

Dangerous Substances



epa

Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Ciaran O'Donnell

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What are Dangerous Substances?

A wide range of individual chemicals

Can have toxic effects on plants, animals, humans

Organic compounds and toxic metals

Chemical properties:

Persistent

Bioaccumulated

Toxic

Properties of Dangerous Substances

Persistence

Stable compounds can take years to break down

Long residence time in the environment

Low levels can produce long-term effects

Cause and effect more difficult to link

Properties of Dangerous Substances

Bioaccumulation

Non-polar organic compounds - soluble in fats

Accumulate and are retained in living organisms

Concentrate in the food chain

Biomagnification can result in high levels in predators

Properties of Dangerous Substances

Toxicity

Direct toxicity at high levels

Intentional use of biocides on target species

Long exposure in the Environment

Unintentional and indiscriminate results

Long-term effects can emerge

Carcinogens - cancer

Endocrine disruptors (EDC) – Fertility effects

Properties of Dangerous Substances

All three properties combined make a substance hazardous

Persistence

Bioaccumulation

Toxicity

PBT

Sources of Dangerous Chemicals

REACH estimates 30,000 chemicals in use in Europe
at more than 1 tonne per year

In the past, main sources were industry and agriculture

Now, many everyday products can contain PBT compounds

Sources of Dangerous Chemicals

Household products

Non-ionic detergents can contain nonylphenol ethoxylates

Textiles can contain flame retardants

Clothes

Furniture

Electronic equipment can contain flame retardants

Sources of Dangerous Chemicals

Industrial sources

Large and small Industries
Chemicals and metals

Agriculture and forestry
Pesticides

Mining – Metals

Construction industry – various chemicals

Sources of Dangerous Chemicals

Diffuse pollution from widespread use of chemicals

Land and urban drainage

Road run-off

Airborne PAH contributing to run-off

Collected run-off can be a new point source

Pressures on the Aquatic Environment

Discharges to water systems

Regulated point discharges

Unregulated diffuse discharges

Accidental

Deliberate

Pressures on the Aquatic Environment

Point discharges

EPA Licenced Effluents

LA Licenced effluents

Onsite Wastewater Treatment Plants

Pressures on the Aquatic Environment

Diffuse inputs

Run-off

Agriculture - pesticides

Forestry – pesticides

Roads – PAH

Railways – Pesticides

Aquaculture - direct input to water

Pressures on the Aquatic Environment

Accidental Discharges

Leaks from landfill sites

Spillages from handling

Road accidents

Fires and resulting contaminated firewater

Pressures on the Aquatic Environment

Deliberate Discharges

Careless disposal

Illegal dumping



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Pressures on the Aquatic Environment

Have we missed something?

Bring suggestions to the workshop

Control and monitoring of Dangerous Substances

Environmental Quality Standards (EQS)

Set at EU and Local level

Dangerous Substances Directive 76/464/EEC

Water Framework Directive 2000/60/EC

Dangerous Substances Regulations - S.I. No. 12 of 2001

Control and monitoring of Dangerous Substances

Which substances should we control?

Large number of compounds in use

Each EQS refers to one compound

Each compound must be monitored independently

Choice of compounds is an important step in control

Control and monitoring of Dangerous Substances

Old EU controls: 76/464/EC was very general

List 1 - Daughter Directives set limits for 18 compounds

Aldrin

Hexachlorobutadiene

Cadmium and its compounds

Hexachlorocyclohexane (including Lindane)

Carbon tetrachloride

Mercury and its compounds

Chloroform

Pentachlorophenol

DDT (including DDD and DDE)

Tetrachloroethylene

1,2-Dichloroethane

Trichlorobenzene (technical mixture)

Dieldrin

1,2,4-Trichlorobenzene

Endrin

Trichloroethylene

Hexachlorobenzene

Isodrin

Control and monitoring of Dangerous Substances

List 2 of 76/464/EC was too general to be effective

Irish Regs in 2001 set limits for 14 compounds under List 2

Pesticides and solvents

Atrazine Dichloromethane Simazine

Toluene Xylenes

Metals and others

Arsenic Chromium Copper Cyanide

Fluoride Lead Nickel Zinc

Tributyl tin (tidal waters only)

Control and monitoring of Dangerous Substances

WFD Annex X was start of new EU control system

Compound selection:

DG Environment and stakeholders

Started 1998 using COMMPS procedure

Combined Monitoring and Modelling-based Priority Setting

Used 820,000 data for 310 substances

On production, use and distribution in the environment

Published as Annex X in Nov 2001 (2255/2001/EC)

33 Substances named

Control and monitoring of Dangerous Substances

Environmental Quality Standards (EQS)

WFD Annex X listed 33 substances

EQS proposed for all of these these by EU (July 2006)

EQS also proposed for remaining 8 from 76/464

(Those not covered in Annex X)

Total EU list contains 41 substances with proposed EQS

WFD Priority Pollutants

alachlor	anthracene	atrazine
benzene	BDE-209	
sum diphenyl ether, octabromo derivate		
C10-C13 (SCCP)	chlorfenvinphos	cadmium
1,2-dichloroethane	dichloromethane	chlorpyrifos(-ethyl)
diuron	endosulfan-alpha	di-(2-ethylhexyl)-phthalate (DEHP)
fluoranthene	hexachlorobenzene	endosulfan-beta
lindane	isoproturon	hexachlorobutadiene
mercury	naphthalene	lead
nonylphenols	4-tert-octylphenol	nickel
pentachlorophenol	benzo[b]fluoranthene	pentachlorobenzene
benzo[a]pyrene	indeno[1,2,3-cd]pyrene	benzo[k]fluoranthene
sum diphenyl ether, pentabromo derivate		benzo[g,h,i]perylene
simazine	tributyltin	
1,2,4-trichlorobenzene	1,2,3-trichlorobenzene	1,3,5-trichlorobenzene
trifluralin	2,4'-DDT	trichloromethane
aldrin	endrin	4,4'-DDT
	dieldrin	isodrin
trichloroethene	tetrachloromethane	tetrachloroethene

Control and monitoring of Dangerous Substances

Relevant Pollutants - WFD Annex VIII

Each Member State must decide on a local list of pollutants

Compounds which are discharged in significant amounts

These must be included in Surveillance Monitoring

Control and monitoring of Dangerous Substances

Selection process for Relevant Pollutants:

Candidate list of 161 compounds

Surveyed to check relevance in Ireland

Monthly samples from 17 sites: May 2005-May 2006

Results were compared with provisional EQS values

Screening Programme - Results

Most positive results were for Metals, VOC and PAH

Priority Substances in Annex X

43 compounds detected

Relevant Pollutants

88 compounds detected

Significance depends on EQS value – annual average

26 relevant pollutants were selected for monitoring

Irish Relevant Pollutants

Epichlorohydrin

Fenitrothion

Glyphosate

Arsenic

Chromium

Molybdenum

Boron

Fluoride

Mancozeb

From S.I.no.12/2001: Toluene

Mecoprop

Malathion

Nonylphenol ethoxylates

Zinc

Selenium

Tin

Vanadium

Maneb

Zineb

Pirimiphos-methyl

Epoxiconazole

Copper

Antimony

Barium

Cobalt

Thiram

Xylenes

Cyanide

Control and monitoring of Dangerous Substances

New EQS have been proposed for 13 substances

Process is defined in WFD

Existing standards listed for 5 further substances

Standards proposals out for public consultation

Monthly monitoring commenced July 2007

All WFF Priority pollutants Annex X and IX

Relevant pollutants Annex VIII

60 river and 31 lake sites

Future Actions

Complete first monitoring cycle – 2007-2009

Extend licencing to include priority listed substances

Licencing of Local Authority discharges

Better controls on chemicals under REACH

Improve industrial reporting – replace EPER with PRTR

PCS to continue pesticide authorisation system

PCS to extend pesticide usage surveys

The Aquatic Environment

Objective – Good Status

Have we missed something?

Bring suggestions to the workshop