SUMMARY DOCUMENT - DANGEROUS SUBSTANCES SCREENING SUMMARY REPORT

NATIONAL DANGEROUS SUBSTANCES EXPERT GROUP

Produced by the National Dangerous Substances Expert Group

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Revision Control Table

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Abbreviations

CAS	-	Chemical Abstract Service
CIS	-	Common Implementation Strategy
COMMPS	-	Combined Monitoring-based and Modelling-based Priority Setting Scheme
CTC	-	Clean Technology Centre
DSD	-	Dangerous Substances Directive (76/464/EEC)
EPER	-	European Pollutant Emission Register
EQS	-	Environmental Quality Standards
IMPRESS	-	Impact and Pressures Common Implementation Strategy Working Group
LC50	-	Lethal Concentration, 50th percentile value
LOD	-	Limit of Detection
LOQ	-	Limit of Quantitation
NOEC	-	No Observed Effects Concentration
OSPAR	-	Oslo Paris Convention
RBD	-	River Basin District
PNEC	-	Predicted No Effects Concentration
POMS	-	Programme of Measures and standards
UNEP POPS	-	United Nations Environmental Programme - Persistent Organic Pollutants
WFD	-	Water Framework Directive
WRc	-	Water Research Centre
WRc-NSF	-	Water Research Centre and National Sanitation Foundation
WWTP	-	Waste Water Treatment Plant

Glossary

Coastal Water - Surface water on the landward side of a line, every point of which is at a distance of one nautical mile on the seaward side.

Chemical Status: Chemical Status describes whether waters contain safe levels of certain chemicals that have been identified as of significant risk to or via the aquatic environment at an EU level.

Dangerous Substances Directive (76/464/EEC) List I substances - lists of substances selected mainly on the basis of their toxicity, persistence and bioaccumulation.

Dangerous Substances Directive (76/464/EEC) List II substances - Substances which have "*deleterious effect upon the aquatic environment*".and for which limits have been set by a daughter directive.

Endocrine Disruptor - An endocrine disruptor is an exogenous substance that causes adverse health effects in an intact organism, or its progeny, consequent to endocrine function.

Environmental (Quality) Objectives - means the objectives set out in Article 4 of the WFD.

Environmental Quality Standards - means the concentration of a particular pollutant or group of pollutants in water, sediment or biota which should not be exceeded in order to protect human health and the environment.

European Pollutant Emission Register - The EPER is based on the Commission Decision of 17 July 2000 (2000/479/EC) on the implementation of a European Pollutant Emission Register (EPER) according to Article 15 of Council Directive 96/61/EC concerning Integrated Pollution Prevention and Control (IPPC). Article 15(3) of IPPC. This Directive requires Member States to compile an inventory and to supply data on principal emissions and responsible sources. The Commission will publish the results of the inventory every three years and shall establish the formats and particulars for the transmission of information provided by the Member States.

Good Status: The status achieved by a surface waterbody when both its ecological status and its chemical status are at least 'Good'

Priority Action Substances - This is a term applied by the Expert group to the following substances: Annex X (WFD) + Annex IX (WFD - relating to the Dangerous Substance 76/464/EEC Daughter Directives).

Priority Substances - Substances identified in accordance with WFD Article 16(2) and listed in Annex X. Among these substances there are 'priority hazardous substances' which means substances identified in accordance with WFD Article 16(3) and (6) for which measures have to be taken in accordance with Article 16(1) and (8). (Article 2(30)).

Relevant Pollutants - Specific synthetic and non synthetic substances (not on priority action list) whose presence may lead to a "risk of failing the objectives" of the WFD.

River Basin District (RBD): The area of land and sea, made up of one or more neighbouring river basins, together with their associated groundwaters and coastal waters, as the main unit for management of river basins.

LOD - The limit of detection is commonly accepted as the smallest amount or concentration of a particular substance that can be reliably distinguished from zero in a given type of sample or medium by a specific measurement process.

LOQ - The limit of quantitation is the lowest concentration at which the determinand can be confidently quantified.

Programmes of Measures (POMs) - Protection measures that must be implemented to meet the environmental objectives of the WFD.

Surveillance Monitoring - One of three types of monitoring specified in the WFD. Its objectives are to
to provide information for:

- supplementing and validating the impact assessment procedure detailed in Annex II of WFD,
- the efficient and effective design of future monitoring programmes,
- the assessment of long-term changes in natural conditions, and
- the assessment of long-term changes resulting from widespread anthropogenic activity.

Surveillance monitoring is to be carried out for each surveillance monitoring site for a period of one year during the period covered by a river basin management plan for:

- parameters indicative of all biological quality elements,
- parameters indicative of all hydromorphological quality elements,
- parameters indicative of all general component (physico-chemical) quality elements,
- priority pollutants which are discharged into the river basin or sub-basin, and other pollutants discharged in significant quantities in the river basin or sub-basin

Synthetic Pollutants - Synthetic substances are man-made, substances (intentionally and unintentionally) identified as being released into the body of water.

Transitional Waters - Bodies of water in the vicinity of river mouths which are partly saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows.

Water Body - "Body of surface water means a discrete and significant element of surface water such as lake, reservoir, a stream, river or canal, part of stream, river or canal, a transitional water or a stretch of coastal water" (WFD(Article 2(10)

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1. Introduction

In Ireland a National Dangerous Substances Expert group was established in 2003 to assist with developing lists of priority action, candidate relevant pollutants and candidate general components for surface waters in Ireland and to design a substances screening monitoring programme as part of the implementation of the WFD. In 2004 the Dangerous Substances Expert Group produced the "Discussion Document Rationale for Deriving National Priority Action, Candidate Relevant Pollutants and Candidate General Components Substances Lists for Surface Waters" which provides information on the rationale behind the development of these lists and the screening monitoring programme.

The screening monitoring programme was the first of its kind to take place in Ireland, as previously no such comprehensive monitoring on dangerous substances had taken place. The screening monitoring programme was designed to be a once-off programme; one of the main purposes of the programme was to test the significance of the candidate relevant pollutants list. If any substances was not found in significant quantities then this information was used to help prioritise the list, which was brought forward into the surveillance monitoring programme.

There are two complimentary approaches (top-down and bottom-up) for deriving dangerous substances lists. The report entitled "Guidance for the Preparation of Pollution Reduction Programmes, in particular the Selection of Relevant Pollutants" (WRc Ref: UC6201 4th draft April 2003), explains that *"The top-down approach starts with the human activities (i.e. pressures) in the river basin by identifying potential pollutants, which may be discharged from point and diffuse sources. In contrast the bottom up approach, starts with identifying those river basins where good ecological quality is not achieved or where the ecological quality is deteriorating (i.e. impact), which is followed by identifying the reasons for the failure. This can be caused by known or unknown pollutants or by other impacts (e.g. morphology, hydrology, river continuity). Once the potential pollutants have been identified either by analysing the human activities and/or by investigative monitoring the assessment of the relevance of the pollutants under the*

two methods is the same. Thus the two approaches can be considered as complementary with a number of elements of the two approaches being the same".

When in developing the candidate lists, the expert group considered all dangerous substances with a view to simultaneously developing three prioritised and separate lists for priority action, candidate relevant pollutant and candidate general component substances. These lists are explained in further detail below.

The approach used for the identification of relevant pollutants in Irish surface waters is in accordance with guidance issued by the Common Implementation Strategy (CIS) IMPRESS working group, which was dedicated to the identification of pressures and assessment of impacts within the characterisation of water bodies according to Article V of the WFD. In accordance with IMPRESS guidance, Ireland adopted a combined top-down and bottom-up approach for deriving a candidate dangerous substances lists.

Step 1 – Starting Point

The starting point of the selection process entailed examination of the list of main pollutants, as set out in Annex VIII of the WFD, which constitutes the "universe of chemicals".

Step 2 – Screening

The screening step involved collating information about known pollution sources and impacts, and on the production and usage of substances to identify a working list of substances which are discharged to water bodies. The data collation process involved investigating sources of information such as chemical registers, existing water quality datasets and information from existing obligations such as the Dangerous Substances Directives (DSD), United Nations Environmental Programme - Persistent Organic Pollutants list (UNEP POPs), European Pollutant Emission Register (EPER) and Combined Monitoring-based and Modelling-based Priority Setting Scheme (COMMPS) programmes. The datasets were then assessed with a view to excluding substances for which there was adequate confidence that they are not being discharged into water bodies from the working list.

Step 3 – Test for Relevance

This step aimed to select from the working or candidate list of substances those which are likely to cause, or are already causing, harm to the environment. Selection should ideally be based on an assessment of the environmental significance of concentrations necessitating obtaining data on concentrations and comparing these with suitable benchmarks. Concentration data can be obtained by monitoring or modelling approaches. Relevant substance benchmarks which were identified included LC50, NOEC, PNEC, EQS or critical load. EQS are supposed to reflect the good status condition of a water body. IMPRESS noted that EQS have not been derived for all potential relevant pollutants. It was at this stage that the need for a screening monitoring programme was identified.

Step 4 – Safety Net

This entails an iterative review of the list to ensure that substances that may be environmentally significant are not incorrectly excluded from the list of specific pollutants.

Step 5 – Final Outcome

The process produced a list of specific pollutants relevant to a river basin district or to particular water bodies within a river basin district.

The National Dangerous Substances Expert Group compiled three prioritised and separate lists of substances:

- priority action;
- candidate relevant pollutant;
- candidate general component;

for surface waters in Ireland using the approach detailed in the IMPRESS guidance.

Final Outcome

Priority Action Substances List

Priority action substances are defined, for the purposes of the report, as those substances for which legislative instruments have been or are to be laid down at the Community level i.e. substances listed in Annex IX and Annex X of the WFD

The priority substances, including priority hazardous substances, listed in Annex X of the WFD comprise a list of substances identified by a COMMPS procedure (Combined monitoring-based and modelling-based priority setting). In the application of the COMMPS procedure, monitoring data from fresh surface waters and sediments from Member States were evaluated. In addition for more than 310 substances, data available on production, use and distribution in the environment and their toxic effects were used for the modelling approach for those substances for which the available monitoring data were insufficient. The Commission proposed draft standards for all of 33 substances in 2006 but to date they have not been finalised.

The other substances for which legislative instruments have been put in place at European level are the DSD List I substances. Daughter Directives, as listed in Annex IX, establish EQSs for 18 substances. Ten of these substances are also listed in Annex X of the WFD, leaving 8 remaining daughter directive substances which must be considered under the transitional arrangements of the WFD.

The substances listed in Annexes IX and X have been identified at European level and there is no discretion regarding their consideration under the WFD. Consequently 41 substances are to be included on the priority action substances list. The overall list of 41 substances is given in Appendix 1 Table 1.

Relevant Pollutants List

The starting point of the relevant pollutant selection process entailed examination of the list of main pollutants as set out in Annex VIII of the WFD "universe of chemicals". Potentially all substances not identified as priority action substances (Annex IX & Annex X of the WFD) were to be considered as candidate relevant pollutants or candidate general components. In the compilation of this list, the Dangerous Substances Directive was first looked at and substances previously identified as List I and II substances were added to the list as a starting point. The existing programmes were also identified for consideration in accordance with the IMPRESS guidance.

- Clean Technology Centre (CTC) project – '*Inventory and tracking of Dangerous Substances in Ireland and Development of Measures to Reduce their Emissions/Losses to the Environment'*
- UNEP POPs - United Nations Environmental Programme - Persistent Organic Pollutants (POPs)
- OSPAR - The Convention for the Protection of the Marine Environment of the North-East Atlantic
- EPER - European Pollutant Emissions Register.

In addition to the main lists of substances identified by IMPRESS the expert group assessed the inclusion of other groups of pollutants associated with significant commercial activities in Ireland. These included substances associated with pesticides usage, aquaculture, forestry and weed control products. The expert group also considered findings of studies into endocrine disrupting substances.

The expert group reviewed the datasets to screen the substances based on the output from existing registers and monitoring programmes in Ireland. The following rationale was applied:

- Substances which had been included in previous monitoring programmes and found to be consistently not detected at significant levels were dismissed from the candidate list.
- Substances which had been prohibited from distribution and use for over 10 years were also excluded from the candidate list.
- Alternatively, where there was no information from monitoring programmes or no ban on or lack of authorisation for the substance, a precautionary principle approach was adopted and substances remained on the candidate list.

The total number of substances on the candidate relevant pollutants list is 161. Table 1.1 shows a summary of the substances added to the candidate relevant pollutants list. The overall list of 161 substances is given in Appendix 1 Table 2.

Table 1.1 - Summary of Substances added to Candidate Relevant Pollutants List

Source of Substances	**Total Number of Substances/ Groups added to Relevant Pollutants List**
DSD List II	91
CTC Project	3
UNEP POPs	2
OSPAR	3
EPER	2
Pesticides of possible relevance	42
Control Products Introduced to the Aquatic Environment	2
Endocrine disrupting substances - BKH report	8
Endocrine disrupting substances - WRc - Usage Review in an Irish Context	4
Endocrine disrupting substances - Com(2001)262 – Usage Review in an Irish Context	4
Total Number of Substances /Groups	**161**

General Component Substances List

General components relate to materials in suspension, substances which contribute to eutrophication (in particular, nitrates and phosphates) and substances which have an unfavourable influence on the oxygen balance (and can be measured using parameters

such as BOD, COD, etc.). There were 18 general components which were included in the water analysis of the screening programme. The overall list of 18 general components is given in Appendix 1 Table 3.

2. Outline of Screening Monitoring Programme

The procurement of a contract to provide the analytical capabilities for the National Dangerous Substances Screening Programme was progressed in May 2004. The contract was awarded to a Dutch laboratory; Netherlands Organisation for Applied Scientific Research (TNO) in November 2004. This laboratory is based in Appledorn, The Netherlands.

The monitoring programme commenced in May 2005. The South Eastern River Basin District monitoring team carried out the sampling for this monitoring programme.

Site Selection

The expert group in consultation with all the River Basin Districts (RBD) agreed the initial sites which were included in the screening monitoring programme.

The rationale for selecting sampling sites was to choose the location of the vicinity of Ireland's major population centres as much of the potential usage of chemicals e.g. households, transport routes, industries, waste disposal facilities, construction sites, etc is concentrated in major urban centres. It was decided that the initial programme would collect data on the presence or absence of substances associated with such activities.

The majority of Ireland's largest cities are located near the coastline, often at the downstream end of major catchments:

- Drogheda – River Boyne
- Dublin – River Liffey
- Waterford – Rivers Barrow, Nore and Suir
- Cork – River Lee
- Limerick – River Shannon

- Galway – River Corrib.

The initial programme also included a sampling site downstream of Athlone on the River Shannon and another site downstream of Mullingar and Tullamore on the River Brosna. It was hoped that these sites would provide data for large inland towns with a mix of industrial activities and would also be representative of large upstream catchment areas.

Diffuse use substances associated with agriculture, mining and forestry activities and rural households were also tested in the initial programme by sampling at additional inland sites in the major catchments. Several of the diffuse source substances are products specifically associated with tillage and horticulture and these activities are concentrated within the Eastern and South Eastern River Basin Districts. Sheep farming is generally concentrated to the west of the Shannon. Sites were selected from the national EPA inland surface waters programme to provide information on diffuse use substances. Overall there were 17 surface water sites selected initially for the screening programme.

Also included in the initial screening programme was one of Ireland's major sewage treatment facilities (Ringsend WWTP, Dublin); and one of Ireland's major landfill sites (Balleally, Co. Dublin), at this site the leachate was monitored. These sites were selected to address diffuse use substances that are related to product use (e.g. pharmaceuticals and household products) as well as urban run-off and light industry (e.g. solvents) and to provide an indication of presence/absence that could be assessed before dilution in the receiving water.

Four groundwater sites were also included at sites representative of the range of hydrogeological conditions in Ireland.

The initial 23 sites are given in Table 2.1 below

Table 2.1- Initial sites included in the Screening Monitoring Programme

RBD	No.	Monitoring Sites	Location
South-Eastern	1	River Barrow	U/S of St. Mullins
	2	River Nore	U/S of tidal limits
	3	River Barrow	D/S Athy
	4	River Suir	U/S of tidal limits
	5	River Suir	D/S of Waterford City
	6	Waterford Estuary	D/S of Waterford City
	7	Athy UDWS- Townparks	Bagenalstown GWB
	8	Balinamuck- Dungarvan PWS	Dungarvan GWB
	9	Gorey WS (Barnadown)	Gorey GWB
Eastern	10	River Boyne	D/S of Drogheda
	11	River Liffey	U/S of Dublin City
	12	River Liffey	D/S of Dublin City
	13	Dublin Bay	D/S of Dublin City
	14	WWTP	Ringsend, Dublin
	15	Landfill	Ballyealy, Co.Dublin
Shannon	16	River Shannon	D/S of Athlone
	17	River Brosna	D/S of Mullingar
	18	River Suck	D/Sof Ballinasloe
	19	River Shannon	D/S of Limerick City
	20	Spring at Boyle	Spring at Boyle (Rockingham)
South Western	21	River Lee	U/S of Cork City
	22	Cork Harbour	Downstream of Cork City at the harbour mouth
Western	23	River Corrib	D/S of Galway City

The overall programme ran from May 2005-May 2006. The initial 23 sites were monitored from May 2005-May 2006 (analysis was not done in December 2005). There were monthly water samples taken at each site over 12 months. One sediment and one biota sample were taken at each of the 17 surface water sites. At the freshwater sites the biota analysed for was the European eel *Anguilla anguilla* and at the Estuarine sites the biota analysed was Mussels *Mytilus sp.*

The original tender procurement requested that the laboratory could analyse for all substances from the three lists given above. At the time of the tender some substances posed analytical difficulties, TNO submitted the best tender could analyse for 147 relevant pollutants out of the original 161 candidate substances. Following further discussions with groundwater experts, MTBE was added as an additional substance. However, this substance is mainly of concern in Groundwaters. This meant overall that 148 substances were analysed as part of the candidate relevant pollutants. All of the Priority Action substances and candidate general components were analysed for.

Following a review of the first 7 months of monitoring programme, by the Dangerous Substances expert group, it was agreed to remove a further 36 substances from the relevant pollutant lists for the remaining programme. These were substances which were not detected in any medium (water, sediment or biota) and for which confidence in detection during the screening programme was high and usage was known to be low. However, in the case of the Oestradiols, these were removed as the current analysis which is available can not reach detection levels for these substances. All of the 36 substances which were removed at this stage were placed on a reserve list to be considered in the future, if further usage information becomes available or in case of the oestradiols if better detection levels are available for these substances.

The remaining 112 substances were analysed in the water samples at each site for the remainder of the programme.

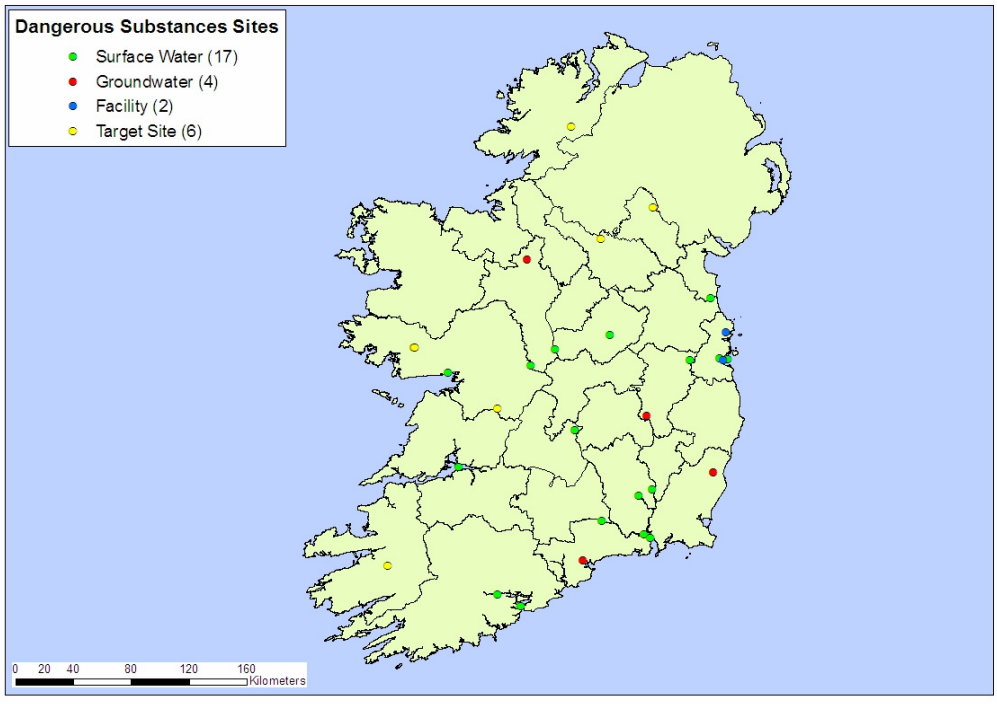
Target site programmes were included in April 2006. Overall there were six target sites included see table 2.2 below.

Table 2.2- Additional target sites added to the Screening Monitoring Programme

RBD	No.	Monitoring Sites	Location
South Western	1	Lough Leane	At Leane bridge
	2	Munster Blackwater	Killavullen Bridge
Western	3	River Owenriff	Owenriff- site 1- 1 km ds of Lough Agraffard- at bridge
		River Owenriff	Owenriff- site 2- Approx 100m d/s of bridge
		River Owenriff	Owenriff- site 3- Approx 200m d/s of bridge
North South Share	4	Finn	Bridge S of Stranorlar
	5	Blackwater	Newmills Bridge (NE of Monaghan)
	6	Erne	Erne Bridge (Belturbet)

Figure 2.1 below outlines the spread of the initial and target sites included in the screening monitoring programme

Figure 2.1- Initial and Target Sites included in the Screening Monitoring Programme



The rationale for the two sites in the South Western RBD were as follows: Lough Leane as a link to high status water body and a review of possible inputs to lakes and the River Blackwater was included to gather information for water quality modelling project.

The River Owenriff was selected as a focused target subcatchment in the Western River Basin District. It has both forestry and sheep dipping activities occurring in the catchment, the area is also quite rural and there are not many other potential sources of dangerous substances in the catchment. The Owenriff catchment is also an important site as it is a known *Margaritifera margariterferia* (Freshwater Pearl Mussel) catchment, which has recently been in decline. Three sub sites along the river course were sampled. Substances to be monitored at these sites were identified by the Pesticide Control Service as substances which are known to be used in both forestry and sheep dipping activities. Table 2.3 below identifies the substances which were sampled.

Table 2.3- Substances sampled at the target site focused on forestry and sheep dipping activities.

Parameter	CAS No.	Usage
glyphosate	1071-83-6	Forestry
alpha-cypermethrin	67375-30-8	Forestry
cypermethrin	52315-07-8/66841-24-5	Forestry & Sheep Dip
atrazine	1912-24-9	Forestry
triclopyr	55335-06-3	Forestry
diazinon	333-41-5	Sheep Dip

The three sites in the NS Share were included so that information could be gathered on cross border sites. These sites are also located in high tillage areas and mushroom and poultry farming also occur in these areas, which had previously not been considered.

Water samples at each of the target sites were taken from April 2006-October 2006. A sediment sample was taken at each site. The full list of substances were analysed at each sediment site.

The monitoring programme outlined that a biota sample would be taken at every target site. However, it was not possible to find biota samples at the following two sites; Munster Blackwater- Killavullen Bridge and Ulster Blackwater- Newmills Bridge.

3. Summary of Overall Findings

The individual results for each site can be found in the two TNO reports which were produced in October 2007. Each sample has a sample code number, the corresponding site name for each code is given in the TNO report reference document.

Priority Action Substances

The overall findings for water were that 47 of the 51 Priority Action Substances were found in one or more of the samples, 18 are found in 10% of the samples. Only 3 compounds are found in more that 50% of the samples; these are Napthalene, Fluoranthene and Nickel. Overall the highest concentrations were found in polycyclic aromatic hydrocarbons then volatiles and pesticides.

In the sediment samples 31 of the Priority Action Substances are found while only 13 are found in more than 50% of the samples. These were mainly polycyclic aromatic hydrocarbons and metals.

In the biota samples 32 of the Priority Action Substances were found, 13 of the 51 compounds are found in more than 50% of the samples. The latter include polycyclic aromatic hydrocarbons, pesticides and metals.

Relevant Pollutants and General Components

Of the 156 relevant pollutant compounds 107 parameters were found in one or more of the water samples, 34 parameters were found in 10% of the samples and only 10 parameters were in 50% of the samples. These 10 parameters are mostly metals, PCB's, anions, fluoride and chloride.

In sediment 63 of the parameters were found in one or more of the samples and 29 of them in at least 50% of the samples. As in water, these 29 samples were mainly metals, PCB's, MTBE, Dibutyltin and a number of phthalates.

In the biota samples 69 compounds were identified out of 156 compounds, 23 were found in more than 50% of the samples. There are mainly PCB's and metals.

Whilst there were very challenging analytical aspects to the programme, it was fit for its main purpose, which was to screen the candidate relevant pollutant list to a smaller more significant list, which will be used in the surveillance monitoring programme. However, there were some concerns over specific results and whilst this was a once-off programme the expert group have agreed that any parameters about which there are concerns can be backed up with further analysis from the surveillance monitoring programme.

3.1 Screening Study Outcome

The main purpose of the screening programme was to develop a list of significant relevant pollutants to be included in the surveillance monitoring programme. The outcome of reducing of the candidate relevant pollutants list was as follows; the monitoring results (only the surface water samples) from the Screening programme were reviewed and from the 148 candidate Relevant Pollutants which were monitored for in the screening monitoring programme, it has now been reduced down to 28 parameters. The rationale for reducing the list of candidate relevant pollutants in Ireland, which has been put forward for dangerous substances monitoring under the surveillance monitoring programme was as follows:

- any specific pollutants detected in "significant quantities" in the screening monitoring programme (criterion >¼ Target concentration) (25)
- any substances which is already regulated under SI No. 12 of 2001 (Dangerous Substances Directive)

This meant that 28 dangerous substances were put on the core monitoring list and samples are to be analysed for them at every surveillance site. This rationale took a precautionary approach.

However, 11 substances have been put on a supplementary list, samples will not all be analysed for these substances. These will be focused on specific target sites such as cross border sites for harmonisation, or for example downstream of known usages. The dangerous substances expert group will do additional work on focusing this monitoring. Table 3.1 outlines the substances which are to be included in the surveillance monitoring programme.

Table 3.1- Reduced list of specific pollutants included in the WFD surveillance monitoring programme

No.	Monitoring List	Reason for inclusion	CAS Number
Core Monitoring List			
1	Antimony	Presence in significant quantities*	7440-36-0
2	Arsenic	Dangerous Substances Regulations and presence in significant quantities*	7440-38-2
3	Barium	Presence in significant quantities*	7440-39-3
4	Boron	Presence in significant quantities*	7440-42-8
5	Chromium	Dangerous Substances Regulations and presence in significant quantities*	7440-47-3
6	Cobalt	Presence in significant quantities*	7440-48-4
7	Copper	Dangerous Substances Regulations and presence in significant quantities*	7440-50-8
8	Cyanide	Dangerous Substances Regulations*	57-12-5
9	Epichlorohydrin	Presence in significant quantities*	106-89-8
10	Epoxiconazole	Presence in significant quantities*	135319-73-2
11	Fenitrothion	Presence in significant quantities*	122-14-5
12	Fluoride	Dangerous Substances Regulations and presence in significant quantities*	16984-48-8
13	Glyphosate	Presence in significant quantities*	1071-83-6
14	Malathion	Presence in significant quantities*	121-75-5
15-18	Maneb/zineb/thiram/mancozeb	Presence in significant quantities*	n/a

No.	Monitoring List	Reason for inclusion	CAS Number
19	Mecoprop	Presence in significant quantities*	96-65-2
20	Molybdenum	Presence in significant quantities*	7439-98-7
21	Nonylphenol ethoxylates	Presence in significant quantities*	37340-60-6
22	Pirimiphos-methyl	Presence in significant quantities*	29232-93-7
23	Selenium	Presence in significant quantities*	7782-49-2
24	Tin	Presence in significant quantities*	7440-31-5
25	Toluene	Dangerous Substances Regulations*	108-88-3
26	Vanadium	Presence in significant quantities*	7440-62-2
27	Xylene-o	Dangerous Substances Regulations and presence in significant quantities*	1330-20-7
	Xylene-p,m		1330-20-7
28	Zinc	Dangerous Substances Regulations and presence in significant quantities*	7440-66-6
Supplementary Monitoring List			
1	2,4/2,5-dichlorophenol	Expert review	120-83-2
2	Monochlorobenzene	Expert review	108-90-7
3	Di-n-butylphthalate	Expert review	84-74-2
4	2,4-D	Expert review	94-75-7
5	Cypermethrin	Expert review	97955-44-7
6	Dimethoate	Expert review	60-51-5
7	Diazinon	Expert review	333-41-5
8	MCPA	Expert review	94-74-6
9	1,1,2,2-tetrachloroethane	Expert review	79-34-5
10	Phenol	Expert review	106-95-2
11	Linuron	Expert review	330-55-2

* A precautionary approach was taken

4. Conclusions

The term dangerous substances describes a wide range of chemicals that may be toxic to people, plants and animals and are harmful to our water environment. They are contained in many everyday products used increasingly in households (for example medicines and cleaning products), industry, forestry, agriculture, small businesses, mines, construction sites and water treatment works. Surface run-off from roads and urban areas can also contain dangerous substances from motor vehicle emission.

This study was the first of its kind to take place in Ireland. Little was known about the dangerous substances in Irish water bodies prior to this study taking place. The purpose was a screening process to try and enable information to be gathered on the presence and absence of dangerous substances in Irish waters. This screening programme has highlighted 28 substances as of high concern and further monitoring of these substances is taking place under the surveillance monitoring programme. The surveillance monitoring list includes a reduced list of substances from the original screening programme which was reviewed and agreed by the expert group. This screening monitoring programme was a once-off programme which helped us to gather information on substances, for which monitoring in Ireland was not carried out in a comprehensive way previously. There were some anomalies which were highlighted as of concern by the group throughout the programme especially in the case of Penta-BDE, which appeared to be showing up at high levels at a number of sites. However, these anomalies will be further investigated under the surveillance monitoring programme which commenced in 2007 and is a much more comprehensive programme. There are approximately 250 river & lakes sites in Ireland's overall surveillance programme; Priority Action Substances and the Relevant Pollutants monitoring will be carried out over a three year cycle, with 90 sites nationally being tested in 2007.

A corresponding project on the usage of dangerous substances has taken place under the WFD further characterisation Programme of Measures (POMs) studies. This study is near completion. This project was a follow on from the screening monitoring programme. The key objectives of the Dangerous Substances Usage study were as follows:

- To establish (via literature review and examination of Irish datasets) the dangerous substances likely to arise in Irish water bodies due to particular human activities.
- To provide information and/or tools for the ongoing collation of the pressures and sources of dangerous substances in Irish water bodies.
- To establish a framework for the licensing and control of dangerous substances discharges

- To optimise the design of the facility (i.e. point source) and status monitoring programmes to be established in accordance with Article 8 of the WFD.

The focus of the Dangerous Substances usage study was on the manufacturing and processing industry's use of dangerous substances. Investigations were also carried out on the use of dangerous substances in forestry, agriculture and aquaculture.

This study will provide further information on the possible uses and sources of dangerous substances in Ireland and will identify any substances which may have been missed in the screening monitoring programme.

An additional Further Characterisation programme "Setting Chemical Water Quality Standards" was also completed in 2007. This programme proposed Irish Environmental Quality Standards (EQSs) for a limited number of substances which are included in the surveillance monitoring programme. These EQS's will be used in the surveillance monitoring programme to help determine the chemical status of each waterbody.

5. References

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Appendix 1

Table 1 - Priority Action Substances List

Number	Substance	CAS No.	Source List
1	Alachlor	15972-60-8	WFD Annex X
2	Anthracene	120-12-7	WFD Annex X
3	Atrazine	1912-24-9	WFD Annex X
4	Benzene	71-43-2	WFD Annex X
5	Brominated diphenylethers	n.a.	WFD Annex X
	Bis(pentabromo-phenyl)ether	1163-19-5	WFD Annex X
	Diphenyl ether, octabromo deviate	323536-52-0	WFD Annex X
	Diphenyl ether, pentabromo derivate	32534-81-9	WFD Annex X
6	Cadmium and its compounds	7440-43-9	WFD Annex X
7	C10-13-Chloralkanes	85535-84-8	WFD Annex X
8	Chlorfenvinphos	470-90-6	WFD Annex X
9	Chlorpyrifos	2921-88-2	WFD Annex X
10	1,2-Dichloroethane	107-06-2	WFD Annex X
11	Dichloromethane	75-09-2	WFD Annex X
12	Di (2-ethylhexyl) phthalate (DEHP)	117-81-7	WFD Annex X
13	Diuron	330-54-1	WFD Annex X
14	Endosulfan	115-29-7	WFD Annex X
15	Fluoranthene	206-44-0	WFD Annex X
16	Hexachlorobenzene	118-74-1	WFD Annex X
17	Hexachlorobutadiene	87-68-3	WFD Annex X
18	Hexachlorocylohexane (Lindane)	608-73-1 58-89-9	WFD Annex X
19	Isoproturon	34123-59-6	WFD Annex X
20	Lead and its compounds	7439-92-1	WFD Annex X
21	Mercury and its compounds	7439-97-6	WFD Annex X
22	Naphthalene	91-20-3	WFD Annex X
23	Nickel and its compounds	7440-02-0	WFD Annex X
24	Nonylphenols	25154-52-3	WFD Annex X
	(4-(para)-nonylphenol) ,(4-nonylphenol,branched)	(104-40-5) (84852-15-3)	WFD Annex X
25	Octylphenols (para-tert-octylphenol)	1806-26-4 (140-66-9)	WFD Annex X
26	Pentachloro-benzene	608-93-5	WFD Annex X
27	Pentachlorophenol	87-86-5	WFD Annex X
28	Polyaromatic Hydrocarbon (PAH)	n.a	WFD Annex X
	(Benzo(a)pyrene)	(50-32-8)	WFD Annex X
	(Benzo(b)fluoranthene)	(205-99-2)	WFD Annex X
	(Benzo(g,h,i)perylene)	(191-24-2)	WFD Annex X
	(Benzo(k)fluoranthene)	(207-08-9)	WFD Annex X
	(Indeno(1,2,3-cd)pyrene)	(193-39-5)	WFD Annex X
29	Simazine	122-34-9	WFD Annex X
30	Tributyltin compounds (TBT-ion)	688-73-3 (36643-28-4)	WFD Annex X
31	Trichlorobenzene	12002-48-1	WFD Annex X
	(1,2,3-trichlorobenzene)	87-61-6	WFD Annex X
	(1,2,4-trichlorobenzene)	120-82-1	WFD Annex X
	(1,3,5-trichlorobenzene)	108-70-3	WFD Annex X
32	Trichloromethane (Chloroform)	67-66-3	WFD Annex X
33	Trifluarlin	1582-09-8	WFD Annex X
34	DDT		DSD List I
	4,4'-isomer	50-29-3	DSD List I
	2,4'-isomer	789-02-6	DSD List I
35	Aldrin	309-00-2	DSD List I
36	Endrin	60-57-1	DSD List I
37	Dieldrin	72-20-8	DSD List I
38	Isodrin	465-73-6	DSD List I
39	Carbon Tetrachloride	56-23-5	DSD List I
40	Trichloroethylene	79-01-6	DSD List I
41	Tetrachloroethylene/Perchloroethylene	127-18-4	DSD List I

Table 2 - Relevant Pollutant Substances List

Number	List of Substances	CAS Number	Source of Substance
1	2-Amino-4-chlorophenol	95-85-2	DSD (99)
2	Arsenic and its mineral compounds	7440-38-2	DSD (99), Irl DSD, CTC, EPER
3	Benzidine	92-87-5	DSD (99)
4	Benzylchloride (Alpha-chlorotoluene)	100-44-7	DSD (99)
5	Benzylidenechloride (Alpha, alpha-dichlorotoluene)	98-87-3	DSD (99)
6	Biphenyl	92-52-4	DSD (99), BKH
7	Chloral hydrate	302-17-0	DSD (99)
8	Chloroacetic acid	79-11-8	DSD (99)
9	2-Chloroaniline	95-51-2	DSD (99)
10	*Mono*-Chlorobenzene	108-90-7	DSD (99)
11	1-Chloro-2,4-dinitrobenzene	97-00-7	DSD (99)
12	2-Chloroethanol	107-07-3	DSD (99)
13	4-Chloro-3-methylphenol	59-50-7	DSD (99)
14	1-Chloronaphthalene	90-13-1	DSD (99)
15	Chloronaphthalenes (technical mixture)	n/a	DSD (99)
16	4-Chloro-2-nitroaniline	89-63-4	DSD (99)
	Chloro-Nitrobenzene	n/a	n/a
	1-Chloro-2-nitrobenzene	89-21-4	DSD (99)
	1-Chloro-3-nitrobenzene	88-73-3	DSD (99)
17	1-Chloro-4-nitrobenzene	121-73-3	DSD (99)
18	4-Chloro-2-nitrotoluene	89-59-8	DSD (99)
19	Chloronitrotoluenes (other than 4-Chloro-2-nitrotoluene)	25567-68-4	DSD (99)
20	Mono-Chlorophenol	n/a	DSD (99)
21	Chloroprene (2-Chloro-1,3-butadiene)	126-99-8	DSD (99)
22	3-Chloropropene (Ally chloride)	107-05-1	DSD (99)
	Chlorotoluene	n/a	
	2-Chlorotoluene	95-49-8	DSD (99)
	3-Chlorotoluene	108-41-8	DSD (99)
23	4-Chlorotoluene	106-43-4	DSD (99)
24	Mono-Chlorotoluidines	n/a	DSD (99)
25	Cyanuric chloride (2,4,6-Trichloro-1,3,5-triazine)	108-77-0	DSD (99)
26	2,4-D (including 2,4-D-salts and 2,4-D-esters)	94-75-7	DSD (99), Pes., IRL. Usage
27	1,2-Dibromoethane	106-93-4	DSD (99)
28	Dibutyltin (DBT)	n/a	DSD (99)
29	Dichloroanilines	n/a	DSD (99)
30	Dichlorobenzene	n/a	DSD (99)
31	Dichlorobenzidines	1331-47-1	DSD (99)
32	Dichloro-di-isopropyl ether	108-60-1	DSD (99)
33	1,1-Dichloroethane	75-34-3	DSD (99)
34	1,1-Dichloroethylene (Vinylidene chloride)	75-35-4	DSD (99)
35	1,2-Dichloroethylene	540-59-0	DSD (99)

Number	List of Substances	CAS Number	Source of Substance
36	Dichloronitrobenzenes	27900-75-0	DSD (99)
37	2,4-Dichlorophenol	120-83-2	DSD (99)
38	1,2-Dichloropropane	78-87-5	DSD (99)
39	1,3-Dichloropropan-2-ol	96-23-1	DSD (99)
40	1,3-Dichloropropene	542-75-6	DSD (99)
41	2,3-Dichloropropene	78-88-6	DSD (99)
42	Dichlorprop	120-36-5	DSD (99), Pes.
43	Diethylamine	109-89-7	DSD (99)
44	Dimethoate	60-51-5	DSD (99), Pes.
45	Dimethylamine	124-40-3	DSD (99)
46	Epichlorohydrin	106-89-8	DSD (99)
47	Ethylbenzene	100-41-4	DSD (99), EPER
48	Hexachloroethane	118-74-1	DSD (99)
49	Isopropyl benzene	87-68-3	DSD (99)
50	Linuron	330-55-2	DSD (99), BKH, Pes.,
51	MCPA	94-74-6	DSD (99), Pes.
52	Mecoprop	93-65-2, 7085-19-0	DSD (99), CTC, Pes.
53	Monolinuron	1746-81-2	DSD (99)
54	Oxydemeton-methyl	301-12-2	DSD (99), Pes.
55	PCB (including PCT)	n/a	DSD (99), UNEP POP, OSPAR, BKH
56	Chloridazon (Pyrazon)	1698-60-8	DSD (99), Pes.
57	Tetrabutyltin	1461-25-2	DSD (99)
58	1,2,4,5-Tetrachlorobenzene	95-94-3	DSD (99)
59	1,1,2,2-Tetrachloroethane	79-34-5	DSD (99)
60	Toluene	108-88-3	DSD (99), IRl DSD, EPER
61	Tributyl phosphate	126-73-8	DSD (99)
62	Trichlorfon	52-68-6	DSD (99), Pes.
63	1,1,1-Trichloroethane	71-55-6	DSD (99)
64	1,1,2-Trichloroethane	79-00-5	DSD (99)
65	Trichlorophenols	95-95-4	DSD (99)
66	1,1,2-Tri-chloro-tri-fluoro-ethane	76-13-1	DSD (99)
67	Vinyl chloride (Chloroethylene)	75-01-4	DSD (99)
68	Xylenes (technical mixture of isomers)	1330-20-7	DSD (99), Irl DSD, CTC, EPER
69	Bentazone	25057-89-0	DSD (99), Pes.
70	Fenitrothion	122-14-5	DSD (15)
71	Malathion	121-75-5	DSD (15) , Pes.
72	Triphenyltin	n/a	DSD (15), OSPAR, BKH
73	Zinc	7440-66-6	DSD (List l) , Irl DSD, EPER
74	Copper	7440-50-8	DSD (List l), Irl DSD, EPER
75	Chromium	7440-47-3	DSD (List l), Irl DSD, EPER
76	Selenium	7782-49-2	DSD (List I)
77	Antimony	7440-36-0	DSD (List l)
78	Molybdenum	7439-98-7	DSD (List l)

Number	List of Substances	CAS Number	Source of Substance
79	Titanium	7440-32-6	DSD (List l)
80	Tin	7440-31-5	DSD (List l), CTC, EPER
81	Barium	7440-39-3	DSD (List l)
82	Beryllium	7440-41-7	DSD (List l)
83	Boron	7440-42-8	DSD (List l)
84	Uranium	7440-61-1	DSD (List l)
85	Vanadium	7440-62-2	DSD (List l)
86	Cobalt	7440-48-4	DSD (List l)
87	Thallium	7440-28-0	DSD (List l)
88	Tellurium	1349-80-9	DSD (List l)
89	Silver	7440-22-4	DSD (List l)
90	Cyanide	57-12-5	DSD (List l), IRl DSD, EPER
91	Fluorides	16984-48-8	DSD (List l), IRl DSD, EPER
92	Nitrobenzene	98-95-3	CTC
93	Butylbenzylphthalate	85-68-7	CTC, BKH,Com (2001)262- IRL. Usage
94	Permethrin	52645-53-1	CTC
95	PCDD	n/a	UNEP POP, OSPAR
96	PCDF	n/a	UNEP POP, OSPAR
97	Nonyl-Phenol Ethoxylate	37340-60-6	OSPAR
98	HBCD (hexabromocyclododecane)	25637-99-4	OSPAR
99	Tetrabromobisphenol A (TBBP-A)	79-94-7	OSPAR
100	Chloride	16887-00-6	EPER
101	Phenols	n/a	EPER
102	Azoxystrobin	131860-33-8	Pes.
103	Captan	133-06-2	Pes.
104	Carbendazim	10605-21-7	Pes.,Com (2001)262- IRL.Usage
105	Carbofuran	1563-66-2	Pes.
106	Chlormequat	7003-89-6	Pes.
107	Cypermethrin	52315-07-8/ 66841-24-5	Pes.
108	Deltamethrin	52918-63-5	Pes.
109	Epoxiconazole	135319-73-2	Pes.
110	Ethoprophos	13194-48-4	Pes.
111	Fenpropimorph	67306-03-0/ 67564-91-4	Pes.
112	Ferrous Sulphate	7720-78-7	Pes.
113	Glyphosate	1071-83-6	Pes.
114	Glyphosate trimesium	81591-81-3	Pes.
115	Kresoxim methyl	143390-89-0	Pes.
116	Mancozeb	8018'-01-7	Pes.
117	Maneb	124727-38-2	Pes., BKH
118	Metamitron	41394-05-2	Pes.
119	Metam-sodium	137-42-8 / 6734-80-1 for dihydrate	Pes., BKH
120	Metazachlor	67129-08-2	Pes.
121	Oxamyl	23135-22-0	Pes.

Number	List of Substances	CAS Number	Source of Substance
122	Paraquat	1910-42-5 for dichloride salt / 4685-14-7 for dictation	Pes.
123	Pirimicarb	23103-98-2	Pes.
124	Propachlor	1918-16-7	Pes.
125	Thiram	137-26-8	Pes., BKH, Com(2001) 262- IRL. Usage
126	Tolclofos-methyl	57018-04-9	Pes.
127	Tri-allate	2303-17-5	Pes.
128	Bromoxynil	1689-84-5	Pes.
129	Chlorpropham	101-21-3	Pes.
130	Chlorotoluron	15545-48-9	Pes.
131	Cyfluthrin	68359-37-5	Pes.
132	Diflubenzuron	35367-38-5	Pes.
133	Ethofumesate	26225-79-6	Pes.
134	Flusilazole	85509-19-9	Pes.
135	Ioxynil	1689-83-4	Pes.
136	Methiocarb	2032-65-7	Pes.
137	Pendimethalin	40487-42-1	Pes.
138	Pirimiphos-methyl	29232-93-7	Pes.
139	Prochloraz	67747-09-5	Pes.
140	Propyzamide	23950-58-5	Pes.
141	Thiabendazole	148-79-8	Pes.
142	Tribenuron-methyl	101200-48-0	Pes.
143	Zineb	12122-67-7	Pes., BKH
144	Styrene	100-42-5	BKH, Com (2001)262-IRL. Usage
145	Di-n-butylphthalate (DBP)	84-74-2	BKH,Com (2001)262- IRL. Usage
146	2,2-Bis(4-hydroxyphenyl)propan=4,4'-isopropylidenediphenol= Bisphenol A	80-05-7	BKH, WRc, Com (2001)262- IRL. Usage
147	Tri-n-propyltin (TPrT)	2279-76-7	BKH
148	Resorcinol	108-46-3	BKH
149	Amitrole = Aminotriazol	61-82-5	BKH,Com (2001)262- IRL. Uasage
150	4-tert-Octylphenol=1,1,3,3-Tetramethyl-4-butylphenol	140-66-9	BKH
151	4-Nitrotoluene	99-99-0	BKH
152	Emamectin benzoate	137512-74-4	Control Product in Aquatic Systems
153	Dichlobenil	1194-65-6	Control Product in Aquatic Systems
154	Ethinyl Oestradiol	57-63-6	WRc/IRL. Usage
155	2,2-bis(4-(2,3-epoxypropoxy)phenyl) propane	1675-54-3	WRc/IRL. Usage
156	Oestradiol	50-28-2	WRc/IRL. Usage
157	Carbon Disulphide	75-15-0	WRc/IRL. Usage
158	Methybromide (bromomethane)	74-83-9	COM (2001) 262/IRL. Usage
159	Diisononyl phthalate=1,2-Benzene dicarboxylic acid, Diisononyl ester (DINP)	28533-12-0	COM (2001) 262/IRL. Usage
160	Oestrone	53-16-7	COM (2001) 262/IRL. Usage
161	Progesterone	n/a	COM (2001) 262/IRL. Usage

Table 3 - General Components List

Number	Substance
1	Transparency
2	Temperature
3	Dissolved oxygen
4	Salinity
5	Electrical conductivity
6	pH
7	Alkalinity
8	Total phosphorus
9	Soluble reactive phosphorus
10	Total nitrogen
11	Nitrate
12	Nitrite
13	Ammonium
14	Suspended solids
15	Turbidity
16	Total organic carbon (TOC)
17	Biochemical oxygen demand (BOD)
18	Chemical oxygen demand (COD)