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Endocrine disruption horizon scanning: priority and new endocrine disrupting chemicals

Science Report – SC030276/SR3

ea/br/e/sci/v1

SCHO0507BMQC-E-P

The Environment Agency is the leading public body protecting and improving the environment in England and Wales.

It's our job to make sure that air, land and water are looked after by everyone in today's society, so that tomorrow's generations inherit a cleaner, healthier world.

Our work includes tackling flooding and pollution incidents, reducing industry's impacts on the environment, cleaning up rivers, coastal waters and contaminated land, and improving wildlife habitats.

This report is the result of research commissioned and funded by the Environment Agency's Science Programme.

Published by:
Environment Agency, Rio House, Waterside Drive,
Aztec West, Almondsbury, Bristol, BS32 4UD
Tel: 01454 624400 Fax: 01454 624409
www.environment-agency.gov.uk

ISBN: 978-1-84432-761-4

Further copies of this report are available from:
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enquiries@environment-agency.gov.uk
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Dissemination Status:
Released to all regions / publicly available

Keywords:
Endocrine disruptor, priority chemicals

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Science Project Number:
SC030276/SR3

Product Code:
SCHO0507BMQC-E-P

Science at the Environment Agency

Science underpins the work of the Environment Agency. It provides an up-to-date understanding of the world about us and helps us to develop monitoring tools and techniques to manage our environment as efficiently and effectively as possible.

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- **Setting the agenda**, by identifying where strategic science can inform our evidence-based policies, advisory and regulatory roles;
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- **Managing science**, by ensuring that our programmes and projects are fit for purpose and executed according to international scientific standards;
- **Carrying out science**, by undertaking research – either by contracting it out to research organisations and consultancies or by doing it ourselves;
- **Delivering information, advice, tools and techniques**, by making appropriate products available to our policy and operations staff.

Steve Killeen

Head of Science

This document is one of four reports produced under the *Endocrine disruption horizon scanning* project (SC030276), which is part of Environment Agency's R&D Project Initiation Document P6-020/U, *Development of methods for detection of endocrine disruption and application to environmental samples*.

The aim of the *Horizon scanning* project is to identify and review new and emerging aspects of endocrine disruption (ED). The full list of documents in the project is:

- *Endocrine disruption horizon scanning : Aquatic invertebrates review (SC030276/SR1)*
- *Endocrine disruption horizon scanning: Molecular and genomic contributions (SC030276/SR2)*
- *Endocrine disruption horizon scanning : Priority and new endocrine disrupting chemicals (SC030276/SR3)*
- *Endocrine disruption horizon scanning: Current status of endocrine disruptor research and policy (SC030276/SR4)*

Executive summary

The Environment Agency (England and Wales) is supporting a number of research projects to guide its risk strategy for endocrine disruption (ED) and endocrine disrupting chemicals (EDCs). The aim of this report is to provide information on the main EDCs of concern to regulators, to ensure that the Environment Agency's ED strategy considers all of the known EDCs and is up to date on current awareness of EDCs.

This document reports on the priority EDCs identified by the main international regulatory organisations (including the European Commission (EC), the United States Environmental Protection Agency (US EPA), and Japanese ministries).

In Europe, members of the European Union use the EC's list of priority EDCs; most member countries do not have their own priority lists, and those that do tend to base them on national importance of those EDCs on the EC's list. The EC list may be seen as a work in progress, allowing for new chemicals to be added or for others to be removed (for example, if legislation bans their use).

In Japan, the Minsistry of the Environment has a list of 65 EDCs that will receive priority in terms of research (following the two Japanes ED strategies SPEED '98 and ExTEND 2005).

The US EPA has no finalised list at present, but is in the process of agreeing one.

A recently published compilation of all known lists of EDCs reported a total of 966 chemical compounds reported as having some degree of ED activity. More than half (539) are general chemical substances of anthropogenic origin, and a quarter (225) are biocides; pharmaceuticals contribute 58 substances, while 62 are naturally occurring chemical substances.

The report also outlines the chemical substances used in experimental studies since 2000 (via the citation of EDCs in published journals). Studies of ED have used 156 different chemicals since 2000. However, the most frequently used chemicals (nonyl phenol, bisphenol A, tributyl tin, oestrone and ethinyloestradiol) are well-known EDCs; this probably reflects the number of studies investigating ED mechanisms as opposed to new EDCs.

None of the chemicals treated as priorities on any of the published lists are new (all have been known to elicit ED effects for several years), but this may reflect the amount of evidence required for such chemicals to be on the priority lists. However, no new chemicals have been identified in the literature, or in consultation with experts in the field of ED from international regulatory organisations.

From a UK perspective, the EC list is probably the most important for prioritisation purposes of ED and EDCs.

Contents

1 Introduction

The Environment Agency (England and Wales) is supporting a number of research projects to guide its risk strategy for endocrine disruption (ED) and endocrine disrupting chemicals (EDCs).

The aim of this report is to provide information on the main EDCs of concern to regulators, to ensure the Environment Agency's ED strategy considers all known EDCs and is up to date on current awareness of EDCs.

2 Methods

A detailed review of all chemical substances that have, or are thought to have, ED properties is beyond the scope of this project. In particular, the aim of this report was to focus on priority chemicals in the field of ED research, risk assessment and legislation/regulation.

For the purposes of this review, a number of information sources were consulted including websites and published journal articles.

2.1 Internet

The internet was used as a source of information from environmental agencies and regulatory organisations around the world. Websites including the main regulatory or governmental departments responsible for legislating on chemical pollution, for example the European Commission (EC) and United States Environmental Protection Agency (US EPA), were consulted for priority ED chemicals.

2.2 Published lists

A search was made for published lists of priority chemicals, either listing EDCs specifically or listing all priority substances including those demonstrated to have ED properties. Data sources included information collated by the Institute for Environment and Health (MRC, University of Leicester) (IEH, 2003; 2005).

2.3 Journal articles

Sourcing information from journal articles published within the last six years, a list was compiled of chemicals known, or suspected, to have ED properties. Journal articles used in the review included:

- those where aquatic animals were exposed to a test substance known or suspected to have ED properties;
- environmental assessments;
- review articles of EDCs.

The review dealt only with EDCs in the aquatic environment. No judgement was made as to whether to include or exclude chemicals form the list – all chemical substances mentioned in the search are included in the list. This list was predicted to have a more academic focus.

Having compiled the list from the journals, chemicals were examined according to a number of criteria, including: frequency of appearance in the literature; increasing appearance in the literature; and legislation.

The list was also passed to colleagues in the Chemicals Assessment Unit of the Environment Agency for comment (especially concerning the regulatory and legislative status of the chemicals).

3 Results

3.1 Websites

3.1.1 European Commission (EC)

The European Commission (EC) already has a list of priority substances that are known, or suspected, to elicit ED properties. The list has been compiled by a series of projects and workshops, and has involved the collaboration of ED and chemical experts from across the EU. The bulk of the project was performed by the Dutch company BKH Consulting Engineers (BKH 2000; 2002). The list of substances has been revised and refined, and is still seen as a work in progress. For example, substances can be added or removed from the list if more information becomes available about their ED properties, or if legislation reduces, or bans, the use of certain chemicals.

To date, the list has been derived as follows:

- In 2000, an initial list of 564 chemical substances of known or potential ED properties was published (BKH, 2000). This list was compiled following examination of the scientific literature and consultation with experts (including chemists, biologists and government/legislative organisations).
- Within this list of 564 substances, 146 substances were identified as either persistent (remaining chemically active in the environment for many years), or produced in high volumes. Of those 146 substances, 66 were known to have definite ED properties (identified as Category 1 substances), and 52 showed potential ED properties (Category 2 substances). These are shown in Table 3.1 (the initial list of 564 chemical substances is presented in Appendix 1).

In 2001, two further projects were started simultaneously:

- WRc-NSF (a UK consultancy) reported a *Study on the scientific evaluation of 12 substances in the context of endocrine disrupter priority list of actions* (WRC, 2002). The 12 substances are presented in Table 3.2.
- BKH continued their work to gain more information on 435 of the substances that were identified as having insufficient data (BKH, 2002). Within these 435 substances, 94 were identified as having definite ED properties (identified as Category 1 substances), and 53 showed potential ED properties (Category 2 substances). Of the total 147 Category 1 and 2 substances, 129 were banned, under restricted use or were being addressed by the EU.

Finally, a project examining new low production volume chemicals was initiated in 2005. This project, intended to complement the priority list, is examining the effects of new chemicals that may elicit ED properties, but are produced in low volumes.

Further information on the EU's priority list of ED substances, and all of the related projects, can be found at: http://ec.europa.eu/environment/endocrine/index_en.htm

Table 3.1: The 146 candidate substances from the EC priority list shown to have proven or potential ED activities (from BKH, 2002)

No.	CAS No.	Name	Reason	-ve	+ve	Total
2	10605-21-7	Carbendazim	HPV	5	24	29
10	309-00-2	Aldrin	Highly Pers	1	7	8
11	12789-03-6	Chlordane	Highly Pers	3	5	8
12	57-74-9	Chlordane (cis- and trans-)	Highly Pers	1	4	5
13	3734-48-3	Chlordene	Highly Pers	0	1	1
15	60-57-1	Dieldrin	Highly Pers	9	18	27
16	115-29-7	Endosulfan	HPV\Highly	2	14	16
17	959-98-8	Endosulfan (alpha)	Pers	0	1	1
18	33213-65-9	Endosulfan (beta)	Highly Pers	0	2	2
19	72-20-8	Endrin	Highly Pers	2	22	24
20	143-50-0	Kepone (chlordecone)	Highly Pers	0	24	24
21	2385-85-5	Mirex	Highly Pers	8	12	20
22	27304-13-8	Oxychlordane	Highly Pers	0	1	1
23	39801-14-4	Photomirex	Highly Pers	0	1	1
24	8001-35-2	Toxaphene = camphechlor	Highly Pers	2	11	13
25	39765-80-5	trans-Nonachlor	Highly Pers	0	2	2
27	94-75-7	2,4-Dichlorophenoxy acetic acid (2,4-D)	Highly Pers	15	7	22
29	67747-09-5	Prochloraz	HPV	0	0	0
42	50-29-3	DDT (technical) = clofenotane	HPV	3	9	12
44	115-32-2	Dicofol = kelthane	HPV	0	5	5
56	50-29-3	p,p'-DDT = clofenotane	HPV	2	11	13
57	3563-45-9	Tetrachloro DDT = 1,1,1,2-tetrachloro-2,2-bis(4-chlorophenyl)ethane	HPV	0	1	1
60	36734-19-7	Iprodione	Highly Pers	0	0	0
63	50471-44-8	Vinclozolin	HPV	2	12	14
69	12427-38-2	Maneb	HPV	1	9	10
70	137-42-8	Metam natrium	HPV	0	0	0
73	137-26-8	Thiram	HPV	1	3	4
74	12122-67-7	Zineb	HPV	1	10	11
75	137-30-4	Ziram	HPV	0	3	3
78	58-89-9	Gamma-HCH (lindane)	HPV	11	39	50
85	330-54-1	Diuron	HPV	0	0	0
87	330-55-2	Linuron (lorox)	HPV	1	4	5
104	333-41-5	Diazinon	HPV	2	5	7
106	60-51-5	Dimethoate	HPV	5	4	9
109	55-38-9	Fenthion	HPV	0	1	1
113	121-75-5	Malathion	HPV	0	25	25
115	298-00-0	Methylparathion	HPV	2	14	16
119	56-38-2	Parathion = parathion(-ethyl)	HPV	0	1	1
141	61-82-5	Amitrol = aminotriazol	HPV	6	34	40
142	1912-24-9	Atrazine	HPV	10	12	22
156	122-34-9	Simazine	HPV	5	0	5
159	43121-43-3	Triadimefon	HPV	0	1	1
163	34256-82-1	Acetochlor	HPV	0	1	1
164	15972-60-8	Alachlor	HPV	4	6	10
169	106-93-4	Dibromoethane (EDB)	HPV	4	11	15
176	76-44-8	Heptachlor	HPV	2	5	7
177	1024-57-3	Heptachlor-epoxide	Highly Pers	1	2	3
179	74-83-9	Methylbromide (bromomethane)	Highly Pers	5	9	14

No.	CAS No.	Name	Reason	-ve	+ve	Total
182	1836-75-5	Nitrofen	HPV	0	1	1
183	4685-14-7	Paraquat = 1,1'-dimethyl-4,4'-bipyridinium	HPV	2	0	2
187	709-98-8	Propanil	HPV	0	1	1
190	29082-74-4	Octachlorostyrene	HPV	0	0	0
191	100-42-5	Styrene	Highly Pers	2	3	5
194	120-83-2	2,4-Dichlorophenol	HPV	1	2	3
195	1570-64-5	4-Chloro-2-methylphenol	HPV	0	0	0
196	59-50-7	4-Chloro-3-methylphenol	HPV	0	0	0
198	118-74-1	Hexachlorobenzene (HCB)	HPV	1	13	14
215	98-54-4	4-tert-Butylphenol	HPV	0	5	5
216	140-66-9	4-tert-Octylphenol = 1,1,3,3-tetramethyl-4-butylphenol	HPV	2	15	17
253	11081-15-5	Phenol, isooctyl-	HPV	0	0	0
254	25154-52-3	Phenol, nonyl-	HPV	0	5	5
275	68515-49-1	1,2-Benzenedicarboxylic acid, di-C9-11-branched alkyl esters, C10-rich (DINP)	HPV	0	0	0
277	103-23-1	Bis(2-ethylhexyl)adipate	HPV	0	0	0
278	85-68-7	Butylbenzylphthalate (BBP)	HPV	3	14	17
279	117-81-7	Di-(2-ethylhexyl)phthalate (DEHP)	HPV	14	31	45
280	84-61-7	Dicyclohexyl phthalate (DCHP)	HPV	0	0	0
281	84-66-2	Diethyl phthalate (DEP)	HPV	0	1	1
283	26761-40-0	Diisodecyl phthalate	HPV	0	0	0
284	28553-12-0	Diisononyl phthalate = 1,2-benzenedicarboxylic acid, diisononyl ester (DINP)	HPV	0	0	0
286	84-74-2	Di-n-butylphthalate (DBP)	HPV	8	48	56
318	1675-54-3	2,2'-Bis(4-(2,3-epoxypropoxy)phenyl)propane = 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane	HPV	0	0	0
326	80-05-7	2,2-Bis(4-hydroxyphenyl)propane = 4,4'-isopropylidenediphenol = bisphenol A	HPV	2	29	31
348	106-89-8	Epichlorohydrin (1-chloro-2,3-epoxypropane)	HPV	2	5	7
370	92-52-4	Diphenyl	HPV	0	0	0
371	90-43-7	o-Phenylphenol	HPV	0	0	0
396	1336-36-3	PCB	Pers	1	12	13
405	38380-07-3	PCB 128 (2,2',3,3',4,4'-hexachlorobiphenyl)	Pers	0	1	1
406	38411-22-2	PCB 136 (2,2',3,3',6,6'-hexachlorobiphenyl)	Pers	0	1	1
408	35065-27-1	PCB 153 (2,2',4,4',5,5'-hexachlorobiphenyl)	Pers	0	7	7
409	38380-08-4	PCB 156 (2,3,3',4,4',5-hexachlorobiphenyl)	Pers	0	2	2
410	32774-16-6	PCB 169 (3,3',4,4',5,5'-hexachlorobiphenyl)	Pers	0	2	2
417	2437-79-8	PCB 47 (2,2',4,4'-tetrachlorobiphenyl)	Pers	0	1	1
418	70362-47-9	PCB 48 (2,2',4,5-tetrachlorobiphenyl)	Pers	0	1	1
419	35693-99-3	PCB 52 (2,2';5,5'-tetrachlorobiphenyl)	Pers	4	1	5
420	33284-53-6	PCB 61 (2,3,4,5-tetrachlorobiphenyl)	Pers	0	1	1
421	32598-12-2	PCB 75 (2,4,4',6-tetrachlorobiphenyl)	Pers	0	1	1
422	32598-13-3	PCB 77 (3,3',4,4'-tetrachlorobiphenyl)	Pers	0	4	4
427	53469-21-9	PCB aroclor 1242	Pers	0	7	7

No.	CAS No.	Name	Reason	-ve	+ve	Total
428	12672-29-6	PCB aroclor 1248	Pers	0	4	4
429	11097-69-1	PCB aroclor 1254	Pers	0	24	24
430	11096-82-5	PCB aroclor 1260 (clophen A60)	Pers	0	1	1
435	No CAS 046	2,2',4,4'-Tetrabrominated diphenyl ether (2,2',4,4'-tetraBDE)	Pers	0	2	2
436	No CAS 044	Decabrominated diphenyl ether (decaBDE)	Pers	1	4	5
437	No CAS 043	Octabrominated diphenyl ether (octaBDE)	Pers	0	6	6
438	59536-65-1	PBBs = brominated biphenyls (mixed group of 209 congeners)	Pers	0	3	3
439	No CAS 045	Pentabrominated diphenyl ether (pentaBDE)	Pers	2	3	5
444	135-19-3	2-Naphthol	HPV	1	1	2
467	40321-76-4	1,2,3,7,8-Pentachlorodibenzodioxin	Pers	0	1	1
472	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)	Pers	3	53	56
483	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	Pers	0	1	1
484	83704-53-4	1,2,3,7,9-Pentachlorodibenzofuran	Pers	0	2	2
485	58802-20-3	1,2,7,8-Tetrachlorodibenzofuran	Pers	0	2	2
486	71998-72-6	1,3,6,8-Tetrachlorodibenzofuran	Pers	0	2	2
487	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF)	Pers	0	6	6
488	67733-57-7	2,3,7,8-Tetrabromodibenzofuran	Pers	1	11	12
489	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	Pers	0	5	5
503	106340-44-7	Tetrabromodibenzofuran (TeBDF)	Pers	0	1	1
504	7429-90-5	Aluminum	HPV/Metal	3	8	11
505	7440-43-9	Cadmium	HPV/Metal	6	17	23
506	1332-40-7	Copper oxychlor	Metal	0	0	0
507	7758-98-7	Copper sulfate	HPV/Metal	7	19	26
508	7439-92-1	Lead	HPV/Metal	10	22	32
509	7439-97-6	Mercury	Metal	2	23	25
510	22967-92-6	Methylmercury	Metal	2	10	12
511	No CAS 050	Tributyl tin compounds	Metal	0	8	8
512	688-73-3	Tributyl tin	Metal	2	21	23
513	56-35-9	Tributyl tin oxide = bis(tributyl tin) oxide	HPV/Metal	2	19	21
514	26354-18-7	2-Propenoic acid, 2-methyl-, methyl ester = stannane, tributylmeacrylate	Metal	0	0	0
515	No CAS 100	Methoxyetylacrylate tributyl tin, copolymer	Metal	0	0	0
516	4342-30-7	Phenol, 2-[[(tributylstannyl)oxy]carbony]	Metal	0	0	0
517	4342-36-3	Stannane, (benzoyloxy)tributyl-	Metal	0	0	0
518	4782-29-0	Stannane, [1,2-phenylenebis(carbonyloxy)]	Metal	0	0	0
519	36631-23-9	Stannane, tributyl = tributyl tin naphtalate	Metal	0	0	0
520	85409-17-2	Stannane, tributyl-, mono(naphthenoyloxy)	Metal	0	0	0
521	24124-25-2	Stannane, tributyl[(1-oxo-9,12-octadecad]	Metal	0	0	0
522	3090-35-5	Stannane, tributyl[(1-oxo-9-octadecenyl)]	Metal	0	0	0
523	26239-64-5	Stannane, tributyl[[[1,2,3,4,4a,4b,5,6,1]]]	Metal	0	0	0
524	30593	Stannane, tributylfluoro-	Metal	0	0	0
525	2155-70-6	Tributyl[(2-methyl-1-oxo-2-	Metal	0	0	0

		propenyl)oxy]stannane				
No.	**CAS No.**	**Name**	**Reason**	**-ve**	**+ve**	**Total**
526	No CAS 099	Tributyl tin carboxylate	Metal	0	0	0
527	26636-32-8	Tributyl tin naphthalate	Metal	0	0	0
528	No CAS 101	Tributyl tin polyethoxylate	Metal	0	0	0
529	2279-76-7	Tri-n-propyl tin (TPrT)	Metal	0	2	2
530	1461-25-2	Tetrabutyl tin (TTBT)	HPV/Metal	0	2	2
531	No CAS 051	Triphenyl tin	Metal	0	0	0
532	900-95-8	Fentin acetate	Metal	0	1	1
536	95-76-1	3,4-Dichloroaniline	HPV	0	1	1
538	99-99-0	4-Nitrotoluene	HPV	0	0	0
541	119-61-9	Benzophenone	HPV	0	0	0
543	75-15-0	Carbon disulphide	HPV	0	1	1
545	68-12-2	Dimethylformamide (DMFA)	HPV	0	0	0
548	107-21-1	Ethylene glycol (ethane-1,2-diol)	HPV	0	0	0
557	127-18-4	Perchloroethylene	HPV	0	1	1
558	108-95-2	Phenol	HPV	1	6	7
560	108-46-3	Resorcinol	HPV	0	2	2
564	108-05-4	Vinyl acetate	HPV	0	1	1

HPV = high production volume;

Pers = persistent.

Table 3.2: The 66 candidate substances from the EC priority list with proven ED activities, classified according to high, medium or low exposure concern (from BKH, 2002)

No.	CAS No.	Name	Reason	Ecology	Human	Total	Concern
11	12789-03-6	Chlordane	Highly Pers	2	1	1	High
12	57-74-9	Chlordane (cis- and trans-)	Highly Pers	2	1	1	High
20	143-50-0	Kepone = chlordecone	Highly Pers	2	1	1	High
21	2385-85-5	Mirex	Highly Pers	2	1	1	High
24	8001-35-2	Toxaphene = camphechlor	Highly Pers	2	1	1	High
42	50-29-3	DDT (technical) = clofenotane	HPV	1	1	1	High
56	50-29-3	p,p'-DDT = clofenotane	HPV	1	1	1	High
57	3563-45-9	Tetrachloro DDT = 1,1,1,2-tetrachloro-2,2-bis(4-chlorophenyl)ethane	Highly Pers	1	2	1	High
63	50471-44-8	Vinclozolin	HPV	3	1	1	High
69	12427-38-2	Maneb	HPV	3	1	1	High
70	137-42-8	Metam natrium	HPV	3	1	1	High
73	137-26-8	Thiram	HPV	3	1	1	High
74	12122-67-7	Zineb	HPV	3	1	1	High
78	58-89-9	Gamma-HCH = lindane	HPV	2	1	1	High
87	330-55-2	Linuron (lorox)	HPV	3	1	1	High
142	1912-24-9	Atrazine	HPV	2	1	1	High
163	34256-82-1	Acetochlor	HPV	3	1	1	High
164	15972-60-8	Alachlor	HPV	2	1	1	High
191	100-42-5	Styrene	HPV	3	1	1	High
198	118-74-1	Hexachlorobenzene = HCB	HPV	3	1	1	High
270	85-68-7	Butylbenzylphthalate (BBP)	HPV	3	1	1	High
279	117-81-7	Di-(2-ethylhexyl)phthalate (DEHP) = dioctylphthalate (DOP)	HPV	3	1	1	High
286	84-74-2	Di-n-butylphthalate (DBP)	HPV	3	1	1	High
326	80-05-7	2,2-Bis(4-hydroxyphenyl)propane = 4,4'-isopropylidenediphenol = bisphenol A	HPV	1	1	1	High
396	1336-36-3	PCB	Pers.		1	1	High
408	35065-27-1	PCB153	Pers.		1	1	High
410	32774-16-6	PCB169	Pers.		1	1	High
417	2437-79-8	PCB47	Pers.		1	1	High
422	32598-13-3	PCB77	Pers.		1	1	High
427	53469-21-9	Aroclor 1242	Highly Pers		1	1	High
428	12672-29-6	Aroclor 1248	Pers.		1	1	High
429	11097-69-1	Aroclor 1254	Highly Pers		1	1	High
430	11096-82-5	Aroclor 1260	Pers.		1	1	High
438	59536-65-1	PBBs = brominated biphenyls (mixed group of 209 congeners)	Pers.		1	1	High
467	40321-76-4	1,2,3,7,8-Pentachlorodibenzodioxin	Pers.		1	1	High
472	No CAS 140	2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	Pers.		1	1	High

No.	CAS No.	Name	Reason	Ecology	Human	Total	Concern
487	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	Pers.		1	1	High
525	688-73-3	Tributyl tin	Metal	1	2	1	High
526	No CAS 050	Tributyl tin compounds	Metal	1	2	1	High
527	56-35-9	Tributyl tin oxide = bis(tributyl tin) oxide	HPV/Metal	1	2	1	High
504	26354-18-7	2-Propenoic acid, 2-methyl-, methyl ester	Metal	1	2	1	High
512	No CAS100	Methoxyetylacrylate tributyl tin, copolymer	Metal	1	2	1	High
514	4342-30-7	Phenol, 2-[[(tributylstannyl)oxy]carbony]	Metal	1	2	1	High
515	4342-36-3	Stannane, (benzoyloxy)tributyl-	Metal	1	2	1	High
516	4782-29-0	Stannane, [1,2-phenylenebis(carbonyloxy)]	Metal	1	2	1	High
517	36631-23-9	Stannane, tributyl = tributyl tin naphtalate	Metal	1	2	1	High
518	85409-17-2	Stannane, tributyl-, mono(naphthenoyloxy)	Metal	1	1	1	High
519	24124-25-2	Stannane, tributyl[(1-oxo-9,12-octadecad)]	Metal	1	1	1	High
520	3090-35-5	Stannane, tributyl[(1-oxo-9-octadecenyl)]	Metal	1	1	1	High
521	26239-64-5	Stannane, tributyl[[[1,2,3,4,4a,4b,5,6,1]]]	Metal	1	1	1	High
522	1983-10-4	Stannane, tributylfluoro-	Metal	1	1	1	High
524	2155-70-6	Tributyl[(2-methyl-1-oxo-2-propenyl)oxy]stannane	Metal	1	1	1	High
528	No CAS 099	Tributyl tin carboxylate	Metal	1	1	1	High
529	26636-32-8	Tributyl tin naphthalate	Metal	1	1	1	High
530	No CAS 101	Tributyl tin polyethoxylate	Metal	1	1	1	High
531	2279-76-7	Tri-n-propyl tin (TPrT)	Metal	1	1	1	High
532	No CAS 051	Triphenyl tin	Metal	1	1	1	High
509	900-95-8	Fentin acetate	Metal	1	1	1	High
536	95-76-1	3,4-Dichloroaniline	HPV	1	1	1	High
560	108-46-3	Resorcinol	HPV	3	3	3	High
141	61-82-5	Amitrol = aminotriazol	HPV	3	3	3	Medium
182	1836-75-5	Nitrofen	HPV	3	3	3	Medium
216	140-66-9	4-tert-Octylphenol = 1,1,3,3-tetramethyl-4-butylphenol	HPV	1	1	1	Medium
254	25154-52-3	Phenol, nonyl-	HPV	1	1	1	Medium
523	1461-25-2	Tetrabutyl tin (TTBT)	HPV/Metal	1	1	1	Low
538	99-99-0	4-Nitrotoluene	HPV	3	3	3	Low

HPV = high production volume;

Pers = persistent.

Table 3.3: The 12 substances investigated in WRc-NSF's *Study on the scientific evaluation of 12 substances in the context of endocrine disrupter priority list of actions* (WRC 2002)

No.	CAS No.	Name	Reason	-ve	+ve	Total
194	120-83-2	2,4-Dichlorophenol	HPV	1	2	3
196	59-50-7	4-Chloro-3-methylphenol	HPV	0	0	0
216	140-66-9	4-tert-Octylphenol = 1,1,3,3-tetramethyl-4-butylphenol	HPV	2	15	17
318	1675-54-3	2,2'-Bis(4-(2,3-epoxypropoyl)phenyl)propane	HPV	0	0	0
371	90-43-7	o-Phenylphenol	HPV	0	0	0
435	No CAS 046	2,2',4,4'-Tetrabrominated diphenyl ether (2,2',4,4'-tetraBDE)	Pers	0	2	2
538	99-99-0	4-Nitrotoluene	HPV	0	0	0
543	75-15-0	Carbon disulphide	HPV	0	1	1
560	108-46-3	Resorcinol	HPV	0	2	2
		Oestrone (E1)				
		17 β-Oestradiol (E2)				
		17 α-Ethinyloestradiol (EE2)				

HPV = high production volume;

Pers = persistent.

3.1.2 United States Environmental Protection Agency (US EPA)

The US EPA is currently running its *Endocrine disruptor screening programme* (EDSP) for categorising risk from EDCs. An important first stage of the EDSP was the creation of an initial priority list of EDCs for screening, which contained between 50 and 100 chemicals. The chemicals were selected based on their relatively high potential for human exposure, rather than a combination of exposure and effects factors. The scope of this first group of chemicals to be tested included pesticide active ingredients and high production volume (HPV) chemicals used as pesticide inerts. Subsequent projects reduced this list to 37 and then 28 chemicals. The list remains to be finalised, but further information can be found at:

http://www.epa.gov/scipoly/oscpendo/pubs/prioritysetting/approach.htm

3.1.3 Ministry of the Environment (MOE), Japan

In the planning of the Japanese Ministry of the Environment's programme on EDCs (SPEED '98; ExTEND 2005), 67 chemicals were identified as high priority in 1998. This list was subsequently revised to 65 chemicals in 2000 because two substances (styrene dimer/trimer and n-butylbenzene) were considered low risk. These substances are listed in Appendix 2.

In 2000, the MOE selected 12 of these chemicals to make risk assessments for mammals: tributyl tin, 4-octylphenol, nonylphenol, di-n-butylphthalate, octachlorostyrene, benzophenone, di-cyclohexylphthalate, di-(2-ethylhexyl)phthalate, butylbenzylphthalate, di-ethylphthalate, di-(2-ethylhexyl)adipate and triphenyl tin. A further eight were added in each year of 2001 and 2002 for risk ssessment: pentachlorophenol, amitrole, bisphenol A, 2,4-dichlorophenol, 4-nitrotoluene, di-pentylphthalate, di-hexylphthalate and di-propylphthalate (2001); and hexachlorobenzene, hexachlorocyclohexane, chlordane, oxychlordane, trans-nonachlor, DDT, DDE, DDD (2002). These chemicals were considered priority EDCs. The list is presented in Appendix 2.

3.2 IEH list

IEH (2005) reviewed all known published lists of substances purported to be EDCs, and combined the findings into one large, catch-all list. Although published in 2005, the review was originally submitted to the Department for Environment, Food and Rural Affairs (Defra) in 2002, and so does not contain and substances identified since then.

IEH (2005) identified a total of 966 chemical compounds reported as having some degree of ED activity. Of these, 539 were general chemical substances of anthropogenic origin, including pure forms of chemicals, as well as any ED active metabolites and/or breakdown products of those chemicals. Of the remaining chemical substances, 225 (including metabolites) were biocides, 62 were naturally occurring chemical substances, 58 were pharmaceuticals, 54 were metallo-complex substances and 28 were consumer products.

IEH also conducted a series of interviews to record the international effort on research and regulation of ED and EDCs (IEH, 2003); part of the interview process was to request information on priority EDCs.

In general, most European countries accept the prioritisation developed by the EC (through the BKH reports). Some chemicals may be seen as more important in some countries, but the EC prioritisation process is the basis for any lists. For example, Denmark has a 'list of undesirable substances', but EDCs on the list have been chosen because they are on the EC list. Japan has created its own list according to SPEED '98 (see above); the USA is still finalising a list of priority EDCs (see above).

http://www.le.ac.uk/wrc/ieh

3.3 Journal articles

The review of journal articles found 156 chemical substances reported in ED studies since the year 2000. Unsurprisingly, hormones and pesticides were the two largest groups of substances used, as these specifically target the endocrine system (hormones by definition, and many pesticides are designed to interfere with processes under endocrine control, such as moulting). Other substances reported were polybrominated diphenyl ethers (PDEs) (used as flame retardants), metals, phthalates, polychlorinated biphenyls (PCBs) (used in a number of industrial and manufacturing applications), and a variety of other substances grouped as 'miscellaneous' for the purposes of this report.

Given that these are mostly academic articles, it is not surprising that the majority of the chemicals listed are hormones or pesticides targeted at the endocrine system, because many laboratory studies chose these substances as 'model' or 'known' EDCs. By the same reasoning, however, the list should include most known, important EDCs.

The chemicals and references are presented in Appendix 3.

3.3.1 Most frequently cited chemicals

The five chemicals most frequently cited in the peer-reviewed literature since 2000 are nonylphenol (NP), 17β oestradiol (E2), ethinyloestradiol (EE2), bisphenol A (BisA) and tributyl tin (and derivatives) (TBT), respectively (see Appendix 4). All five of these are well-known EDCs.

NP and BisA are chemical substances of industrial origin.

E2 is a natural hormone excreted by humans (and other mammals) that has been shown to cause intersex (partial feminisation of males) in freshwater fish. E2 enters watercourses in sewage effluent, as most sewage treatments do not remove complex organic compounds such as steroids. The *Endocrine disruption demonstration programme* is currently investigating the possibility of using granular activated charcoal (GAC) to remove steroids such as E2 and EE2.

EE2 is a synthetic hormone, and is the active ingredient in the female contraceptive pill. EE2 also enters watercourse via sewage effluent, and is considerably more potent than E2 in causing intersex in fish. There is no legislation limiting the use of EE2.

TBT is perhaps the best known of all EDCs, having been identified as the agent causing imposex (the superimposition of non-functioning male genitalia in females) in UK dogwhelk populations during the 1980s. TBT is the active ingredient of anti-fouling paints, but in Europe its use has been banned on vessels smaller than 25 metres in length.

Other frequently cited EDCs include other hormones (such as oestrone and testosterone), other organotin compounds (such as dibutyl tin and triphenyl tin), other phenolic compounds (such as octylphenol), and certain pesticides, such as dichlorodibenzotetrachloroethane (DDT), diethylstilbestrol (DES) and methooprene.

Since these chemicals are all well known EDCs, these findings clearly do not identify new and emerging EDCs. Regardless, they do demonstrate that these five chemicals are still receiving much attention in experimental studies, undoubtedly because they are well known, or potent, EDCs and so are chosen deliberately to elicit ED effects.

4 Summary

This review of scientific literature, published lists, websites of regulatory agencies, and other published sources demonstrates that there is a wide range of chemical substances either known or suspected to cause ED. A study that collated all available lists of EDCs identified a total of 966 different chemical substances (including any degradation or metabolic products that also exhibited ED activity) (IEH, 2005).

Most national regulatory organisations are in the process of developing prioritised lists of EDCs. Member states of the EU accept, and work to, the priority list developed by BKH (2000, 2002) for the EC. In the United States, a prioritisation strategy for EDCs is currently being developed by the EPA. And in Japan, a list of 65 substances identified as priority EDCs has been developed as a result of SPEED '98 and ExTEND 2005.

In the published scientific literature, ED research remains a popular subject. A review of papers published since 2000 identified 156 different chemical substances used in ED-related research. The most popular (most frequently cited) chemicals are well-known EDCs (NP, BisA, TBT, E2 and EE2); this is probably a reflection of the number of projects trying to study ED mechanisms. These chemicals are clearly still very important, but a great deal of information is already available on them.

From a UK perspective, the BKH and EC lists are probably the most important.

References

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List of abbreviations

BisA	Bisphenol A
CAS	Chemical Abstracts Service
Defra	Department for Environment, Food and Rural Affairs
E2	Oestradiol
ED	Endocrine disruption
EDC	Endocrine disrupting chemical
EE2	Ethinyloestradiol
HPV	High production volume
IEH	Institute of Environment and Health
MOE	Minstry of the Environment (Japan)
NP	Nonyl phenol
US EPA	Environmental Protection Agency

Appendix 1

Appendix 1: The 564 candidate substances from the EC priority list shown to have proven or potential ED activities (from BKH, 2002)

No.	CAS No.	Name	HPV	Persist	Category	Concern
11	12789-03-6	Chlordane		Pers+	1	High
12	57-74-9	Chlordane (cis- and trans-)		Pers+	1	High
20	143-50-0	Kepone (chlordecone)		Pers+	1	High
21	2385-85-5	Mirex		Pers+	1	High
24	8001-35-2	Toxaphene = camphechlor		Pers+	1	High
42	50-29-3	DDT (technical) = clofenotane	HPV	Pers	1	High
56	No CAS 008	p,p'-DDT = clofenotane	HPV	Pers	1	High
57	3563-45-9	Tetrachloro DDT = 1,1,1,2-tetrachloro-2,2-bis(4-chlorophenyl)ethane	HPV	Pers+	1	High
63	50471-44-8	Vinclozolin	HPV	Pers	1	High
69	12427-38-2	Maneb	HPV	Not pers	1	High
70	137-42-8	Metam natrium	HPV	Not pers	1	High
73	137-26-8	Thiram	HPV	Not pers	1	High
74	12122-67-7	Zineb	HPV	Not pers	1	High
78	58-89-9	Gamma-HCH (lindane)	HPV	Pers	1	High
87	330-55-2	Linuron (lorox)	HPV	Not pers	1	High
142	1912-24-9	Atrazine	HPV	Pers	1	High
163	34256-82-1	Acetochlor	HPV	Not pers	1	High
164	15972-60-8	Alachlor	HPV	Not pers	1	High
191	100-42-5	Styrene	HPV	Not pers	1	High
198	118-74-1	Hexachlorobenzene (HCB)	HPV	Pers	1	High
278	85-68-7	Butylbenzylphthalate (BBP)	HPV	Not pers	1	High
279	117-81-7	Di-(2-ethylhexyl)phthalate (DEHP)	HPV	Not pers	1	High
286	84-74-2	Di-n-butylphthalate (DBP)	HPV	Not pers	1	High
326	80-05-7	2,2-Bis(4-hydroxyphenyl)propane = 4,4'-isopropylidenediphenol = bisphenol A	HPV	Not pers	1	High
396	1336-36-3	PCB		Pers	1	High
408	35065-27-1	PCB 153 (2,2',4,4',5,5'-hexachlorobiphenyl)		Pers	1	High
410	32774-16-6	PCB 169 (3,3',4,4',5,5'-hexachlorobiphenyl)		Pers	1	High
417	2437-79-8	PCB 47 (2,2',4,4'-tetrachlorobiphenyl)		Pers	1	High
422	32598-13-3	PCB 77 (3,3',4,4'-tetrachlorobiphenyl)		Pers	1	High
427	53469-21-9	PCB aroclor 1242		Pers	1	High
428	12672-29-6	PCB aroclor 1248		Pers	1	High
429	11097-69-1	PCB aroclor 1254		Pers	1	High
430	11096-82-5	PCB aroclor 1260 (Clophen A60)		Pers+	1	High
438	No CAS 140	PBBs = brominated biphenyls (mixed group of 209 congeners)		Pers	1	High
467	40321-76-4	1,2,3,7,8-pentachlorodibenzodioxin		Pers	1	High

No.	CAS No.	Name	HPV	Persist	Category	Concern
472	1746-01-6	2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)		Not pers	1	High
487	57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran (2,3,4,7,8-PeCDF)		Pers	1	High
511	No CAS 050	Tributyl tin compounds		Metal	1	High
512	688-73-3	Tributyl tin hydride		Metal	1	High
513	56-35-9	Tributyl tin oxide = bis(tributyl tin) oxide	HPV	Metal	1	High
514	26354-18-7	2-Propenoic acid, 2-methyl-, methyl ester = stannane, tributylmeacrylate		Metal	1	High
515	No CAS 100	Methoxyetylacrylate tributyl tin, copolymer		Metal	1	High
516	4342-30-7	Phenol, 2-[[(tributylstannyl)oxy]carbonyl]		Metal	1	High
517	4342-36-3	Stannane, (benzoyloxy)tributyl-		Metal	1	High
518	4782-29-0	Stannane, [1,2-phenylenebis(carbonyloxy)]		Metal	1	High
519	36631-23-9	Stannane, tributyl = tributyl tin naphtalate		Metal	1	High
520	85409-17-2	Stannane, tributyl-, mono(naphthenoyloxy		Metal	1	High
521	24124-25-2	Stannane, tributyl[(1-oxo-9,12-octadecad]		Metal	1	High
522	3090-35-5	Stannane, tributyl[(1-oxo-9-octadecenyl)]		Metal	1	High
523	26239-64-5	Stannane, tributyl[[[1,2,3,4,4a,4b,5,6,1]]]		Metal	1	High
524	1983-10-4	Stannane, tributylfluoro-		Metal	1	High
525	2155-70-6	Tributyl[(2-methyl-1-oxo-2-propenyl)oxy]stannane		Metal	1	High
526	No CAS 099	Tributyl tin carboxylate		Metal	1	High
527	26636-32-8	Tributyl tin naphthalate		Metal	1	High
528	No CAS 101	Tributyl tin polyethoxylate		Metal	1	High
529	2279-76-7	Tri-n-propyl tin (TPrT)		Metal	1	High
531	No CAS 051	Triphenyl tin		Metal	1	High
532	900-95-8	Fentin acetate = triphenyl tin acetate		Metal	1	High
536	95-76-1	3,4-Dichloroaniline	HPV	Not pers	1	High
560	108-46-3	Resorcinol	HPV	Not pers	1	High
141	61-82-5	Amitrol = aminotriazol	HPV	Not pers	1	Medium
182	1836-75-5	Nitrofen	HPV	Pers	1	Medium
216	140-66-9	4-tert-Octylphenol = 1,1,3,3-tetramethyl-4-butylphenol	HPV	Not pers	1	Medium
254	25154-52-3	Phenol, nonyl-	HPV	Not pers	1	Medium
530	1461-25-2	Tetrabutyl tin (TTBT)	HPV	Metal	1	Low
538	99-99-0	4-Nitrotoluene	HPV	Not pers	1	Low
2	10605-21-7	Carbendazim	HPV	Not pers	2	
10	309-00-2	Aldrin		Pers+	2	
15	60-57-1	Dieldrin		Pers+	2	
16	115-29-7	Endosulfan	HPV	Pers+	2	
17	959-98-8	Endosulfan (alpha)		Pers+	2	
18	33213-65-9	Endosulfan (beta)		Pers+	2	
19	72-20-8	Endrin		Pers+	2	

No.	CAS No.	Name	HPV	Persist	Category	Concern
22	27304-13-8	Oxychlordane		Pers+	2	
23	39801-14-4	Photomirex		Pers+	2	
27	94-75-7	2,4-Dichlorophenoxy acetic acid (2,4-D)	HPV	Not pers	2	
29	67747-09-5	Prochloraz	HPV	Not pers	2	
44	115-32-2	Dicofol = kelthane	HPV	Pers	2	
60	36734-19-7	Iprodione	HPV	Not pers	2	
75	137-30-4	Ziram	HPV	Not pers	2	
85	330-54-1	Diuron	HPV	Not pers	2	
104	333-41-5	Diazinon	HPV	Not pers	2	
106	60-51-5	Dimethoate	HPV	Not pers	2	
113	121-75-5	Malathion	HPV	Not pers	2	
115	298-00-0	Methylparathion	HPV	Not pers	2	
119	56-38-2	Parathion = parathion(-ethyl)	HPV	Not pers	2	
156	122-34-9	Simazine	HPV	Not pers	2	
159	43121-43-3	Triadimefon	HPV	Not pers	2	
176	76-44-8	Heptachlor		Pers+	2	
179	74-83-9	Methylbromide (bromomethane)	HPV	Not pers	2	
187	709-98-8	Propanil	HPV	Not pers	2	
194	120-83-2	2,4 Dichlorophenol	HPV	Not pers	2	
195	1570-64-5	4-Chloro-2-methylphenol	HPV	Not pers	2	
196	59-50-7	4-Chloro-3-methylphenol	HPV	Not pers	2	
215	98-54-4	4-tert-Butylphenol	HPV	Not pers	2	
283	26761-40-0	Diisodecyl phthalate	HPV	Not pers	2	
284	28553-12-0	Diisononyl phthalate = 1,2-benzenedicarboxylic acid, diisononyl ester (DINP)	HPV	Not pers	2	
318	1675-54-3	2,2'-Bis(4-(2,3-epoxypropoxy)phenyl)propane = 2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane	HPV	Not pers	2	
371	90-43-7	o-Phenylphenol	HPV	Not pers	2	
406	38411-22-2	PCB 136 (2,2',3,3',6,6'-hexachlorobiphenyl)		Pers	2	
409	38380-08-4	PCB 156 (2,3,3',4,4',5-hexachlorobiphenyl)		Pers	2	
418	70362-47-9	PCB 48 (2,2',4,5-tetrachlorobiphenyl)		Pers	2	
420	33284-53-6	PCB 61 (2,3,4,5-tetrachlorobiphenyl)		Pers	2	
421	32598-12-2	PCB 75 (2,4,4',6-tetrachlorobiphenyl)		Pers	2	
483	57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran		Pers	2	
484	83704-53-4	1,2,3,7,9-Pentachlorodibenzofuran		Pers	2	
485	58802-20-3	1,2,7,8-Tetrachlorodibenzofuran		Pers	2	
486	71998-72-6	1,3,6,8-Tetrachlorodibenzofuran		Pers	2	
488	67733-57-7	2,3,7,8-Tetrabromodibenzofuran		Pers	2	
489	51207-31-9	2,3,7,8-Tetrachlorodibenzofuran		Pers	2	
503	106340-44-7	Tetrabromodibenzofuran (TeBDF)		Pers	2	
543	75-15-0	Carbon disulphide	HPV	Not pers	2	
557	127-18-4	Perchloroethylene	HPV	Not pers	2	

No.	CAS No.	Name	HPV	Persist	Category	Concern
435	No CAS 046	2,2',4,4'-Tetrabrominated diphenyl ether (2,2',4,4'-tetraBDE)		No data	2	
436	No CAS 044	Decabrominated diphenyl ether (decaBDE)		No data	2	
437	No CAS 043	Octabrominated diphenyl ether (octaBDE)		No data	2	
439	No CAS 045	Pentabrominated diphenyl ether (pentaBDE)		No data	2	
190	29082-74-4	Octachlorostyrene		Pers+	3 A	
253	11081-15-5	Phenol, isooctyl-	HPV	No data	3 A	
541	119-61-9	Benzophenone	HPV	Not pers	3 A	
545	68-12-2	Dimethylformamide (DMFA)	HPV	Not pers	3 A	
169	106-93-4	Dibromoethane (EDB)	HPV	Not pers	3 A	
348	106-89-8	Epichlorohydrin (1-chloro-2,3-epoxypropane)	HPV	Not pers	3 A	
419	35693-99-3	PCB 52 (2,2',5,5'-tetrachlorobiphenyl)		Pers	3 A	
13	3734-48-3	Chlordene		Pers+	3 B*	
25	39765-80-5	trans-Nonachlor		Pers+	3 B*	
177	1024-57-3	Heptachlor-epoxide		Pers+	3 B*	
183	4685-14-7	Paraquat = 1,1'-dimethyl-4,4'-bipyridinium	HPV	Not pers	3 B*	
277	103-23-1	Bis(2-ethylhexyl)adipate	HPV	Not pers	3 B*	
280	84-61-7	Dicyclohexyl phthalate (DCHP)	HPV	Not pers	3 B*	
281	84-66-2	Diethyl phthalate (DEP)	HPV	Not pers	3 B*	
370	92-52-4	Diphenyl	HPV	Not pers	3 B*	
405	38380-07-3	PCB 128 (2,2',3,3',4,4'-hexachlorobiphenyl)		Pers	3 B*	
444	135-19-3	2-Naphthol	HPV	Not pers	3 B*	
482	107555-93-1	1,2,3,7,8-Pentabromodibenzofuran		Pers	3 B*	
564	108-05-4	Vinyl acetate	HPV	Not pers	3 B*	
504	7429-90-5	Aluminum	HPV	Metal	3 C	
505	7440-43-9	Cadmium	HPV	Metal	3 C	
506	1332-40-7	Copper oxychlor		Metal	3 C	
507	7758-98-7	Copper sulfate	HPV	Metal	3 C	
508	7439-92-1	Lead	HPV	Metal	3 C	
509	7439-97-6	Mercury		Metal	3 C	
510	22967-92-6	Methylmercury		Metal	3 C	
558	108-95-2	Phenol	HPV	Not pers	3 C	
109	55-38-9	Fenthion	HPV	Not pers	3 C*	
275	68515-49-1	1,2-Benzenedicarboxylic acid, di-C9-11-branched alkyl esters, C10-rich (DIDP)	HPV	Not pers	3 C*	
548	107-21-1	Ethylene glycol (ethane-1,2-diol)	HPV	Not pers	3 C*	
1	17804-35-2	Benomyl		Not pers		
3	116-06-3	Aldicarb		Not pers		
4	No CAS 001	Carbamate		No data		
5	63-25-2	Carbaryl		Not pers		
6	1563-66-2	Carbofuran		Not pers		
7	72490-01-8	Fenoxycarb		Not pers		
8	16752-77-5	Methomyl		Not pers		

No.	CAS No.	Name	HPV	Persist	Category	Concern
9	254887	1-Hydroxychlordene		No data		
14	No CAS 002	cis-Nonachlor		No data		
26	93-76-5	2,4,5-T = 2,4,5-trichlorophenoxy acetic acid		Not pers		
28	69806-50-4	Fluazifop-butyl		Not pers		
30	76578-14-8	Quizalofop-ethyl		Not pers		
31	2971-22-4	1,1,1-Trichloro-2,2-bis(4-chlorophenyl)ethane		Not pers		
32	65148-76-7	3-MeO-o,p'-DDA		No data		
33	65148-80-3	3-MeO-o,p'-DDE		No data		
34	43216-70-2	3-OH-o,p'-DDT		No data		
35	65148-81-4	4-MeO-o,p'-DDE		No data		
36	65148-72-3	4-MeO-o,p'-DDT		No data		
37	65148-77-8	5-MeO-o,p'-DDA		No data		
38	65148-75-6	5-MeO-o,p'-DDD		No data		
39	65148-82-5	5-MeO-o,p'-DDE		No data		
40	65148-74-5	5-MeO-o,p'-DDT		No data		
41	65148-73-4	5-OH-o,p'-DDT		No data		
43	No CAS 003	DDT metabolites		No data		
45	4329-12-8	m,p'-DDD		No data		
46	34113-46-7	o,p'-DDA		Not pers		
47	65148-83-6	o,p'-DDA-glycinate = N-[(2-chlorophenyl)(4-chlorophenyl)acetyl]glycin		No data		
48	53-19-0	o,p'-DDD		Pers		
49	3424-82-6	o,p'-DDE		Pers		
50	14835-94-0	o,p'-DDMU		Not pers		
51	789-02-6	o,p'-DDT		Pers		
52	No CAS 084	p,p'-DDA		No data		
53	72-54-8	p,p'-DDD		Pers		
54	72-55-9	p,p'-DDE		Pers		
55	No CAS 085	p,p'-DDMU		No data		
58	3563-45-9	Tetrachloro DDT = 1,1,1,2-tetrachloro-2,2-bis(4-chlorophenyl)ethane		Pers+		
59	88378-55-6	3,5-Dichlorophenylcarbamin acid-(1-carboxy-1-methyl)-allyl		No data		
61	83792-61-4	N-(3,5-Dichlorophenyl)-2-hydroxy-2-methyl-3-butenacidamide		No data		
62	32809-16-8	Procymidon		Pers		
64	40487-42-1	Pendimethalin		Pers		
65	29091-21-2	Prodiamine		Pers		
66	1582-09-8	Trifluralin		Pers		
67	79-44-7	Dimethyl carbamyl chloride		Not pers		
68	8018-01-7	Mancozeb		Not pers		
71	9006-42-2	Metiram (metiram-complex)		Not pers		
72	142-59-6	Nabam		Not pers		
76	319-85-7	Beta-HCH		Pers		
77	319-86-8	Delta-HCH		Pers		
79	608-73-1	Hexachlorocyclohexane = HCH mixed		Pers		

No.	CAS No.	Name	HPV	Persist	Category	Concern
80	1689-84-5	Bromoxynil		Not pers		
81	1689-83-4	Ioxynil		Not pers		
82	17356-61-5	1-(3,4-Dichlorophenyl)-3-methoxyurea		No data		
83	3567-62-2	1-(3,4-Dichlorophenyl)-3-methylurea		Not pers		
84	35367-38-5	Diflubenzuron		Pers		
86	96-45-7	Ethylene thiourea (ETU)		Not pers		
88	No CAS 096	1,1-Trichloro-2,2-bis(4-hydroxyphenyl)ethane (HPTE)		No data		
89	30668-06-5	1,3-Dichloro-2,2-bis(4-methoxy-3-methylphenyl)propane		No data		
90	14868-03-2	Bis-OH-MDDE		Not pers		
91	2971-36-0	Bis-OH-Methoxychlor = 1,1,1-trichloro-2,2-bis(4-hydroxyphenyl)ethane (HTPE)		Not pers		
92	2132-70-9	MDDE		Not pers		
93	72-43-5	Methoxychlor		Not pers		
94	75938-34-0	Mono-OH-MDDE		No data		
95	28463-03-8	Mono-OH-methoxychlor		No data		
96	72-43-5	p,p'-Methoxychlor		Not pers		
97	No CAS 108	1-Methyl-2-methylcarbamoylvinyldimethyl phosphate		No data		
98	30560-19-1	Acephate		Not pers		
99	470-90-6	Chlorfenvinphos		Not pers		
100	2921-88-2	Chlorpyrifos		Not pers		
101	50-18-0	Cyclophosphamide		Not pers		
102	682-80-4	Demefion		Not pers		
103	919-86-8	Demeton-s-methyl		Not pers		
105	62-73-7	Dichlorvos		Not pers		
107	2597-03-7	Elsan = dimephenthoate		Not pers		
108	122-14-5	Fenitrothion		Not pers		
110	2540-82-1	Formothion		Not pers		
111	51276-47-2	Glufosinate		Not pers		
112	70393-85-0	Glufosinate-ammonium		No data		
114	No CAS 122	Metalodemeton		No data		
116	7786-34-7	Mevinphos = phosdrin		Not pers		
117	1113-02-6	Omethoate		Not pers		
118	301-12-2	Oxydemeton-methyl		Not pers		
120	13171-21-6	Phosophamidon		Not pers		
121	13593-03-8	Quinalphos = chinalphos		Not pers		
122	299-84-3	Ronnel = fenchlorfos		Not pers		
123	22248-79-9	Tetrachlorvinphos = gardona		Not pers		
124	52-68-6	Trichlorfon = dipterex		Not pers		
125	No CAS 005	Pyrethrin		No data		
126	82657-04-3	Bifenthrin (@talstar)		Pers		
127	584-79-2	Bioallethrin = d-trans allethrin		Not pers		
128	91465-08-6	Cyhalothrin (@karate)		Not pers		
129	52315-07-8	Cypermethrin		Not pers		
130	52918-63-5	Deltamethrin		Not pers		
131	66230-04-4	Esfenvalerate		Not pers		

No.	CAS No.	Name	HPV	Persist	Category	Concern
132	26002-80-2	Fenothrin = sumithrin		Not pers		
133	51630-58-1	Fenvalerate		Not pers		
134	69409-94-5	Fluvalinate		Not pers		
135	52645-53-1	Permethrin		Not pers		
136	10453-86-8	Resmethrin		Not pers		
137	No CAS 123	Synthetic pyrethroids		No data		
138	314-40-9	Bromacil		Not pers		
139	60168-88-9	Fenarimol		Pers		
140	1918-02-1	Picloram		Pers		
143	No CAS 120	Bitertanol		No data		
144	21725-46-2	Cyanazine		Not pers		
145	94361-07-6	Cyproconazole		Not pers		
146	119446-68-3	Difenoconazole		Pers		
147	No CAS 121	Epiconazol		No data		
148	No CAS 008	Epoxiconazole		No data		
149	2593-15-9	Etridiazole		Not pers		
150	No CAS 130	Febuconazole		No data		
151	No CAS 009	Indole(3,2-b)carbazole (ICZ)		No data		
152	65277-42-1	Ketoconazol		Pers		
153	21087-64-9	Metribuzin		Not pers		
154	66246-88-6	Penconazole		Not pers		
155	60207-90-1	Propiconazole		Pers		
157	107534-96-3	Tebuconazole		Not pers		
158	886-50-0	Terbutryn		Pers		
160	123-88-6	Triadimenol		Not pers		
161	No CAS 007	Triazines (e.g. atrazine)		No data		
162	71751-41-2	Abamectin		No data		
165	33089-61-1	Amitraz		Not pers		
166	6164-98-3	Chlordimeform		Not pers		
167	74115-24-5	Clofentezine = chlorfentezine		Not pers		
168	96-12-8	Dibromochloropropane (DBCP)		Not pers		
170	25550-58-7	Dinitrophenol		Not pers		
171	88-85-7	Dinoseb		Not pers		
172	80844-07-1	Ethofenprox		Not pers		
173	No CAS 132	Fipronil		No data		
174	76674-21-0	Flutriafol		Pers		
175	2439-99-8	Glyphosate		Not pers		
178	3555-44-0	Imazalil		No data		
180	2212-67-1	Molinate		Not pers		
181	88671-89-0	Myclobutanil		Not pers		
184	82-68-8	Pentachloronitrobenzene (PCNB)		Pers		
185	51-03-6	Piperonyl butoxide		Not pers		
186	7287-19-6	Prometryn		Not pers		
188	NO CAS 129	Thiazopyr		No data		
189	104-51-8	n-Butylbenzene		Not pers		
192	No CAS 010	Styrenes (e.g. dimers and trimers)		No data		
193	12002-48-1	Trichlorobenzene		Not pers		
197	25167-81-1	Dichlorophenol		Not pers		
199	608-93-5	Pentachlorobenzene		Pers		

No.	CAS No.	Name	HPV	Persist	Category	Concern
200	87-86-5	Pentachlorophenol (PCP)		Pers		
201	87-26-3	2-sec-Pentylphenol = 2-(1-methylbutyl)phenol		Not pers		
202	53792-11-3	4-(4-Hydroxyphenyl)-2,2,6,6-tetramethylcyclohexanecarbon acid		No data		
203	1131-60-8	4-Cyclohexylphenol		Not pers		
204	No CAS 133	4-Hydroxyalkylphenol		No data		
205	1009-11-6	4-Hydroxy-n-butyrophenone		Not pers		
206	70-70-2	4-Hydroxypropiophenone		Not pers		
207	1805-61-4	4-iso-Pentylphenol = 4-(3-methylbutyl)phenol		No data		
208	104-40-5	4-Nonylphenol (4-NP)		Not pers		
209	20427-84-3	4-Nonylphenoldiethoxylate (NP2EO)		Not pers		
210	14409-72-4	4-Nonylphenolnonaethoxylate (Tergitol NP 9)		No data		
211	3115-49-9	4-nonylphenoxy acetic acid		Not pers		
212	No CAS 016	4-Nonylphenoxy carboxylic acid (NP1EC)		No data		
213	99-71-8	4-sec-Butylphenol = 4-(1-methylpropyl)phenol		Not pers		
214	94-06-4	4-sec-Pentylphenol = 4-(1-methylbutyl)phenol = p-sec-amylphenol		Not pers		
217	No CAS 013	4-tert-Pentylphenol = p-tert-amylphenol		No data		
218	7786-61-0	4-Vinylguaiacol (4-VG)		Not pers		
219	2628-17-3	4-Vinylphenol (4-VP)		Not pers		
220	27986-36-3	Ethanol, 2-(nonylphenoxy)-		Not pers		
221	1322-97-0	Ethanol, 2-(octylphenoxy)- = Octylphenolethoxylate		Not pers		
222	9040-65-7	Formaldehyde, polymer with nonylphenol		No data		
223	9036-19-5	Glycols, polyethylene, mono((1,1,3,3-tet = poly(oxy-1,2-ethanediyl), .alpha.-[(1,1,3,3-tetramethylbutyl)phenyl]-.omega.-hydroxy-		Not pers		
224	9002-93-1	Glycols, polyethylene, mono(p-(1,1,3,3-t = Octoxynol = Poly(oxy-1,2-ethanediyl), alpha-(4-(1,1,3,3-tetramethyl-butyl)phenyl)-omega-hydroxy-		Not pers		
225	26027-38-3	Glycols, polyethylene, mono(p-nonylphenol)		Not pers		
226	2717-05-5	Heptaoctatrikosan-1-ol, 23-(nonylphenoxy)3,6,9,12,15,18,21-nonylphenolmonoethoxylate		No data		
227	No CAS 102	malein.anhydride, monoester with ethoxylated nonylphenol, nutrilized with reaction products like dipropylenetriamine		No data		
228	No CAS 015	Nonylphenol carboxylic acid		No data		
229	9016-45-9	Nonylphenol ethoxylate		Not pers		

No.	CAS No.	Name	HPV	Persist	Category	Concern
230	No CAS 017	Nonylphenol ethoxylate carboxylic acid		No data		
231	No CAS 104	Nonylphenol ethoxylate with 9<EO<19		No data		
232	No CAS 103	Nonylphenol ethoxylate with EO<9		No data		
233	No CAS 105	Nonylphenol ethoxylate with EO>19		No data		
234	No CAS 106	Nonylphenol ethyleneoxyphosphate		No data		
235	No CAS 014	Octylphenol-5-ethoxylate		No data		
236	9004-87-9	OP-7 = poly(oxy-1,2-ethanediyl), alpha-(iso-octylphenyl)-omegahydroxy-		No data		
237	No CAS 012	Penta- to nonylphenols		No data		
238	27193-28-8	Phenol, (1,1,3,3-tetramethylbutyl)- = octylphenol		Not pers		
239	27985-70-2	Phenol, (1-methylheptyl)-		Not pers		
240	1331-54-0	Phenol, (2-ethylhexyl)-		No data		
241	3884-95-5	Phenol, 2-(1,1,3,3-tetramethylbutyl)-		Not pers		
242	17404-44-3	Phenol, 2-(1-ethylhexyl)-		Not pers		
243	18626-98-7	Phenol, 2-(1-methylheptyl)-		Not pers		
244	37631-10-0	Phenol, 2-(1-propylpentyl)-		Not pers		
245	949-13-3	Phenol, 2-octyl-		Not pers		
246	26401-75-2	Phenol, 2-sec-octyl-		No data		
247	3307-00-4	Phenol, 4-(1-ethylhexyl)-		Not pers		
248	1818-08-2	Phenol, 4-(1-methylheptyl)-		Not pers		
249	3307-01-5	Phenol, 4-(1-propylpentyl)-		Not pers		
250	27013-89-4	Phenol, 4-isooctyl-		No data		
251	1806-26-4	Phenol, 4-octyl-		Not pers		
252	27214-47-7	Phenol, 4-sec-octyl-		No data		
255	67554-50-1	Phenol, octyl-		No data		
256	93891-78-2	Phenol, sec-octyl-		No data		
257	52623-95-7	Poly(oxy-1,2-ethanediyl), alpha-((1,1,3,3-tetramethylbutyl) phenyl)-omega-hydroxy-phosphate		No data		
258	81642-15-1	Poly(oxy-1,2-ethanediyl), alpha-(3-octylphenyl)-omega-hydroxy		No data		
259	51651-58-2	Poly(oxy-1,2-ethanediyl), alpha-(4-isooctylphenyl)-omega-hydroxy-		No data		
260	68891-21-4	Poly(oxy-1,2-ethanediyl), alpha-(dinonylphenyl)-omega-hydroxyforgrenet		No data		
261	37205-87-1	Poly(oxy-1,2-ethanediyl), alpha-(iso-nonylphenyl)-omega-hydroxyphosphate		No data		
262	51811-79-1	Poly(oxy-1,2-ethanediyl), alpha-(nonylphenyl)-omega-hydroxyforgrenet		Not pers		
263	68412-54-4	Poly(oxy-1,2-ethanediyl), alpha-(nonylphenyl)-omega-hydroxyforgrenet		No data		
264	9036-89-2	Poly(oxy-1,2-ethanediyl), alpha-(octylphenyl)-omega-hydroxy-		No data		

No.	CAS No.	Name	HPV	Persist	Category	Concern
265	68987-90-6	Poly(oxy-1,2-ethanediyl), alpha-(octylphenyl)-omega-hydroxyforgrenet		No data		
266	60864-33-7	Poly(oxy-1,2-ethanediyl), alpha-(phenylmethyl)-omega-((1,1,3,3-tetramethyl-butyl)-phenoxy)		No data		
267	9014-90-8	Poly(oxy-1,2-ethanediyl), alpha-sulfo-omega-nonylphenoxy		Not pers		
268	55348-40-8	Poly(oxy-1,2-ethanediyl), alpha-sulpho-omega-((1,1,3,3-tetramethyl-butyl)-phenoxy)		No data		
269	109909-39-9	Poly(oxy-1,2-ethanediyl), alpha-sulpho-omega(2,4,6-tris(1-methylpropyl)phenoxy)-sodium salt		No data		
270	69011-84-3	Poly(oxy-1,2-ethanediyl), alpha-sulpho-omega-(octylphenyl)-forgrenet, sodium salt		No data		
271	25013-16-5	tert-Butylhydroxyanisole (BHA)		Not pers		
272	No CAS 020	Intermediate-chain chlorinated paraffins		No data		
273	No CAS 021	Long-chain chlorinated paraffins		No data		
274	No CAS 019	Short-chain chlorinated paraffins		No data		
276	117-84-0	1,2-Benzenedicarboxylic acid, dioctyl ester		Not pers		
282	89-69-5	Diisobutylphthalate		No data		
285	No CAS 024	Dioctylphthalate (DOP)		No data		
287	84-75-3	Di-n-hexylphthalate (DnHP) = dihexylphthalate (DHP)		Not pers		
288	No CAS 022	Di-n-octylphthalate (DnOP)		No data		
289	131-18-0	Di-n-pentylphthalate (DPP) = dipentylphthalate		Not pers		
290	131-16-8	Di-n-propylphthalate (DprP) = dipropylphthalate		Not pers		
291	4376-20-9	Mono-2-ethylhexylphthalate (MEHP)		Not pers		
292	131-70-4	Mono-n-butylphthalate		Not pers		
293	No CAS 023	Phthalates		No data		
294	31751-59-4	2,4-trans-Diphenyltetramethylcyclotrisiloxane - 2,4-trans-[(PhMeSiO)2(Me2SiO)]		No data		
295	33204-76-1	2,6-cis-Diphenylhexamethylcyclotetrasiloxane - 2,6-cis-[(PhMeSiO)2(Me2SiO)2]		Not pers		
296	33204-77-2	2,6-trans-Diphenylhexamethylcyclotetrasiloxane - 2,6-trans-[(PhMeSiO)2(Me2SiO)2]		No data		
297	30026-85-8	Diphenylhexamethylcyclotetrasiloxane [(PhMeSiO)2(Me2SiO)2]		Not pers		
298	51134-25-9	Diphenyltetramethylcyclotrisiloxane [(PhMeSiO)2(Me2SiO)]		No data		
299	56-33-7	Diphenyltetramethyldisiloxane PhMe2-SiOSiMe2Ph		Not pers		
300	35964-76-2	o-Tolylheptamethylcyclotetrasiloxane [(o-TolylMeSiO)(Me2SiO3)]		No data		

No.	CAS No.	Name	HPV	Persist	Category	Concern
301	10448-09-6	Phenylheptamethylcyclotetrasiloxane [(PhMeSiO)(Me2SiO)3]		Not pers		
302	17156-72-8	Phenylhexamethylcyclotetrasiloxane [(PhHSiO)(Me2SiO)3]		No data		
303	17964-44-2	PhMe[SiCH2CH2SiMePhO]		No data		
304	28994-41-4	Phenyl-2-hydroxyphenylmethane = 2-benzylphenol = o-benzylphenol		Not pers		
305	101-53-1	Phenyl-4-hydroxyphenylmethane = 4-benzylphenol = p-benzylphenol		Not pers		
306	92569-29-4	1,1-Bis(4-hydroxyphenyl)-2-ethyl-n-butane		No data		
307	No CAS 025	1,1-Bis(4-hydroxyphenyl)-2-n-propylpentane		No data		
308	2081-08-5	1,1-Bis(4-hydroxyphenyl)ethane		Not pers		
309	1844-00-4	1,1-Bis(4-hydroxyphenyl)-iso-butane		No data		
310	2081-32-5	1,1-Bis(4-hydroxyphenyl)-iso-pentane		Not pers		
311	4731-84-4	1,1-Bis(4-hydroxyphenyl)-n-butane		Not pers		
312	3373-03-3	1,1-Bis(4-hydroxyphenyl)-n-heptane		Not pers		
313	24362-98-9	1,1-Bis(4-hydroxyphenyl)-n-hexane		Not pers		
314	1576-13-2	1,1-Bis(4-hydroxyphenyl)-n-propane		Not pers		
315	7615-24-9	2,2,5,5-Tetra(4-hydroxyphenyl)-n-hexane		No data		
316	No CAS 027	2,2,6,6-Tetramethyl-4,4-bis(4-hydroxyphenyl)-n-heptane		No data		
317	25036-25-3	2,2'-Bis(2-(2,3-epoxypropoxy)phenyl)-propane		Pers		
319	3555-19-9	2,2-Bis(4-hydroxyphenyl)-3-methyl-n-butane		No data		
320	6807-17-6	2,2-Bis(4-hydroxyphenyl)-4-methyl-n-pentane		Not pers		
321	77-40-7	2,2-Bis(4-hydroxyphenyl)-n-butane = bisphenol B		Not pers		
322	41709-94-8	2,2-Bis(4-hydroxyphenyl)-n-heptane		No data		
323	14007-30-8	2,2-Bis(4-hydroxyphenyl)-n-hexane		Not pers		
324	6052-90-0	2,2-Bis(4-hydroxyphenyl)-n-octane		No data		
325	4204-58-4	2,2-Bis(4-hydroxyphenyl)-n-pentane		No data		
327	131-54-4	2,2'-Dihydroxy-4,4'-dimethoxybenzophenone		Not pers		
328	52479-85-3	2,3,4,3',4',5'-Hexahydroxybenzophenone		Not pers		
329	31127-54-5	2,3,4,4'-Tetrahydroxybenzophenone		No data		
330	131-56-6	2,4-Dihydroxybenzophenone = resbenzophenone		Not pers		
331	10196-77-7	3,3-Bis(4-hydroxyphenyl)-n-hexane		No data		
332	3600-64-4	3,3-Bis(4-hydroxyphenyl)-n-pentane		No data		
333	7425-79-8	4,4-Bis(4-hydroxyphenyl)-n-heptane		No data		
334	No CAS 026	4,4-Bis(4-hydroxyphenyl)-n-octane		No data		
335	611-99-4	4,4'-Dihydroxybenzophenone		Not pers		
336	21388-77-2	4-Hydroxyphenyl-4'-methoxyphenylmethane		No data		
337	57547-76-9	5,5-Bis(4-hydroxyphenyl)-n-nonane		No data		

No.	CAS No.	Name	HPV	Persist	Category	Concern
338	59176-75-9	6,6-Bis(4-hydroxyphenyl)-n-undekane		No data		
339	10193-50-7	Bis(3-hydroxyphenyl)methane		No data		
340	620-92-8	Bis(4-hydroxyphenyl)methane		Not pers		
341	36425-15-7	Bisphenol A-(epichlorhydrin) metacrylate polymer		No data		
342	25068-38-6	Bisphenol A-(epichlorhydrin) polymer		No data		
343	25085-99-8	Bisphenol A-diglycidylether polymer (mw < 700)		Not pers		
344	105839-18-7	C16 or C18 polymerized bisphenol A, butylglydiocylether, epichlorhydrine or 1AN,N'-bis(2aminoethyl)ethane-1,2-diamine		No data		
345	No CAS 098	Cresol bisphenol A formaldehyde polymer		No data		
346	66070-77-7	Dehydrated castor oil polymer with bisphenol A of epichlorhydrine		No data		
347	98824-88-5	Epichlorhydrin-bisphenol A/F, reaction products, C12-C14 aliphatic... (DER 353)		No data		
349	25085-75-0	Formaldehyde, polymer with 4,4'-(1-methylidene)bis(phenol)		No data		
350	93572-41-9	Linseed oil, reaction products with 1-[[2-[(2-aminoethyl)amin)-3-phenoxy-2-propanol]]], bisphenol A-diglycidylether, formaldehyde or pentaethylenehexamine		No data		
351	No CAS 028	Tetrabromobisphenol A (TBBP-A)		No data		
352	115489-12-8	1,1-Bis(4-hydroxyphenyl)-1-(4-methoxyphenyl)ethane		No data		
353	1571-75-1	1,1-Bis(4-hydroxyphenyl)-1-phenylethane		No data		
354	No CAS 029	2,4-Dihydroxytriphenylmethancarbonacid lacton		No data		
355	81-92-5	2-[Bis(4-hydroxyphenyl)methyl]benzylalkohol = phenolphthalol		Not pers		
356	77-09-8	3,3'-Bis(4-hydroxyphenyl)phthalid = phenolphthaleine		Not pers		
357	135505-63-4	4-Hydroxyphenyl-di-a-naphthylmethane		No data		
358	791-92-4	4-Hydroxy-triphenylmethane		No data		
359	115481-73-7	Bis(4-hydroxyphenyl)[(2-phenoxysulfonyl)phenyl]methane		No data		
360	4081-02-1	Bis(4-Hydroxyphenyl)phenylmethane		Not pers		
361	630-95-5	Diphenyl-a-naphthylcarbinol		No data		
362	4865-83-2	1,3-Bis(4-hydroxyphenyl)pentane		No data		
363	2549-50-0	1,3-Bis(4-hydroxyphenyl)propane		No data		
364	85-95-0	2,4-Bis(4-hydroxyphenyl)-3-ethylhexane		No data		
365	No CAS 030	2,4-Bis(4-hydroxyphenyl)-3-ethylpentane		No data		
366	140131-31-3	3,5-Bis(4-hydroxyphenyl)heptane		No data		

No.	CAS No.	Name	HPV	Persist	Category	Concern
367	1806-29-7	2,2'-Dihydroxybiphenyl = 2,2'-biphenol		Not pers		
368	92-88-6	4,4'-Dihydroxybiphenyl = 4,4'-biphenol		Not pers		
369	92-69-3	4-Hydroxybiphenyl = 4-phenylphenol		Not pers		
372	No CAS 127	2,4-6-Trichlorobiphenyl		No data		
373	No CAS 124	2,5-Dichlorobiphenyl		No data		
374	53905-30-9	2-Hydroxy-2',5'-dichlorobiphenyl		Not pers		
375	No CAS 128	3,4',5-Trichlorobiphenyl		No data		
376	No CAS 125	3,5-Dichlorobiphenyl		No data		
377	67651-37-0	3-Hydroxy-2',3',4',5'-tetrachlorobiphenyl		No data		
378	53905-29-6	3-Hydroxy-2',5'-dichlorobiphenyl		Not pers		
379	100702-98-5	4,4'-Dihydroxy-2,3,5,6-tetrachlorobiphenyl		No data		
380	56858-70-9	4,4'-Dihydroxy-2'-chlorobiphenyl		No data		
381	13049-13-3	4,4'-Dihydroxy-3,3',5,5'-tetrachlorobiphenyl		No data		
382	53905-33-2	4-Hydroxy-2,2',5'-trichlorobiphenyl		No data		
383	67651-34-7	4-Hydroxy-2',3',4',5'-tetrachlorobiphenyl		No data		
384	14962-28-8	4-Hydroxy-2',4',6'-trichlorobiphenyl		No data		
385	53905-28-5	4-Hydroxy-2',5'-dichlorobiphenyl		Not pers		
386	79881-33-7	4-Hydroxy-2',6'-dichlorobiphenyl		No data		
387	23719-22-4	4-Hydroxy-2-chlorobiphenyl		Not pers		
388	No CAS 040	4-Hydroxy-3',3',4',5'-tetrachlorobiphenyl		No data		
389	4400-06-0	4-Hydroxy-3,4',5-trichlorobiphenyl		Not pers		
390	No CAS 126	4-hydroxy-3,5-dichlorobiphenyl		No data		
391	28034-99-3	4-Hydroxy-4'-chlorobiphenyl		Not pers		
392	No CAS 097	4-OH-2,2',4',5,5'-pentachlorobiphenyl		No data		
393	54991-93-4	Clophen A30		No data		
394	8068-44-8	Clophen A50		No data		
395	No CAS 038	Mixture of 2,3,4,5-tetrachlorobiphenyl (PCB 61), 2,2',4,5,5'-octachlorobiphenyl (PCB 101) and 2,2',3,3',4,4',5,5'-octachlorobiphenyl (PCB 194)		No data		
397	2051-60-7	PCB 1 (2-chlorobiphenyl)		Not pers		
398	No CAS 039	PCB 104 (2,2',4,6,6'-pentachlorobiphenyl)		No data		
399	No CAS 041	PCB 105 (2,3,3',4,4' -pentachlorobiphenyl)		No data		
400	2050-67-1	PCB 11 (3,3'-dichlorobiphenyl)		Not pers		
401	No CAS 092	PCB 114 (2,3,4,4',5-pentachlorobiphenyl)		No data		
402	No CAS 111	PCB 118 (2,3',4,4',5-pentachlorobiphenyl)		No data		
403	No CAS 042	PCB 122 (2,3,3',4,5 -pentachlorobiphenyl)		No data		
404	No CAS 037	PCB 126 (3,3',4,4',5-pentachlorobiphenyl)		No data		
407	2050-68-2	PCB 15 (4,4'-dichlorobiphenyl)		Not pers		

No.	CAS No.	Name	HPV	Persist	Category	Concern
411	37680-65-2	PCB 18 (2,2',5-trichlorobiphenyl)		Not pers		
412	2051-61-8	PCB 2 (3-chlorobiphenyl)		Not pers		
413	55702-46-0	PCB 21 (2,3,4-trichlorobiphenyl)		Not pers		
414	No CAS 110	PCB 28 (2,4,4'-trichlorobiphenyl)		No data		
415	2051-62-9	PCB 3 (4-chlorobiphenyl)		Not pers		
416	13029-08-8	PCB 4 (2,2'-dichlorobiphenyl)		Not pers		
423	34883-43-7	PCB 8 (2,4'-dichlorobiphenyl)		Not pers		
424	No CAS 036	PCB aroclor 1016		No data		
425	11104-28-2	PCB aroclor 1221		Not pers		
426	11141-16-5	PCB aroclor 1232		Not pers		
431	No CAS 035	PCB hydroxy metabolites		No data		
432	No CAS 087	PCB 138		No data		
433	No CAS 088	PCB 180		No data		
434	No CAS 134	Polychlorinated diphenyl ether		No data		
440	12642-23-8	PCT aroclor 5442		No data		
441	617883-33-8	Polychlorinated terphenyls PCT (mixture)		No data		
442	90-15-3	1-Naphthol		Not pers		
443	553-39-9	2-Hydroxy-6-naphthylpropion acid		No data		
445	1125-78-6	5,6,7,8-Tetrahydro-2-naphthol = 6-hydroxytetralin		Not pers		
446	15231-91-1	6-Bromo-2-naphthol		Not pers		
447	No CAS 031	Halowax 1014		No data		
448	No CAS 032	Mixture of 1,2,3,5,6,7-hexachloronaphthalene and 1,2,3,6,7-hexachloronaphthalene		No data		
449	530-91-6	Tetrahydronaphthol-2		Not pers		
450	20291-73-0	1,9-Dimethylphenanthrene		No data		
451	573-22-8	1-Oxo-1,2,3,4-tetrahydrophenanthrene		No data		
452	58024-06-9	2,8-Dihydroxy-4b,5,6,10b,11,12-hexahydrochrysene		No data		
453	No CAS 089	2,8-Dihydroxy-5,6,11,12,13,14-hexahydrochrysene		No data		
454	56614-97-2	3,9-Dihydroxybenz(a)anthracene		No data		
455	56-49-5	3-Methylcholanthrene		Not pers		
456	7099-43-6	5,6-Cyclopento-1,2-benzanthracene		No data		
457	57-97-6	7,12-Dimethyl-1,2-benz(a)anthracene		Pers		
458	No CAS 047	9,10-Dihydroxy-9,10-diethyl-9,10-dihydro-1,2,5,6-dibenzanthracene		No data		
459	63041-53-2	9,10-Dihydroxy-9,10-di-n-butyl-9,10-dihydro-1,2,5,6-dibenzanthracene		No data		
460	63041-56-5	9,10-Dihydroxy-9,10-di-n-propyl-9,10-dihydro-1,2,5,6-dibenzanthracene		No data		
461	56-55-3	Benz(a)anthracene		Pers		
462	50-32-8	Benzo[a]pyrene		Pers		
463	5684-12-8	Dehydrodoisynol acid = bisdehydrodoisynol acid		No data		
464	53-96-3	n-2-Fluorenylacetamide		Not pers		
465	No CAS 048	PAHs		No data		
466	109333-34-8	1,2,3,7,8-PeBDD		Not pers		

No.	CAS No.	Name	HPV	Persist	Category	Concern
468	No CAS 112	1,2,4,7,8-PeCDD		No data		
469	No CAS 115	1,3,7,8-TeBCDD		No data		
470	50585-46-1	1,3,7,8-Tetrachlorodibenzodioxin		Not pers		
471	50585-41-6	2,3,7,8-TeBDD		Not pers		
473	50585-40-5	2,3-Dibromo-7,8-dichlorodibenzodioxin		Not pers		
474	109333-32-6	2,8-Dibromo-3,7-dichlorodibenzodioxin		No data		
475	131167-13-0	2-Bromo-1,3,7,8-tetrachlorodibenzodioxin		No data		
476	No CAS 093	2-Bromo-3,7,8-trichlorodibenzodioxin		No data		
477	97741-74-7	7-Bromo-2,3-dichlorodibenzodioxin		No data		
478	112344-57-7	8-Methyl-2,3,7-trichlorodibenzodioxin		No data		
479	No CAS 049	Dioxins/Furans = PCDDs/PCDFs		No data		
480	No CAS 113	TeBCDD		No data		
481	103456-39-9	TeBDD		Not pers		
490	125652-16-6	6-Ethyl-1,3,8-trichlorodibenzofuran		No data		
491	125652-13-3	6-i-Propyl-1,3,8-trichlorodibenzofuran		No data		
492	118174-38-2	6-Methyl-1,3,8-trichlorodibenzofuran		No data		
493	139883-51-5	6-Methyl-2,3,4,8-tetrachlorodibenzofuran		No data		
494	172485-97-1	6-Methyl-2,3,8-trichlorodibenzofuran		No data		
495	125652-14-4	6-n-Propyl-1,3,8-trichlorodibenzofuran		No data		
496	125652-12-2	6-t-Butyl-1,3,8-trichlorodibenzofuran		No data		
497	103124-72-7	8-Bromo-2,3,4-trichlorodibenzofuran		No data		
498	139883-50-4	8-Methyl-1,2,4,7-tetrachlorodibenzofuran		No data		
499	172485-96-0	8-Methyl-1,3,6-trichlorodibenzofuran		No data		
500	172485-98-2	8-Methyl-1,3,7-trichlorodibenzofuran		No data		
501	172486-00-9	8-Methyl-2,3,4,7-tetrachlorodibenzofuran		No data		
502	172485-99-3	8-Methyl-2,3,7-trichlorodibenzofuran		No data		
533	303-38-8	2,3-Dihydroxybenzoicacid (2,3-DHBA)		Not pers		
534	94-82-6	2,4-Dichlorophenoxybutyric acid = 2,4-DB		Not pers		
535	490-79-9	2,5-Dihydroxybenzoicacid (2,5-DHBA)		Not pers		
537	106-47-8	4-Chloroaniline		Not pers		
539	No CAS 052	Allenolic acid		No data		
540	No CAS 056	Azadirachtin		No data		
542	No CAS 055	Biochanin A		No data		
544	57-12-5	Cyanide		Not pers		
546	482-49-5	Doisynolic acid		Not pers		
547	64529-56-2	Ethiozin		Not pers		
549	537-98-4	Ferulic acid (FA)		Not pers		
550	No CAS 054	Formononetin		No data		
551	533-73-3	Hydroxyhydroquinone		Not pers		
552	No CAS 135	Iodine, radioactive		No data		
553	72-33-3	Mestranol		Not pers		

No.	CAS No.	Name	HPV	Persist	Category	Concern
554	No CAS 091	Methyl tertiary butyl ether (MTBE)		No data		
555	19044-88-3	Oryzalin		Pers		
556	7400-08-0	p-Coumaric acid (PCA)		Not pers		
559	23950-58-5	Pronamide		Not pers		
561	No CAS 109	TEPA		No data		
562	No CAS 136	Tetrachloro benzyltoluenes		No data		
563	463-56-9	Thiocyanate		Not pers		

Not pers = not persistent;

Pers = persistent;

Pers+ = very persistant;

No data = no data are presented in BKH (2002).

Appendix 2

Appendix 2: Japanese priority EDC list

Substances	Use	Restrictions
Dioxins and furans	(Unintended product)	Air Pollution Law, Waste Disposal and Public Cleaning Law, POPs
Polychlorinated biphenyl (PCB)	Heat medium, non-carbon paper, electric product	Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Class I in 1974, stopped production in 1972, Water Pollution Control Law, Marine Pollution Prevention Law, Waste Disposal and Public Cleaning Law, Environmental Quality Standards for Groundwater, Soil Pollution, and Water Pollutants, POPs
Polybromobiphenyl (PBB)	Fire retardant	
Hexachlorobenzene (HCB)	Bactericide, organic synthetic raw material	Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Class I in 1979, unregistered in Japan, POPs
Pentachlorophenol (PCP)	Antiseptic, herbicide, bactericide	Lapsed in 1990, Water-pollutant Agricultural Chemicals, Poisonous and Deleterious Substances Control Law
2,4,5-Trichlorophenoxyacetic acid	Herbicide	Lapsed in 1975, Poisonous and Deleterious Substances Control Law, Food Sanitation Law
2,4-Dichlorophenoxyacetic acid	Herbicide	Registered
Amitrole	Herbicide, disperse dye, hardener for resins	Lapsed in 1975, Food Sanitation Law
Atrazine	Herbicide	Registered
Alachlor	Herbicide	Registered, Marine Pollution Prevention Law

Substances	Use	Restrictions
Simazine (CAT)	Herbicide	Registered, Water Pollution Control Law, Environmental Quality Standards for Groundwater, Soil Pollution and Water Pollutants, Waste Disposal and Public Cleaning Law, Waterworks Law
Hexachlorocyclohexane, ethyl parathion	Insecticide,	Hexachlorocyclohexane lapsed and banned sales in 1971, ethyl parathion lapsed in 1972
Carbaryl	Insecticide	Registered, Poisonous and Deleterious Substances Control Law, Food Sanitation Law
Chlordane	Insecticide	Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Class I in 1981, lapsed in 1968, Poisonous and Deleterious Substances Control Law, POPs
Oxychlordane	Chlordane metabolite	
trans-Nonachlor	Insecticide	Nonachlor unregistered in Japan, heptachlor lapsed in 1972
1,2-Dibromo-3-chloropropane	Insecticide	Lapsed in 1980
DDT	Insecticide	Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Class I in 1981, lapsed and banned sales in 1971, Food Sanitation Law, POPs
DDE and DDD	Insecticide (DDT metabolite)	Unregistered in Japan
Kelthane (Dicofol)	Acaricide	Registered, Food Sanitation Law
Aldrin	Insecticide	Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Class I in 1981, lapsed in 1975, Soil-persistent Agricultural Chemicals, Poisonous and Deleterious Substances Control Law, POPs

Substances	Use	Restrictions
Endrin	Insecticide	Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Class I in 1981, lapsed in 1975, Crop-persistent Agricultural Chemicals, Poisonous and Deleterious Substances Control Law, Food Sanitation Law, POPs
Dieldrin	Insecticide	Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Class I in 1981, lapsed in 1975, Soil-persistent Agricultural Chemicals, Poisonous and Deleterious Substances Control Law, Food Sanitation Law, Harmful Substance Containing Household Products Control Law, POPs
Endosulfan (Benzoepin)	Insecticide	Poisonous and Deleterious Substances Control Law, Water-pollutant Agricultural Chemicals
Heptachlor	Insecticide	Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Class I in 1986, lapsed in 1975, Poisonous and Deleterious Substances Control Law, POPs
Heptachlor epoxide	Heptachlor metabolite	
Malathion	Insecticide	Registered, Food Sanitation Law
Methomyl	Insecticide	Registered, Poisonous and Deleterious Substances Control Law
Methoxychlor	Insecticide	Lapsed in 1960
Mirex	Insecticide	Unregistered in Japan, POPs
Nitrofen	Herbicide	Lapsed in 1982
Toxaphene (Camphechlor)	Insecticide	Unregistered in Japan, POPs

Substances	Use	Restrictions
Tributyl tin	Anti-fouling paints on ships, antiseptic for fishnets	Law Concerning the Examination and Regulation of Manufacture of Chemical Substances re TBTO: Class I, the remaining 13 substances: Class II TB in 1990, Harmful Substance Containing Household Products Control Law
Triphenyl tin	Anti-fouling paints on ships, antiseptic for fishnets	Law Concerning the Examination and Regulation of Manufacture of Chemical Substances Class II in 1990, lapsed in 1990, Harmful Substance Containing Household Products Control Law
Trifluralin	Herbicide	Registered
Alkylphenol (from C5 to C9) Nonylphenol Octylphenol	Raw material for surface-active agents/decomposition product Raw material for surface-active agents/decomposition product	Marine Pollution Prevention Law
Bisphenol A	Raw material for resins	Food Sanitation Law
Di-(2-ethylhexyl)phthalate	Plasticizer for plastics	Monitoring substances in water environment
Butyl benzyl phthalate	Plasticizer for plastics	Marine Pollution Prevention Law
Di-n-butyl phthalate	Plasticizer for plastics	Marine Pollution Prevention Law
Dicyclohexyl phthalate	Plasticizer for plastics	
Diethyl phthalate	Plasticizer for plastics	Marine Pollution Prevention Law
Benzo(a)pyrene	(Unintended product)	
Dichlorophenol	Dye intermediate	Marine Pollution Prevention Law
Diethylhexyl adipate	Plasticizer for plastics	Marine Pollution Prevention Law
Benzophenone	Synthetic raw materials for medical products, perfume, and so on	
4-Nitrotoluene	2,4-Dinitrotoluene intermediate	Marine Pollution Prevention Law
Octachlorostyrene	(By-product of organic chlorine compound)	
Aldicarb	Insecticide	Unregistered in Japan
Benomyl	Bactericide	Registered

Substances	Use	Restrictions
Kepone (Chlordecone)	Insecticide	Unregistered in Japan
Manzeb (Mancozeb)	Bactericide	Registered
Maneb	Bactericide	Registered
Metiram	Bactericide	Lapsed in 1975
Metribuzin	Herbicide	Registered, Food Sanitation Law
Cypermethrin	Insecticide	Registered, Poisonous and Deleterious Substances Control Law, Food Sanitation Law
Esfenvalerate	Insecticide	Registered, Poisonous and Deleterious Substances Control Law
Fenvalerate	Insecticide	Registered, Poisonous and Deleterious Substances Control Law, Food Sanitation Law
Permethrin	Insecticide	Registered, Food Sanitation Law
Vinclozololin	Bactericide	Lapsed in 1998
Zineb	Bactericide	Registered
Ziram	Bactericide	Registered
Dipentyl phthalate		Not produced in Japan
Dihexyl phthalate		Not produced in Japan
Dipropyl phthalate		Not produced in Japan

Appendix 3: EDCs cited in journal articles since 2000

Type	Use	Name	Abbreviation	Reference(s)
	Industrial	Octylphenol	OP	1, 7, 9, 23, 51, 66, 75, 95, 144, 162, 171, 204, 210, 221, 225
	Industrial	Bisphenol A	BPA	1, 5, 6, 7, 8, 10, 23, 25, 30, 51, 64, 66, 75, 76, 80, 83, 89, 109, 123, 144, 146, 153, 157, 161, 162, 167, 177, 205, 221, 228
		Tetrabromobisphenol A	TBBPA	200
	Industrial	Nonylphenol	NP	5, 10, 12, 13 – 27, 73, 80, 93, 119, 120, 129, 136 – 138, 144 - 147, 152, 162, 167, 170, 182, 184, 189, 196, 200, 201, 205, 210, 212, 215, 216, 221, 225, 230
		Nonylphenol ethoxylate	NPEO	116, 200
		Nonylphenol ether carboxylates	NPEC	200
		Alkylphenol ethoxylate	APEO	133, 201
		Pentylphenol	PP	229
		4-(1-Adamantyl)phenol	AdP	205
		Hexabromocyclododecane	HBCD	200
		4,4'-Dihydroxy-alpha-methylstilbene	DRMS	205
	Industrial	Benzo(A)pyrene	BaP	73
	Industrial	Atrazine	A	73, 135, 142, 151, 166, 178
	Industrial	1,2-Benzenedicarboxylic acid		75
	Industrial	Bis(2-ethythexyl) ester		75
	Industrial	Bis(methylpropyl) ester		75
	Industrial	Styrene		101
	Diffuse	Nitrate		142, 188

Type	Use	Name	Abbreviation	Reference(s)
Synthetic oestrogen	Contraceptive pill	17α-Ethinyloestradiol	EE2	1, 9, 13, 30, 51, 64, 66, 83, 89, 91, 93, 95 – 98, 108, 109, 117, 120, 124, 125, 127, 144, 145, 150, 157, 162, 170, 172, 181, 196, 198, 206, 207, 210, 224, 228
		17β -Oestradiol	E2	18, 19, 20, 51, 64, 73, 81, 84 – 88, 92, 94, 95, 98, 114, 124, 125, 127, 136, 139, 144, 146, 148, 150, 158, 160, 162, 171, 177, 182, 183, 189, 197, 199, 204, 205, 207, 210, 214, 228
		Oestrone	E1	51, 98, 114, 124, 125, 127, 144, 150, 157, 162, 207, 228
		Oestriol	E3	51, 98, 124, 125, 162
		Progesterone	P4	51, 88, 189
		Testosterone		13, 88, 90, 93
		Methyltestosterone	MT	117, 213
		Dihydrotestosterone	DHT	214
		Mestranol	MeEE2	125
		Diethylstilbestrol	DES	80, 95, 125, 130, 156, 227, 228
		Thyroxine		90
		Dehydroepiandrosterone	DHEA	88
		17 Alpha-methyldihydrotestosterone	MDHT	94
		Cyproterone acetate	CA	213
	Plant oestrogen	Genistein		80, 100, 162, 171, 223, 226
		Daidzein		162, 223, 226
		Tomatine		100
		Coumestrol		100
		Luteolin		100
		Quercetin		100
		Apigenin		100
		Chrysin		100
		Daidzein		

Type	Use	Name	Abbreviation	Reference(s)
Polychlorinated biphenyls	Industrial	Araclor 1221		2
		PCB 28	PCB 28	2
		PCB 105	PCB 105	2
		Unspecified		112
		Araclor 1260		3
		Araclor 1254		173
		Tetrabromobisphenol A	TBBPA	4
		Tribromophenol	TBP	4
Polybrominated diphenyl ethers	Flame retardant	Polybrominated diphenyl ether - 99	PBDE-99	4
		Polybrominated diphenyl ether - 100	PBDE-100	4
		Polybrominated diphenyl ether - 47	PBDE-47	131
	Pesticide	Tamoxifen		9,
		Lindane		30, 52, 53
		Pyriproxyfen		165
		Dieldrin		30, 60, 143, 165
		Chlordane		52, 53, 112, 143
		Heptachlor		54
		Fenobucarb		59
		Paraquat	PQ	61
		Dichlorodibenzotetrachloroethane	DDT	77 – 79, 112
			p,p'-DDD	143
		Dichlorodiphenyltrichloroethane	op-'DDT	111, 134, 143, 164, 218
		Dichlorodiphenyltrichloroethane	p,p'-DDT	143
			DI-31	99
		Hexachlorobenzene	HCB	112, 143, 223, 226
		Hexachlorocyclohexanes	HCH	112, 143
		Beta-benzene hexachloride	beta-BHC	223, 226
		Gamma-benzene hexachloride	gamma-BHC	223, 226
		Aldrin		143
		Heptachlor		143
		trans-Nonachlor		223

Type	Use	Name	Abbreviation	Reference(s)
		Endosulfan I		143, 173
		Endosulfan II		143
		Endrin aldehyde		143
		Endosulfan sulphate		143
		Methoxychlor		143, 228
		Hepachlor epoxide		143
		Endrin		143
		Dicofol		143, 216
		Acetochlor		143
		Alachlor		143
		Methoxychlor		218
		Metolachlor		143
		Chlorpyriphos		143
		Nitrofen		143
		Trifluralin		143
		Cypermethrin		143
		Fenvalerate		143
		Deltamethrin		143
		Resmethrin		154
		Thiobencarb		217
	Miticide	Dicofol		149
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		Surflan		211
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	JHA insecticide	Methyl farnesoate		55, 105, 106, 165
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		Methoprene		56, 57, 126, 155, 165, 191, 193, 194
		Fenoxycarb		69, 126, 165, 191, 192
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		Tebufenozide		58, 126
		Precocene II		126
		Hexaflumuron		126
		Teflubenzuron		126
		Flutamide		9
		B-Sitosterol		11
Alkyl tin	Anti-fouling substance	Monobutyl tin	MBT	202
		Dibutyl tin (inc chloride, oxide)	DBT	33, 36, 37, 141, 202
		Tributyl tin (inc chloride, oxide)	TBT	21, 31 – 39, 41 – 49, 51, 82, 108, 111, 120, 140, 141, 174, 202, 216, 220, 222
		Triphenyl tin (inc chloride, oxide)	TPT	31, 32, 36, 38, 40, 49, 110, 141, 202, 216, 220
	Ecdysteroid	20-Hydroxyecdysone	20-EH	28, 74, 104,
	Ecdysteroid	Ponasterone A	PoA	28
	Ecdysone agonsist	Rh-2485	RH-2485	29
	Ecdysone agonsist	Rh-5992	RH-5992	29
	Ecdysone agonsist	Rh-5849	RH-5849	29
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	Model anti-androgen	Vinclozolin	VZ	102, 216
		Toxaphene		107
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		Loratadine		132
		Beta-trenbolone	TB	169, 176
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		Perchlorate		113, 175, 208
		2,3,7,8-Tetrachlorodibenzo-P-dioxin	TCDD	115, 134, 163, 214
	UV filter	4-Methylbenzylidene camphor	4-MBC	121
	UV filter	Octocrylene	OC	121
		Diallyl phthalate	DAP	123
		Tetrabromodiphenylether	TBDE	123
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Waterside Drive, Aztec West
Almondsbury, Bristol BS32 4UD
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