

**south
western**
river basin district



South Western River Basin District

Significant Water Management Issues

**Dangerous Substances Usage
("Bottom up Study")**

Background Document

1.0 The rationale for the study

The Characterisation report submitted to the European Commission under Article V of the WFD highlighted knowledge gaps regarding the quantities and locations of discharges of dangerous substances to water bodies. This information will be required to establish the status of water bodies and to develop the River Basin Management Plans (RBMP) containing programmes of measures for reporting to the European Commission in 2010. The Dangerous Substances Programme of Measures and Standards (POMS) study was established to fill the knowledge gaps identified by the Characterisation report in relation to dangerous substances (Appendix I).

Under the WFD implementation programme a dangerous substance screening programme has been carried out. The screening programme has involved investigative monitoring of water, sediment and biota for dangerous substances. The purpose of the screening programme is to assess if substances on the candidate lists developed by the dangerous substances expert group are detected, to obtain concentration data for these substances and to compare these against suitable benchmarks. The dangerous substances usage POMS study complements the dangerous substances screening study. The dangerous substances usage study includes gathering information on the specific sources of the substances found in the screening study. The dangerous substances usage study will highlight substances discharged to the environment that may have been found in the water/sediment or biota samples in the dangerous substances screening programme. The dangerous substances usage study may also highlight substances discharged that were not found in the screening study.

2.0 The objectives

The key objectives of the Dangerous Substances Usage POMS study are summarised 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 tools for the ongoing collation of the pressures and sources of dangerous substances in Irish water bodies.
- To provide an inventory of discharges, emissions and losses of priority and priority hazardous substances which will allow future assessment of progress towards WFD reduction and cessation targets.
- To establish a framework for the licensing and control of dangerous substances discharges.
- To optimise the design of monitoring programmes to be established in accordance with Article 8 of the WFD.

The focus of the dangerous substances usage study is on industrial use of dangerous substances. The study is also developing inventories of dangerous substances in use in forestry, agriculture and aquaculture.

3.0 Progress

3.1 Data Collection

A data collection exercise took place to collate the pertinent data, documents and pressure layers that are available on the dangerous substances found in Ireland. The data that is available on dangerous substances in Ireland is limited. Data however was collated on agricultural and forestry pesticide use and marine sediment, nutrient and biota data for example

3.2 Monitoring Data Review

All existing monitoring data was reviewed and will be used to update the risk assessments. EPA monitoring information will also be used to update the risk assessments and have been reviewed as part of this study. The EPA data on pesticides and metals and the Local Authority substances compliance results (under S.I. 12 of 2001) have been used to update the dangerous substances risk assessments.

Marine Institute sediment data that was received since the Article V risk assessments are being used to update the risk assessments. Marine Institute dredge sediment data which was put into a database will be used in the update of the marine risk assessments. The data is monitoring analysis that was carried out as part of the applications for a dredge sediment dumping licence. This information will be linked to the current dumping sites to establish inventories of dredge material disposed in Irish waters. The substances that will be included in these inventories include contaminants associated with dredged material such as organotin compounds, heavy metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs) and oils.

A screening study has been completed by the SERBD on the dangerous substances in Irish waterbodies. The purpose of this study was to confirm the presence or absence of dangerous substances in the receiving waters. The screening study analysed for Priority Substances and for a Relevant Pollutant list that was developed by the Dangerous Substances Expert Group. The data from this study is being used in the risk assessments. It was also used to develop a list of substances for the WFD monitoring.

The European Pollutant Emission register (EPER) data has been received for Ireland from the EPA by the dangerous substances group. This register gives limited dangerous substances information as it is based on the EPA annual environmental reports (AER) which are limited in their dangerous substances information. For some IPPC licensed industries that the license monitoring includes dangerous substances such as metals. This information has been cross checked with the DEFRA spreadsheets and the questionnaire results and will go towards establishing a risk for the different industry types. The historical AER data have also been collated by the EPA and will be used to cross check substances associated industries. The monitoring data that the AER and EPER datasets are based on are carried out by the IPPC licence holders themselves and will be verified by the EPA.

3.3 Update of Pressure Data Layers

During the initial characterisation a number of GIS layers were generated or made available to RBDs from a variety of sources. This included data on the location of industries, landuse, agriculture, forestry and aquaculture activities. This study has sourced and updated pressure layers to provide national datasets that will allow the most recent and relevant information to be used for subsequent WFD activities such as designing monitoring programmes and developing RBMPs.

3.4 Literature Review

A literature review of the sources of dangerous substances has been prepared. The literature that has been reviewed for this Dangerous Substances Usage Programme of Measures study is from national studies, UK, SEPA and European studies. The studies are related to the use of dangerous substances by industries, agriculture, aquaculture, transport networks etc. The studies reviewed identify the likely sources of dangerous substances from anthropogenic activities. The literature review is divided into the different sources of use, the first being industry, then agriculture, domestic and service sector use, municipal sources, fisheries and marine, transport networks, diffuse sources and mines and contaminated lands. The literature review also covers the relevant legislation and the associated implementation documents. The literature review highlighted the lack of data available on the dangerous substances in Ireland. The information on sources and potential risk that were highlighted as part of the literature review will be used to develop inventories of dangerous substances and update the Article V risk assessments. The literature review concludes that the use of UK tools and risk scores will be necessary for the development of the dangerous substances risk assessments.

A spreadsheet of possible dangerous substances was produced from profiles of industries and contaminated sites prepared by the UK Department of Environment, Food and Rural Affairs. This spreadsheet gives possible substances associated with different industry types. There are almost 750 substances noted in these DEFRA spreadsheets associated with the specific types of industries. The industries include airport and railway stations, pharmaceutical industries and iron, steel and lead works for example

4.0 Tools for data collection

4.1. Questionnaire

A questionnaire was developed to send to selected IPPC licence holders to establish an IPPC industries database of dangerous substances. The questionnaire asked the IPPC licensees to verify their usage and discharge of particular dangerous substances annually. The questionnaire was sent to selected IPPC licensed industry for each NACE code. A NACE code is a unique 5 or 6 digit code that classifies economic activities or industries in the European Union. The questionnaire was issued by the EPA, as they are the licensing body. The chosen industries reply will then be used as a representative for industries that

hold IPPC licences with the same NACE Code. A database of dangerous substances related to IPPC licences has been developed. This database has been crosschecked with the DEFRA spreadsheets and the AER results.

4.2 AER

The EPA are currently developing a web based reporting tool for the Pollution Release and Transfer Register (PRTR) this will also include the information from the Annual Environmental Reports (AER). The data to date has been collected in paper format. It is intended to replace for the 2007 reporting year the spreadsheet AER emissions reporting system with a web-based system to allow licensees to report emissions and waste transfers offsite more easily and in a readily available format. The EPA will carry out training for IPPC licensees on this web-based system in the third and fourth quarter of 2007. The system will be in place by March 2008 for the reporting year of 2007.

5.0 Generation of National Inventories

Detailed national inventories of the discharge of dangerous substances have been developed or are in the process of being developed as part of this dangerous substances screening programme.

National Inventories of the Dangerous Substances will be developed for the following sectors

- Industry
- Agriculture
- Aquaculture
- Forestry

Where possible each inventory will contain information on the

- Type of dangerous substance
- Period of use
- Toxicity to fish and aquatic invertebrates
- Area of use/location

5.1 Industry

For industry a questionnaire has been sent to over 200 IPPC licensees. Each industry was assigned to a NACE code (which is a European coding for industry types) and a questionnaire was sent to at least one industry per NACE code. The questionnaire asked for information on the use and discharge of dangerous substances by the different industry types. This information has been collated and compared with the DEFRA industrial profile lists of substances. A list of potential substances discharged from the particular industry types will be developed and a risk score placed on each. This information will also go towards the development of industrial inventories of discharges of dangerous substances. The collated AER results and

the EPER/PRTR information will also be used to develop inventories for IPC licensed industries. This may also be extended to Small and Medium sized Enterprises.

5.2 Agriculture

Dangerous substances are used as pesticides in agricultural practices. Surveys are carried out by the Department of Agriculture and the Northern Ireland Agri-Food and Biosciences Institute relating to the use of pesticides in a sample group of farms. Reports have been published with the results of these studies. It is proposed to use these surveys and combine them to agricultural land use layers. To date the dangerous substances usage study has not been able to access agricultural land use layers and therefore the development of agricultural land use layers has not been possible.

The following are the pesticide usage studies that have been published since 2003:

Table 1: The agricultural pesticide survey reports that have been published since 2003

Arable Crops	Northern Ireland
Grasslands and Fodder Crops	Republic Ireland
Grassland and Fodder Crops	Northern Ireland
Vegetable Crops	Northern Ireland

The Northern Ireland studies will be used with caution to represent the Irish pesticide usage for those crops that surveys have not yet been carried out in Ireland. Pesticide licensing will be different in Northern Ireland than in the Republic of Ireland, these differences will be taken into account.

5.3 Aquaculture

Dangerous substances are used by aquaculture farms as pesticides, detergents and medicines. A study was carried out by a veterinary expert and the Marine Institute in relation to the chemical use in finfish farms on behalf of the South Western River Basin District. The information provided in this report will be used to develop inventories of dangerous substances used by finfish farms. Currently the finfish farms are being mapped and the toxicity and persistence of the substances noted in the report investigated. The report also noted that production in Irish aquaculture has been falling since a peak in 2001. Salmon, sea reared trout and freshwater trout are the predominant produce in the sector. The Marine Institute database lists 60 finfish aquacultural sites nationally. The report concluded that work is currently underway to develop a national approach for regulation chemical use and discharge for finfish aquaculture in Ireland.

5.4 Forestry

The Western RBD has produced an inventory of dangerous substances associated with forestry. Forestry constitutes 10.1% of the land cover in Ireland. The inventory is based on Coillte data. Data is not available for chemical usage in privately owned forestry. The Coillte data gives an indication of the substances and the quantities of substances used. Pesticides are used in forestry to control the large pine weevil (cypermethrin), at preplanting, post planting and to control weeds around young trees (glyphosate).

The annual quantity of each pesticide was calculated for each Coillte forest parcel. The forestry risk assessment will take these pesticides from forestry into account.

6.0 Design of the Monitoring Programmes

The Dangerous substances usage study has been involved in the development of the monitoring programme by:

- Ongoing identification of water bodies for which monitoring programmes should include dangerous substances monitoring.
- Identification of substances to be included in the monitoring programmes.

The WFD dangerous substances monitoring will include the substances set out by the Commission Priority Substances proposal (COM (2006)397 final). This proposed Priority Substances directive includes the 33 Priority Substances set out in Annex 10 of the WFD and 8 other pollutants listed below.

Table 2 shows list of Priority Action Substances

Priority Action Substances		
No.	Parameter	CAS Number
1	Alachlor	159772-60-8
2	Anthracene	120-12-7
3	Atrazine	1912-24-9
4	Benzene	71-43-2
5	Pentabromodiphenylether	32534-81-9
6	Cadmium and its compounds	7440-43-9
7	C10-13-Chloralkanes	85535-84-8
8	Chlorfenvinphos	470-90-6
9	Chlorpyrifos	2921-88-2
10	1,2-Dichloroethane	107-06-2
11	Dichloromethane	75-09-2
12	Di (2-ethylhexyl) phthalat (DEHP)	117-81-7
13	Diuron	330-54-1
14	Endosulfan	115-29-7
15	Fluoranthene	206-44-0
16	Hexachlorobenzene	118-74-1
17	Hexachlorobutadiene	87-68-3
18	Hexachlorocyclohexane (Lindane)	608-73-1
19	Isoproturon	34123-59-6
20	Lead and its compounds	7439-92-1
21	Mercury and its compounds	7439-92-1
22	Naphthalene	91-20-3
23	Nickel and its compounds	7440-02-0

24	Nonylphenols	25154-52-3
25	Octylphenols	1806-26-4
26	Pentachloro-benzene	608-93-5
27	Pentachlorophenol	87-86-5
28	Polyaromatic Hydrocarbon (PAH)	n/a
	(benzo-a-pyrene)	50-32-8
	(benzo-b-fluoranthene)	205-99-2
	(benzo-k-fluoranthene)	207-99-2
	(benzo-k-fluoranthene)	207-08-9
	(benzo-g,h,i-perylene)	191-24-2
	(indeno(1,2,3-cd)pyrene)	191-39-5
29	Simazine	122-34-9
30	Tributyltin	688-73-3
31	Trichlorobenzene (all isomers)	12202-48-1
32	trichloromethane	67-66-3
33	Trifluarin	1582-09-8
34	DDT total	n/a
	para-para DDT	50-29-3
35	Aldrin	309-00-2
36	Endrin	60-57-1
37	Dieldrin	72-20-8
38	Isodrin	465-73-6
39	Carbontetrachloride	56-23-5
40	Tetrachloroethylene	127-18-4
41	Trichloroethylene	79-01-6

Table 3 shows list of Other Pollutants

Other Pollutants		
No.	Parameter	CAS Number
42	Epichlorohydrin	106-89-8
43	Mecoprop	96-65-2
44	Pirimiphos-methyl	29232-93-7
45	Fenitrothion	122-14-5
46	Malathion	121-75-5
47	Epoxiconazole	135319-73-2
48	Glyphosate	1071-83-6
49	Nonylphenol ethoxylates	37340-60-6
50	Arsenic	7440-38-2
51	Zinc	7440-66-6
52	Copper	7440-50-8
53	Chromium	7440-47-3
54	Selenium	7782-49-2
55	Antimony	7440-36-0
56	Molybdenum	7439-98-7

57	Tin	7440-31-5
58	Barium	7440-39-3
59	Boron	7440-42-8
60	Vanadium	7440-62-2
61	Cobalt	7440-48-4
62	Fluoride	16984-48-8
63	Maneb	124727-38-2
64	Thiram	137-26-8
65	Mancozeb	8018'-01-7
66	Zineb	12122-67-7

Relevant Irish pollutants have also been identified by reviewing the screening programme results and through consultation with the dangerous substances expert group which will be monitored under the WFD monitoring. These are the 28 core monitoring parameters and the 11 supplementary monitoring parameters listed below.

Table 4 shows list of relevant pollutants for core monitoring list

Core Monitoring List

No.	Parameter	CAS Number
1	Antimony	7440-36-0
2	Arsenic	7440-38-2
3	Barium	7440-39-3
4	Boron	7440-42-8
5	Chromium	7440-47-3
6	Cobalt	7440-48-4
7	Copper	7440-50-8
8	Cyanide	57-12-5
9	Epichlorohydrin	106-89-8
10	Epoxiconazole	135319-73-2
11	Fenitrothion	122-14-5
12	Fluoride	16984-48-8
13	Glyphosate	1071-83-6
14	Malathion	121-75-5
15	Mancozeb	8018'-01-7
16	Maneb	124727-38-2
17	Mecoprop	96-65-2
18	Molybdenum	7439-98-7
19	Nonylphenol ethoxylates	37340-60-6
20	Pirimiphos-methyl	29232-93-7
21	Selenium	7782-49-2
22	Thiram	137-26-8
23	Tin	7440-31-5
24	toluene	108-88-3
25	Vanadium	7440-62-2
26	xylenes	1330-20-7

27	Zinc	7440-66-6
28	Zineb	12122-67-7

Table 5 shows list of relevant pollutants for supplementary monitoring list

Supplementary Monitoring List

No.	Parameter	CAS Number
1	2,4-D	94-75-7
2	cypermethrin	52315-07-8/ 66841-24-5
3	diazinon	333-41-5
4	dibutyltin	n/a
5	dichlorophenol 2,4-	120-83-2
6	dimethoate	60-51-5
7	di-n-butylphthalate	84-74-2
8	MCPA	94-74-6
9	mono-chlorobenzene	108-90-7
10	phenol	n/a
11	tetrachloroethane	79-34-5

The core monitoring list will be monitored at each of the Surveillance network sites. The supplementary list of parameters will be monitored at specific Operational network sites. These parameters have been highlighted through the screening programme.

7.0 Risk Assessments

The new registers and map/GIS layers combined with information from monitoring programmes will be used to improve on the Article 5 identification risk assessments and new risk assessments are being developed in relation to dangerous substances.

Work has begun on the risk assessments. There are five risk assessments that will be updated, these are:

- Industrial Point Sources
- Diffuse Agriculture
- Diffuse Transportation
- Coastal and Transitional – Hazardous Substances
- River and Lakes- Hazardous Substances

These will be completed in the next few months.

7.0 The early indications of results/conclusions

The activities and substances associated with the greatest risk to water quality will be prioritised for programmes of measures. Likely measures will entail recommendations for the review of existing licensing and compliance monitoring arrangements as well as prioritisation of activities requiring pollution reduction measures. This will lead to the establishment of a framework for appropriate Programmes of Measures for the control of dangerous substances emissions to water bodies.

New environmental water quality standards will be set in Ireland for toxicants following a consultation period in the second half of 2007. These substances will have to be monitored for at groundwater, river, lake and marine sites and will be surveyed by the EPA and the Marine Institute. Their status will be classified, monitored and reported upon. Non-compliances will result in investigation being carried out. This process will have to be repeated periodically as new concerns emerge about substances.

The systems of licensing and authorisation will be updated and extended to cover the new range of substances and the activities discharging these substances. Under new regulations being made by the DEHLG, licences for wastewater treatment plant discharges and storm overflows will set mandatory emission limits and specify monitoring requirements to achieve new quality standards in receiving waters. The system will be administered by the EPA. Other local authority discharges containing dangerous substances, which may require licensing, are being studied.

Industrial licence conditions will be revised to set controls and emission limits adequate to achieve the new quality standards in receiving waters. This will require minor changes to existing EPA, local authority and Marine Institute licensing systems. From March 2008 the reporting of emissions from IPPC licensed industries will be done through a web-based system. This new web-based system will also include reporting under the European Pollution Release and Transfer Register (PRTR).

In June 2007 a new European regulatory framework for the Registration, Evaluation and Authorisation of Chemicals (REACH) set up a registration system for chemical usage. Chemicals identified under REACH will be assessed for the risks they pose to human health and the environment. It will be administered by the Health and Safety Authority, supported by the EPA.

Inventories of emission, discharges and losses of substances (whether prioritised by the EU or nationally) will be established so that the working of controls can be checked. These activities will all help to identify substances needing control through licensing, authorisation, water quality standards and monitoring. Education and awareness-raising programmes, and voluntary initiatives like the phosphorus-free detergents agreement, will also highlight these issues.

The new water quality standards and the extended monitoring, licensing and authorisation actions will address the major sources of dangerous substance discharges. Stakeholders directly affected by these proposed measures include the public, local authorities and industrial and commercial activities involved in the production, use, handling, storage or discharge of dangerous substances.

Appendix: I

The definition of “Dangerous Substances” incorporates all of the following groups and was adopted from the Discussion Document produced by the National Dangerous Substances Expert Group:

- Priority Substances are substances identified in accordance with WFD Article 16(2) and listed in Annex X (33 Substances). 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).
- Priority Action Substances is a term applied by the National Dangerous Substances Expert Group to the following substances: Annex X (WFD) and Annex IX (WFD- relating to the Dangerous Substances 76/464/EEC Daughter Directives).
- Relevant Pollutants are 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.