (polypropylene) and stored in a freezer (-18°C) until analysed.

Surface **sediment** (0-2 cm) samples were collected by means of a Kajak sampler. The sediment was transferred into preheated (400°C) glass jars and stored in a freezer (-18°C) until analysed.

The **fish** samples were collected by means of fishing net, hoop net or fishing-rod. The fish samples were individually wrapped in cleaned aluminium foil and stored in freezer (-18°C) until analysed.

5.2 Analysis

5.2.1 Air samples, extraction

Each pair of filter and adsorbent column was Soxhlet extracted with n-hexane/MTBE 1:1 for 6 hours. The extract was spiked with recovery standards (biphenyl, 1-chlorooctane, 1-chlorohexadecane, 1-chlorooctadecane) and concentrated by evaporation. Extracts belonging to the same sampling period were pooled. Clean-up was performed by shaking with KOH-solution (1 M) followed by open column chromatography on silica gel and finally on Florisil. Volumetric standard (4-chlorobiphenyl) was added prior to GC-MS analysis.

5.2.2 Sludge and sediment samples, extraction

The sample was spiked with recovery standard, made alkaline with a small amount of KOH solution, and extracted twice with acetone and pentane. The acetone in the pooled extract was washed away by extraction with KOH- and HCl-solution. The organic extract was safeguarded and subjected to clean-up on a silica gel and a Florisil column prior to GC-MS analysis.

5.2.3 Fish samples, extraction

Fish samples (muscle, 10 g) were homogenised in a mixture of acetone and pentane. The extracts were safeguarded and the samples were extracted once more with acetone and pentane. The extracts were combined and the acetone was removed by shaking with water and pentane. The extracts were dried, concentrated, treated with alkaline ethanol at 85°C for one hour and finally cleaned-up on a silica gel and a Florisil column prior to GC-MS analysis.

5.2.4 GC-MS analysis

The extracts were analysed on a 6890N gas chromatograph coupled to a 5973N mass selective detector (Agilent). The injection, 1 µl, was done in splitless mode at 240°C. The fused silica capillary column (VF-5MS 30 m x 0.25 mm i.d. x 0.25 µm film thickness, Varian) was held at 45°C for 1 min., ramped 15°C/min to 200°C, 5°C/min until 300°C and held at 300°C for 2 min. Helium was used as carrier gas. The detector was used in selected ion monitoring mode (SIM) with electron

ionisation energy 70 eV. The analytes were identified by their characteristic retention times and target ions and one or more qualifier ions used to increase specificity (Table 6). Quantification was based on comparison of peak abundance of the target ion to the known response of the internal standard. The reported analyte concentrations were corrected according to the determined surrogate standard losses.

Table 6. Target- and qualifier ions (Q-ion) used in the GC-MS-quantification

Analyte	Target-ion	Q-1 ion	Q-2 ion	Q-3 ion
1-Chlorooctane	91	93	-	-
Cyclododecatriene	79	93	119	133
Biphenyl	154	153	-	-
4-Chlorobiphenyl	188	152	-	-
1-Chlorohexadecane	91	260	-	-
1-Chlorooctadecane	91	288	-	-

5.2.5 Method evaluation

The air sampling method was tested by spiking an adsorbent column with 1 µg CDDT. Outdoor air was pumped through this column and a blank column in series for one week. 30% of the spiked amount was recovered from the spiked column and none from the blank column. The recovery from a column that had not been exposed to air was >90%. The partial loss of CDDT could be due to oxidation on the adsorbent, but not to desorption as there was no transfer of CDDT to the blank column. A test was done with an additional filter for ozone but was not successful. The efficiency was judged to be sufficient for the purpose of the measurements.

The method used for analysis of sludge and sediment samples was evaluated as follows. Sludge samples were spiked with the analyte (CDDT) and biphenyl as recovery standard. The samples were processed through the method described above. The extraction recovery was 88-92 % and adjusted according to the recovery standard 117 %.

6 Results and discussion

CDDT was not found in any of the samples. The reported detection limits were 0.04 - 0.05 ng/m³ in air, 10 ng/g DW in sediment and soil, 20 ng/g DW in sludge and 1-4 ng/g WW in fish. The detection limits for individual samples are listed in Appendix 1.

The environmental samples collected close to potential point sources showed that possible emissions of CDDT in these areas are of minor importance.

Davis et al. (2006) have shown that the flame retardant HBCD may be debrominated to CDDT under anaerobic conditions. Therefore, it is possible that CDDT can be produced from HBCD in the digestion chambers of sewage treatment plants. However, no CDDT was found in the sludge samples from Swedish sewage treatment plants.

No risk levels have been derived for other environmental matrices than water, where the suggested PNEC is 1 µg/L. As no water samples have been analysed in the current study, it was not possible to do a direct PEC/PNEC comparison. However, it is possible to predict the water concentration

that corresponds to the detection limits obtained for the sediment samples. This was done through the following equation:

$$C_{\text{WATER}} [\mu\text{g/L}] = C_{\text{SED}} [\mu\text{g/kg ww}] / K_{\text{P}} [\text{L/kg}], \quad (1)$$

where K_{P} is the sediment-water partition coefficient which was calculated according to:

$$K_{\text{P}} = f_{\text{OC}} \times 0.41 \times K_{\text{OW}}, \quad (2)$$

where f_{OC} is the fraction organic carbon in the sediment, 0.41 is the correction factor according to the Karickhoff model ($K_{\text{OC}} = 0.41 * K_{\text{OW}}$; Karickhoff, 1981) and K_{OW} is the octanol-water partition coefficient (Table 2).

Converting the analysed sediment concentrations to wet weight basis gave detection limits varying between 0.5 and 8 $\mu\text{g/kg ww}$. Using equation (1) and assuming an organic carbon content of 4 % gave corresponding water concentrations in the range 0.0001-0.001 $\mu\text{g/L}$, which is 1000 to 10000 times lower than the suggested PNEC-value. The organic carbon content in the sediments would have to be very low (ppm-levels), in order for the corresponding water concentration to be close to the PNEC-value, and this is hardly the case in the Baltic region.

Thus, the overall conclusion of the screening is that 1,5,9-cyclododecatriene is generally not present in the Swedish environment in concentration that is of environmental concern. The substance is thus not recommended as a candidate to be included in regular monitoring.

7 Acknowledgements

Samples of traffic storm water sludge were kindly provided by Jan Stenlycke, Stockholm Vatten AB. Gunnar Gustavsson, Gislaved municipality, is acknowledged for providing air samples from Gislaved. The study was funded by Environmental Monitoring at the Swedish Environmental Protection Agency.

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Appendix 1. Sample list

Sampl ID	Type	Matrix	Site	Species / Misc. info	Coordinates	Sample date	DW, %	Unit	Cyclododecatriene
	Background	Air	Råö 1			06-11-01 - 11-30		ng/m ³	<0.04
	Background	Air	Råö 2			07-01-22 - 01-29		ng/m ³	<0.04
	Background	Air	Råö 3			07-03-05 - 04 02		ng/m ³	<0.04
	Background	Air	Pallas 1			06-11-22 - 12-10		ng/m ³	<0.04
	Background	Air	Pallas 2			07-01-03 - 02-05		ng/m ³	<0.04
5242	Background	Sediment	Krageholmssjön	Skåne		2006-11-23	6.5	ng/g DW	<10
5241	Background	Sediment	Lilla Öresjön			2006-11-23	5.3	ng/g DW	<10
5240	Background	Sediment	Övre Skärsjön	Västmanland		2006-11-23	11.1	ng/g DW	<10
5243	Background	Fish	Krageholmssjön	perch		2006-10-30		ng/g WW	<1
5244	Background	Fish	Lilla Öresjön	perch		2006-10-31		ng/g WW	<1
5245	Background	Fish	Övre Skärsjön	perch		2006-10-31		ng/g WW	<1
5205	Background	Sediment	Gårdsjön, G1, 0-5 cm		6445543, 1277303	2006-10-26	11.4	ng/g DW	<10
5206	Background	Sediment	Gårdsjön, G2, 0-5 cm		6444969, 1277417	2006-10-26	6.92	ng/g DW	<10
5207	Background	Sediment	Gårdsjön, G3, 0-5 cm		6444778, 1277733	2006-10-26	11.4	ng/g DW	<10
5373a	Background	Soil	Gårdsjön			2006-10	23.5	ng/g DW	<10
5373b	Background	Soil	Gårdsjön			2006-10	23.5	ng/g DW	<10
5373c	Background	Soil	Gårdsjön			2006-10	23.5	ng/g DW	<10
5310	Background	Fish	Landsort	baltic herring	58° 17' 17° 50'	2004-11-10		ng/g WW	<4
5309	Background	Fish	Ängskär	baltic herring	60° 30' 18° 15'	2004-09-20		ng/g WW	<4
5313	Background	Fish	Ö Möja	baltic herring	59° 21.27' 18° 57.84'	2004-06-18		ng/g WW	<4
	Pot. pointsource	Air	Stenungsund, skolan 1		6444993; 1266406	06-11-02 - 12-01		ng/m ³	<0.04
	Pot. pointsource	Air	Stenungsund, skolan 2		6444993; 1266406	07-01-03 - 04-02		ng/m ³	<0.04
	Pot. pointsource	Air	Stenungsund, skolan 3		6444993; 1266406	07-03-02 - 04-02		ng/m ³	<0.04
5208	Pot. pointsource	Sediment	Stenungsund, A5		64478702, 1264882	2007-10-22 - 26	34.6	ng/g DW	<10
5210	Pot. pointsource	Sediment	Stenungsund, F2		6448959, 1265181	2007-10-22 - 26	38.3	ng/g DW	<10
5212	Pot. pointsource	Sediment	Stenungsund, D7		6448098, 1264879	2007-10-22 - 26	31.4	ng/g DW	<10
5214	Pot. pointsource	Fish	Stenungsund, A1	eelpout	6447568, 1265342	2007-10-22 - 26		ng/g WW	<1
5215	Pot. pointsource	Fish	Stenungsund, D7	eelpout	6448098, 1264879	2007-10-22 - 26		ng/g WW	<1

Sampl ID	Type	Matrix	Site	Species / Misc. info	Coordinates	Sample date	DW, %	Unit	Cyclododecatriene
5216	Pot. pointsource	Fish	Stenungsund, E1	eelpout	6446071, 1263467	2007-10-22 - 26		ng/g WW	<1
	Pot. pointsource	Air	Gislaved, Mossarp 1		N57°17.19' E13°34.48'	06-11-09 - 12-07		ng/m ³	<0.05
	Pot. pointsource	Air	Gislaved, Mossarp 2		N57°17.19' E13°34.48'	06-12-07 - 12-21, 07-01-18 - 02-01		ng/m ³	<0.05
	Pot. pointsource	Air	Gislaved, Mossarp 3		N57°17.19' E13°34.48'	07-02-01 - 03-02		ng/m ³	<0.05
5118a	Pot. pointsource	Soil	Gislaved		N57°17.5' E13°33.6'	2006-10-26	72.8	ng/g DW	<10
5118b	Pot. pointsource	Soil	Gislaved		N57°17.5' E13°33.6'	2006-10-26	72.8	ng/g DW	<10
5118c	Pot. pointsource	Soil	Gislaved		N57°17.5' E13°33.6'	2006-10-26	72.8	ng/g DW	<10
	Diffuse	Air	Stockholm 1		6579403; 1628272	06-11-20 - 12-19		ng/m ³	<0.04
	Diffuse	Air	Stockholm 2		6579403; 1628272	07-01-19 - 02-16		ng/m ³	<0.04
	Diffuse	Air	Stockholm 3		6579403; 1628272	07-02-16 - 03-16		ng/m ³	<0.04
5641	Diffuse	Traffic storm water, sediment	Stockholm, Sveavägen			2007-04-23	59.3	ng/g DW	<10
5662	Diffuse	Traffic storm water, sediment	Stockholm, Lugnets Allé			2007-05	71.9	ng/g DW	<10
5287	Diffuse	Sediment	Stockholm, Stora Essingen	27,7 m	5679263, 1623628	06-12-05	14.1	ng/g DW	<10
5288	Diffuse	Sediment	Stockholm, Årstaviken	7,6 m	6578157, 1628321	06-12-05	13.5	ng/g DW	<10
5296	Diffuse	Sediment	Stockholm, Riddarfjärden	19,2 m	6580155, 1627284	06-12-05	15.7	ng/g DW	<10
5527	Diffuse	Fish	Stockholm, Stora Essingen	perch		2005-11-24		ng/g WW	<1
5528	Diffuse	Fish	Stockholm, Årstaviken	perch		2006-12-06		ng/g WW	<1
5526	Diffuse	Fish	Stockholm, Riddarfjärden	perch		2005-11-24		ng/g WW	<1
5555	Diffuse	Soil	Stockholm, Vårbergstoppen			2007-03-27	80.4	ng/g DW	<10
5561	Diffuse	Soil	Stockholm, Humlegården			2007-03-29	64.5	ng/g DW	<10
5574	Diffuse	Soil	Stockholm, Årstafältet			2007-04-05	77.1	ng/g DW	<10
5224	Diffuse	Sludge	Stockholm, Henriksdal	644 000 p e		2006	25.8	ng/g DW	<20
5221	Diffuse	Sludge	Göteborg, Ryaverket	605 000 p e		2006	27.2	ng/g DW	<20
5226	Diffuse	Sludge	Eslöv, Ellinge	126 000 p e		2006	16.5	ng/g DW	<20
5223	Diffuse	Sludge	Alingsås, Nolhaga	24 000 p e		2006	22.3	ng/g DW	<20
5222	Diffuse	Sludge	Floda	9 800 p e		2006	18.3	ng/g DW	<20
5225	Diffuse	Sludge	Bollebygd	2 200 p e		2006	15.6	ng/g DW	<20