The Finnish Environment 622

ENVIRONMENTAL PROTECTION

Susan Londesborough

Proposal for a Selection of National Priority Substances

Fulfilling the Requirements Set by the Dangerous Substances Directive (76/464/EEC) and the Water Framework Directive (2000/60/EC)

FINNISH ENVIRONMENT INSTITUTE

Susan Londesborough

Proposal for a Selection of National Priority Substances

Fulfilling the Requirements Set by the Dangerous Substances Directive (76/464/EEC) and the Water Framework Directive (2000/60/EC)

HELSINKI 2003

FINNISH ENVIRONMENT INSTITUTE

Painotuote

The publication is available in the internet:
www.environment.fi/publications

ISBN 952-11-1386-3
ISBN 952-11-1387-1 (PDF)
ISSN 1238-7312

Cover photo:
Esko Kuusisto

Edita Prima Ltd, Helsinki 2003

Table of contents

Executive summary in Finnish / Yhteenveto

Johdanto

Työn tarkoituksena oli kehittää systemaattinen menetelmä haitallisten kemikaalien priorisointiin sekä soveltaa menetelmää vesipuitedirektiivin (2000/60/EC) sekä vaarallisten aineiden direktiivin (76/464/EEC) edellyttämään haitallisten aineiden valintaan. Työn tuloksena esitetään ehdotus kansallisten prioriteettiaineiden listaksi.

Valintaprosessi keskittyi tietoisesti tuotettuihin aineisiin, joita käytetään Suomessa. Tarkastelun ulkopuolella jätettiin siten prosesseissa syntyvät aineet, kuten esimerkiksi dioksiinit. Niiden osalta priorisointi ja mahdollinen sisällyttäminen kansalliselle prioriteettilistalle tulee tehdä erikseen. Käytännössä valintaprosessi kattoi ne aineet, jotka on rekisteröity kemikaalituoterekisteriin ja jotka ovat kemikaalilain tai torjunta-ainelain säätelemiä. Yksinomaan tuontituotteissa esiintyviä aineita ei rekisteröidä kemikaalirekisteriin ja ne jäivät siten käsittelyn ulkopuolelle. Kemikaalilainsäädännön ulkopuolelle jääviä aineryhmiä ovat mm. lääkeaineet ja kosmetiikassa käytettävät aineet.

Valintaprosessissa pyrittiin tunnistamaan haitallisia aineita, jotka ovat merkittäviä valtakunnallisella tasolla. Paikallisella tasolla mahdollisesti vesistöhaittoja aiheuttavat kemikaalit, esim. harvojen tuotantolaitosten käyttöön rajoittuvat kemikaalit, tulee huomioida paikallisella tasolla. Paikallisella tasolla tehtävää vesipuitedirektiivin mukaista päästöjen tunnistamista varten valmistellaan ympäristöministeriön toimeksiannosta SYKE:ssä ohjetta, joka kattaa myös haitalliset aineet.

Valinta kohdistui aineisiin, joiden voidaan epäillä aiheuttavan ympäristöhaittoja nimenomaan pintavesissä. Pohjavesien suojeluun tähtäävässä aineiden priorisoinnissa tulee käyttää muuta lähestymistapaa, joka ottaa huomioon pohjavesien erityispiirteet. Suomen pohjoisen luonnon asettamat erityisvaatimukset on pyritty ottamaan huomioon. Tämä näkyy käytetyissä valintakriteereissä pysyvyyden osalta.

Esitetty kansallisten prioriteettiaineiden luettelo tulee tarkistaa ja uudistaa määräajoin. Kemikaalien käyttömäärien ja käyttötapojen muuttuessa sekä tiedon lisääntyessä käytössä olevista aineista tulee joidenkin aineiden poistaminen ja toisten lisääminen listalle tarpeelliseksi. Tulevaisuudessa on syytä kiinnittää erityistä huomiota tämän tarkastelun ulkopuolelle jääviin aineryhmiin, esim. lääkeaineisiin, kosmetiikkatuotteisiin sekä yksinomaan tuontituotteissa esiintyviin aineisiin.

Kansallisille prioriteettiaineille määritetään ympäristönlaatunormit. Niiden ympäristöpitoisuudet kartoitetaan, ja jos aineita esiintyy vesiympäristöstä, ne sisällytetään vesipuitedirektiivin mukaisiin seurantaohjelmiin. Tarvittaessa prioriteettiaineille valmistellaan päästönvähennysohjelmat.

Valintaprosessi

Esitetty kemikaalien valintamenettely perustuu sekä aineen ominaisuuksiin (pysyvyys (P), kertyvyys (B), toksisuus (T)) että altistuspotentiaalin. Valintaprosessi oli kolmivaiheinen. Ensimmäisessä vaiheessa muodostettiin aloitusainelista, johon kerättiin aineita toisaalta niiden PBT-ominaisuuksien perusteella, toisaalta kansainvälisiltä haitallisten aineiden prioriteettilistoilta (esim. HELCOM ja OSPAR). Taulukossa 5.1 on esitetty kansainväliset haitallisten aineiden prioriteettiluettelot, joilla mainitut Suomessa käytössä olevat aineet sisällytettiin valintaprosessiin. Aloituslistalle valitut PBT-aineet tunnistettiin pohjoismaisessa ainetietokannassa (NSDB) tehdyn haun pohjalta (Koivisto, 2001a). Näin muodostettiin 279 aineen lista.

Valintaprosessin toisessa vaiheessa aloituslistan aineet priorisoitiin altistuspotentiaalin perusteella. Priorisoinnissa käytettiin kemikaalien käyttömäärää sekä käytön laajuutta kuvaavaa kerrointa (engl. Use Pattern Score, UPS). Kerroin ottaa huomioon kemikaalia käyttävien toimialojen suurimman mahdollisen lukumäärän sekä kemikaalin käyttötapaa kuvaavan päästökertoimen (välillä 0.01-1). Näin valittiin lähempään tarkasteluun 50 kemikaalia, jotka täyttivät seuraavat ehdot:

i) käyttömäärä > 10 tonnia ja UPS > 500, tai
ii) käyttömäärä > 100 tonnia, tai
iii) UPS > 6000.

Kolmannessa vaiheessa tarkasteltiin valittuja kemikaaleja. Kemikaalien ominaisuuksista kerättiin tietoa eri lähteistä, ja aineiden altistuspotentiaalia arvioitiin kemikaalituoterekisterin tietojen pohjalta. PBT-ominaisuuksien osalta valintakriteerinä käytettiin seuraavia:

i) aine on myrkyllinen (EC/LC50 arvo ≤ 10 mg/l), ja
ii) pysyvä (hajoaminen nopean hajoavuuden testissä ≤ 70 %), ja
iii) kertyvä (BCF ≥ 500 tai logKow ≥ 4.

Jos aine oli hyvin myrkyllinen (EC/LC50 arvo ≤ 1 mg), riitti joko pysyvyyden tai kertyvyyden kriteerin täyttyminen perusteeksi aineen sisällyttämiselle listalle. Kemikaalit, yhteenveto niistä kerätyistä tiedoista sekä perusteet niiden mukaan ottamiselle tai pois jättämiselle on esitetty liitteessä 4.

Torjunta-aineet valittiin eri menettelyllä. Torjunta-aineiden valinnassa käytettiin hyväksi Suomen ympäristökeskuksessa kehitteillä olevaa torjunta-aineindikaattoria sekä kemikaaliyksikössä olevaa asiantuntemusta.

Myös metallit käsiteltiin erikseen. Metalleista on olemassa runsaasti pitoisuustietoa, jota käytettiin hyväksi metallien valinnassa. Valinta perustui metallien kokonaispitoisuuksiin, koska lähes kaikki olemassa oleva pitoisuustieto koskee metallien kokonaispitoisuuksia. Pintavesirekisteristä (PIVET) saatuja pitoisuustietoja verrattiin eri maissa asetettujen ympäristönlaatunormien perusteella valittuun kriittiseen pitoisuuteen. Valitut kriittiset pitoisuudet on esitetty taulukossa 7.3. Metallien luonnollista taustaa arvioitiin Geologian tutkimuskeskuksen tekemän purovesikartoituksen avulla. Prioriteettimetalleiksi ehdotetut metallit täyttivät seuraavat ehdot:

i) huomattava osa tuloksista ylitti asetetun kriittisen pitoisuuden,
ii) ylittäviä pitoisuuksia esiintyi eri puolilla maata,
iii) ylitykset olivat merkittäviä myös, kun metallien luonnollinen taustapitoisuus huomioitiin.

Ehdotus kansallisiksi prioriteettiaineiksi

Taulukossa 0.1 on esitetty kansallisiksi prioriteettiaineiksi ehdotetut kemikaalit. Aineet on ryhmitelty kemiallisten ominaisuuksien tai käyttötavan (biosidit ja torjunta-aineet) mukaan. Aineet on esitelty tarkemmin luvussa 8 sekä liitteessä 4.

Taulukko 0.1. Vesipuitedirektiivin ja vaarallisten aineiden direktiivin mukaisiksi kansallisiksi prioriteettiaineiksi ehdotetut kemikaalit.

Cas-numero	Nimi
1. Klooribentseenit	
95 501	1,2-diklooribentseeni
106 467	1,4-diklooribentseeni
108 907	Klooribentseeni
2. Terpeenit	
80 568	Alfa-pineeni; Pin-2-(3)-eeni
138 863	D/L-Limoneeni; Dipenteeni
5 989 275	D-Limoneeni
65 996 965	Terpeenit ja terpenoidit, turpentiiniöljy, alfa-pineeni fraktio
91 770 808	Terpeenit ja terpenoidit, turpentiiniöljy, 3-kareeni fraktio
3. Bentsotiatsoli -yhdisteet	
120 785	Bentsotiatsolidisulfidi (MBTS) ja sen hajoamistuote merkaptobentsotiatsoli (MBT, cas 149 304)
21 564 170	2-(tiosyanometyylitio)bentsotiatsoli (TCMTB) ja sen hajoamistuote merkaptobentsotiatsoli (MBT, cas 149 304)
4. Ftalaatit	
85 687	Butyylibentsyyliftalaatti (BBP)
84 742	Dibutyyliftalaatti (DBP)
5. Muut teollisuuskemikaalit	
793 248	N-1,3-Dimetyylibutyyli-N'-fenyyli-p-fenyleenidiamiini
9016459; 26027383; 37205871; 68412544; 127087870	Nonyylifenolietoksylaatit
556 672	Oktametyylisyklotetrasiloksaani
108 463	Resorsinoli; 3-hydroksifenoli
6. Biosidit	
52 517	Bronopoli; 2-Bromo-2-nitropropaani-1,3-dioli
59 507	4-kloori-3-metyylifenoli
7. Torjunta-aineet	
60515	Dimetoaatti
8018017	Mankotsebi ja sen hajoamistuote etyylitiourea (cas 96457)
41394052	Metamitroni
94746	MCPA
67747095	Prokloratsi
101200480	Tribenuroni-metyyli
8. Metallit	
7440473	Kromi ja sen yhdisteet
7440508	Kupari ja sen yhdisteet
7440666	Sinkki ja sen yhdisteet

List of abbreviations

(D)T50	Half Life
B	Bioaccumulation, Bioaccumulable
BCF	Bioconcentration factor
BGL	Background Level
BOD	Biological Oxygen Demand
COD	Chemical Oxygen Demand
COMMPS	Combined Monitoring-based and Modeling-based Priority Setting Scheme
DSD	Dangerous Substances Directive
EC	Effect Concentration
ED	Endocrine Disrupting (Substance)
EF	Emission Factor
EFDB	Environmental Fate Database
EPER	European Pollutant Emmission Register
EQS	Environmental Quality Standard
EU-RAR	European Union Risk Assessment Report
GSF	Geological Survey of Finland
HELCOM	Helsinki Commission; Convention for the Protection of the Marine Environment of the Baltic Sea Area
HPV	High Production Volume (Chemical)
HSDB	Hazardous Substances Database
IUCLID	International Uniform Chemical Database
KETU	Finnish Register of Chemical Products
Kow	Octanol-Water Distribution Coefficient
LC	Lethal Concentration
N-CLASS	Database on Environmental Hazard Classification
NOEC	No Observed Effect Concentration
NPS	National Priority Substance
NSDB	Nordic Substances Database
OECD	Organization for Economic Cooperation and Development
OSPAR	Convention for the Protection of the Marine Environment of the Northeast Atlantic
P	Persistent
PBT	Persistent, Bioaccumulable and Toxic (Substances)
PEC	Predicted Effect Concentration
PIVET	National Surface Water Monitoring Register
PNEC	Predicted No Effect Concentration
PS	Priority Substance
QSAR	Quantitative Structure Activity Relationship
SYKE	Finnish Environment Institute
T	Toxic
TGD	Technical Guidance Document
UPS	Use Pattern Score
UV	Use Volume
vPvB	very Persistent and Very Bioaccumulable (Substances)
vTB	very Toxic and Bioaccumulable
vTP	very Toxic and Persistent (Substances)
WFD	Water Framework Directive

Introduction

The purpose of this work was to develop a systematic method for the prioritisation and selection of chemicals used in Finland, and present a well-founded list of National Priority Substances in the context of the Water Framework Directive (WFD) and the Dangerous Substances Directive (DSD). The aim of the work was to identify substances that are of possible concern to the aquatic environment throughout the country.

The starting point in the selection was to examine all chemicals used in Finland as inclusively as possible. Both the exposure potential and the ecotoxicological properties of chemicals were assessed. In addition to various international lists identifying hazardous chemicals, all chemicals fulfilling a set of criteria for persistence (P), bioaccumulation (B) and toxicity (T) and classified in the Finnish Register of Chemical Products (KETU-register) as dangerous to human health or the environment were included in the selection procedure. Finnish environmental conditions set special requirements in the selection of chemicals hazardous to the aquatic environment. This was taken into account when deciding on the criteria for PBT-substances. The selection criteria used serves the identification of substances that are expected to exhibit environmental risks in surface waters. For groundwaters a different approach should be used.

The proposal for a list of National Priority Substances as presented in this report shall be subject to public consultation. Further alterations of the list are possible if additional information is presented. The process will lead to a list of substances that can be referred to in relevant national legislation.

2 Finnish environmental conditions relevant for the selection of priority chemicals

The chapter is a direct citation from Koivisto 2001a.

2.1 Climate

The most crucial climatic factors influencing the fate and behaviour of chemicals in Finland are temperature and solar irradiation. The mean annual temperature varies between –2 °C and +5 °C from north to south (FMI 2002) and winter is the longest season lasting about 100 and 200 days in south and north Finland, respectively (Heino 1999). The mean temperature remains below 0 °C in winter. The growing season, when the average daily temperature is higher than 5 °C, lasts about 140 days. Low temperature delays the degradation of organic compounds, and it is assumed that biodegradation of organic compounds is significant only during the growing season. No biodegradation is expected to occur in winter. Also hydrolytical degradation occur slowly at low temperature.

Short day conditions decrease photodegradation of organic compounds during late autumn and winter in Finland. North of the Arctic Circle, the sun does not rise above horizon at all for several weeks and in south Finland the shortest day is only six hours long (Heino 1999). In winter snow and ice cover on soil and waters prevent the penetration of light into soil surface and water minimizing the photodegradation to zero. The Finnish lakes are ice covered about five to eight months per year depending on latitude (Heino 1999). Despite long days in summer, photodegradation is not significantly higher in Finland compared to central and south Europe. Due to the adsorption of UV-B radiation (280-320 nm) by ozone, the latitudinal variation in UV-B radiation is minimal during summer (OECD 93). The UV-B light is responsible for the direct photolysis of many organic chemicals, including most commonly used pesticides (Braunschweiler & Koivisto 2000).

2.2 Soil

Acid gneisses, granodiorites and granites dominate the Finnish bedrock (Braunchweiler & Koivisto 2000). A large part of Finland is covered with a peat layer. The dominating soil type is podzol, which is typically acid, sandy, non-sorted and covered by an organic horizon (Greve 1998). Acid minerals cause natural acidity of soils and waters in Finland. Temperature, organic matter content, pH and particle size are essential factors affecting fate and behaviour of chemicals in soils. High content of organic matter is typical for Finnish soils. The organic matter content is typically 5-7%, but it can be over 50% in the podzol of coniferous forests (Kähäri 1987, Martikainen 1998). The agricultural soils are usually acid. Low pH and temperature of Finnish soils inhibits the microbial activity reducing the degradation rate of organic compounds. The soil is frozen from three to six months every year in Finland. Frost causes structural cracks and holes in clay soil, which enhances leaching of chemicals (Al-Soufi 1999). In spring melting snow increases desorption

and leaching of chemicals from soil surface (Seppälä 1997). Thin soil layer above the bedrock and the coarse texture further increase the risk for groundwater contamination by chemicals.

2.3 Lakes

Inland waters cover about 10 % of Finnish area. Most of the lakes are small and shallow. The mean retention time of water is estimated to be two years and in large lakes up to 10 years. A typical feature of many Finnish lakes is the brown colour caused by humic substances (Kortelainen 1993). The humic lakes naturally have pH below 7. Many lakes are naturally acid, and only 9% are considered to be very acid sensitive (Mannio et al. 2000). There is also relatively soft water in majority of Finnish lakes (Kemira Kemi Ab 1996). The physical and chemical characters of inland waters affect the bioavailability and toxicity of chemicals. The humic substances may increase the toxicity of metals and some organic compounds (Oikari 1992, Kukkonen 1995). On the other hand, humic substances decrease the bioconcentration of organic compounds to aquatic organisms (Landrum et al. 1985, Black & McCarthy 1988, Kukkonen et al. 1989). Heavy metals are more toxic to aquatic organisms in soft waters.

2.4 The Baltic Sea

The Baltic Sea is one of the largest brackish water sea in the world. The salinity varies from 0.2 % in the Bothnian Bay to 2 % in the Danish Straits. The present salinity has persisted about three thousand years which is a short time in the evolutionary time perspective. Only a few species are truly adapted to live in brackish water and consequently the biodiversity is low in the Baltic Sea compared to sea and lakes. The large, densely populated catchment area and slow exchange of water makes the Baltic Sea particularly exposed to man-made chemicals. Small water volume compared to seas as well as the permanent stratification of water because of salinity (halocline) contributes to the concentration of chemicals. Low temperature delays the hydrolytic and microbiological degradation of chemicals. In winter the ice cover prevents photolysis and volatilization of chemicals. Living in brackish water may increase the sensitivity of marine invertebrates to some hazardous substances (McLusky et al. 1986, Tedengren & Kautsky 1987, Tedengren et al. 1988).

The main concern for substances, which could reach the marine environment, is that they are persistent. Persistency leads to long-term exposure to marine organisms, dispersion to large regions and transportation to remote areas. Furthermore, if persistent substances cause an effect, the exposure will continue for a long period, even if all uses of substance are banned and all releases are strictly controlled. Biodegradation in the marine environment is assumed to be relatively slow due to low density of micro-organisms, small diversity of micro-organisms, lack of adaptation and low concentrations of chemicals. The half-life under marine conditions is by large unknown. Therefore, the extrapolation of the biodegradation potential from freshwater data should be performed in a very cautious manner. In the marine environment substances will be present at low concentrations in water due to dilution. Depending on the inherent properties a chemical may be accumulated in the sediment or bioconcentrated in the organisms.

3 Legal requirements

3.1 Dangerous Substances Directive 76/464/EEC

The aim of the Dangerous Substances Directive (DSD) is to eliminate pollution of the waters (inland surface water, territorial water and internal costal water) by dangerous substances in List I of Annex I to the Directive and reduce the pollution of the said waters by the dangerous substances in List II of Annex I. Discharges of both List I and List II substances require prior authorization. For List I substances provisions to eliminate pollution shall be made on Community level, whereas the pollution caused by List II substances shall be reduced through pollution reduction programmed by Member States. The pollution reduction programmes consist of several elements: the identification of relevant pollutants, the setting of quality standards, the design of a surface water monitoring system, authorizations and other pollution reduction measures, such as product controls. The pollution reduction programmes must cover the whole country. However, the identified relevant pollutants can be different for different river basins. (EC 2000)

List I contains individual substances which belong to families and groups of substances selected mainly on the basis of their toxicity, persistence and bioaccumulation. So far only 18 individual substances from the substance groups mentioned in the Annex have been identified on the Community level. These have been established in the daughter directives to the DSD. List II contains substances that belong to the substance groups mentioned in List II. In addition to this, List II contains all those substances belonging to List I for which provisions have not been made on Community level. In effect List II contains many thousands of individual dangerous substances with the exception of the 18 substances identified on the Community level. It is up to the Member States to identify the relevant pollutants from these substance groups and to establish pollution reduction programmes for them.

The main difficulty in the implementation of the DSD has been the lack of guidance for the identification of relevant pollutants (WRc, 2002). With the introduction of the Water Framework Directive (WFD) guidance for the identification of pollution problems and the substances concerning them as well as for the establishment of quality standards and for the adoption of measure is now available. According to WFD (Article 22, paragraph 3b) Member States may apply these principles when establishing pollution reduction programmes according to the DSD.

3.2 Water Framework Directive 2000/60/EC

The aim of the Water Framework Directive is, i.a. to achieve good surface water status of all surface water bodies subject to the Directive (inland surface waters, transitional waters, coastal waters) at the latest 15 years after the date of entry of the Directive and to prevent deterioration of the status of the said water bodies. In order to achieve the objectives of the Directive a review of the impact of human activity on the status of surface waters must be conducted by Member States. The

review must be completed by 2004. Annex II to the Directive, chapters 1.4 and 1.5 specify the contents of the review. In relation to hazardous substances all significant point and diffuse sources of relevant pollutants in each river basin district have to be identified. On the Community level a list of 33 priority substances or substance groups has been identified (see Annex 3A for details). In addition to the Community Priority Substances, all other specific pollutants which are released into the water bodies and which can threaten the achievement of the aims of the Directive need to be identified. These substances can be defined as National Priority Substances (NPS) in the scope of the WFD.

The starting point for the identification of specific pollutants in the WFD is the list of "main pollutants" mentioned in Annex VIII (see table 3.1). This list can be considered equivalent to the "universe of chemicals", hence no chemical substance or pollutant can be excluded from the beginning. Only those pollutants under points 1 to 9 need further consideration as potential specific pollutants. The pollutants under points 10,11 and 12 of the Annex are general physico-chemical quality elements and are considered separately (IMPRESS 2002).

For Community Priority Substances environmental quality standards shall be set on the Community level. For National Priority Substances environmental quality standards shall be established nationally. Environmental quality standards determine the borderline between good and moderate status of a water body. In order to establish whether a water body is at risk at not achieving the objectives set by the Directive concentrations levels of specific pollutants identified, either monitored or estimated, have to be available in order to compare them with the set environmental quality standards. In order to establish the objectives of the Directive Member States shall establish programmes of measures for each river basin district on the basis of the results obtained from the impacts review.

In table 3.1 the substances and substance groups mentioned in the WFD Annex VIII and the DSD Annex I are presented. The lists resemble each other. However, some differences are present. In relation to metals the DSD is more specific. Whereas the WFD mentions metals in general, the DSD specifies 20 individual metals and metalloids in List II. In List I it mentions mercury and cadmium which are covered in the WFD, in addition to lead and nickel, by the list of priority substances set on the Community level (Annex X). Three substance groups mentioned in List II of DSD are missing from Annex VIII to WFD: substances which have a deleterious effect on the taste and/or smell of fish (point 3), toxic and persistent compounds of silicon (point 4) and non persistent mineral oils and hydrocarbons of petroleum origin (point 6). In contrast to the DSD, the WFD introduces the concept of persistent and bioaccumulable organic toxic substances (point 5) and mentiones, in addition to substances which poses carcinogenic properties, substances that affect endocrine functions in the aquatic environment . Table 3.1. The substance groups mentioned in the WFD and the DSD which form the universe of chemicals from which relevant pollutants need to be identified. (The pollutants under points 10,11 and 12 of Annex VIII are general physico-chemical quality elements and are not considered when selecting spesific pollutants, (IMPRESS 2002).)

Annex VIII to WFD, Indicative list of the main pollutants	Annex I List I to DSD	Annex I List II to DSD
1. Organohalogen compounds and substances which may form such compounds in the aquatic environment	1. Organohalogen compounds and substances which may form such compounds in the aquatic environment	1. A list of 20 metalloids and metals and their compounds
2. Organophosphorous compounds	2. Organophosphorus compounds	2. Biocides and their derivatives not appearing in List I.
3. Organotin compounds	3. Organotin compounds	3. Substances which have a deleterious effect on the taste and/or smell of the products for human consumption derived from the aquatic environment, and compounds liable to give rise to such substances in water.
4. Substances and preparations, or the breakdown products of such, which have been proven to possess carcinogenic or mutagenic properties which may affect steroidogenic, thyroid, reproduction or other endocrine-related functions in or via the aquatic environment	4. Substances in respect of which it has been proven that they possess carsinogenic properties in or via the aquatic environment	4. Toxic and persistent organic compounds of silicon, and substances which may give rise to such compounds in water, excluding those which are biologically harmless or rapidly converted in water into harmless substances.
5. Persistent hydrocarbons and persistent and bioaccumulable organic toxic substances	5. Mercury and its compounds	5. Inorganic compounds of phosphorus and elemental phosphorus.
6. Cyanides	6. Cadmium and its compounds	6. Non persistent mineral oils and hydrocarbons of petroleum origin.
7. Metals and their compounds	7. Persistent mineral oils and hydrocarbons of petroleum origin	7. Cyanides, fluorides
8. Arsenic and its compounds	8. Persistent synthetic substances which may float, remain in suspension or sink which may interfere with any use of the waters	8. Substances which have an adverse effect on the oxygen balance, particularly: ammonia, nitrites.
9. Biocides and plant production products		
10 Materials in suspension		
11. Substances which contribute to eutrophication (in particular, nitrates and phosphates)		
12. Substances which have an unfavourable influence on the oxygen balance (and can be measured using parameters such as BOD, COD, etc.)		

Chemicals covered in the selection

4

Ideally all chemicals substances, that can endanger the good ecological status of water bodies in Finland should be taken into consideration when selecting priority hazardous substances. As a pragmatic starting point this selection concentrated on those substances that are registered in the Finnish Register of Chemical Products (KETU-register). In addition, metals and pesticides were assessed separately. The KETU-register contains data on professionally used chemicals imported to or produced in Finland, which are classified as dangerous to the human health or the environment or which may otherwise cause hazard.[1] Therefore chemicals that appear solely in imported articles and are not registered in KETU-register were in practice excluded from the selection. For the same reason process born substances, such a dioxins, were excluded from the selection. The prioritisation of process borne substances, and the need to include them on the national list must be done separately. As the selection procedure concentrated on pollutants that are expected to be relevant in the whole country, substances that are known to have only a few point sources should be taken into consideration on a local level. Instructions and procedures for this are given in a national guidance for the identification of pressures.

Substance groups that are regulated by other legislation than the Chemicals act or the Pesticide Act are not registered in KETU and were excluded from the selection. Such substance groups are:

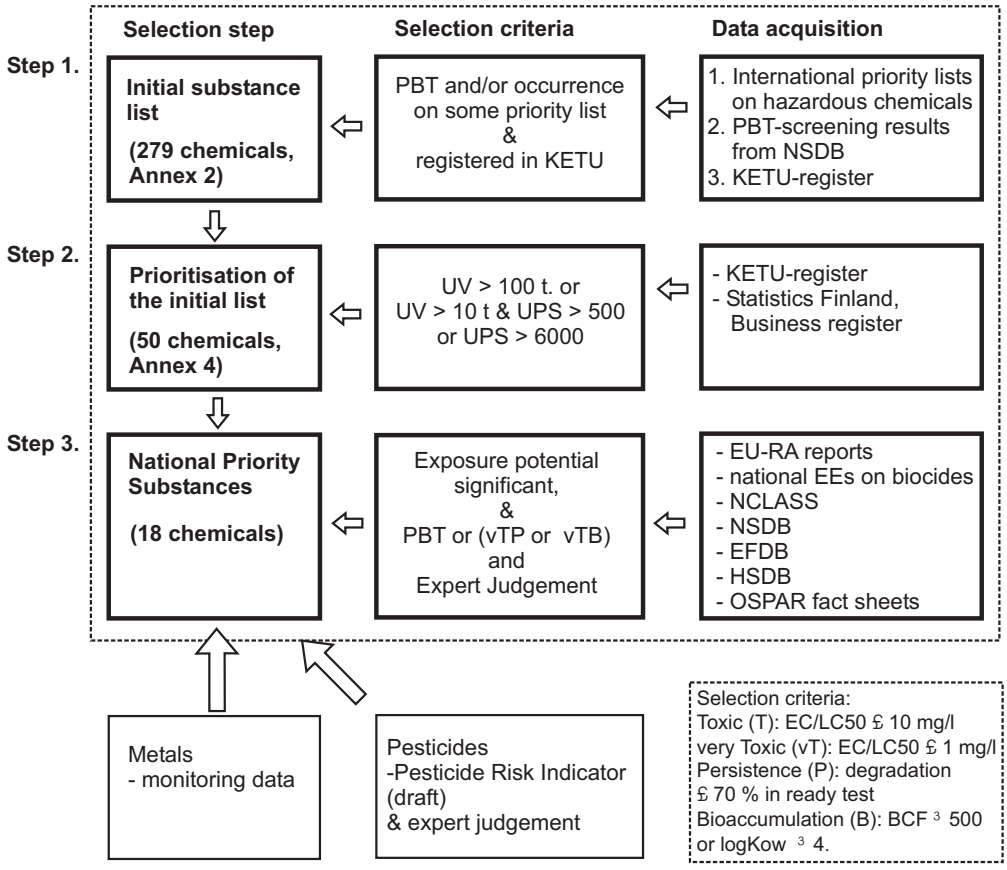
- radioactive substances (radioactive substances are not covered in the list of main pollutants mentioned in Annex VIII to WFD, nor in lists I and II to DSD)
- human and veterinary pharmaceuticals, food and fodder additives
- cosmetics

There are about 5400 substances in the KETU- register. Of these only about 900 chemicals have data on both toxicity, bioaccumulation and biodegradation. A further exercise looking into chemicals that had information on two properties (e.g. on toxicity and persistence) extended the amount of chemicals taken into consideration to about 1500 (for details see chapter 5.1). However, in practice about 3900 substances registered in the KETU were still left out of the selection procedure due to lack of data on PBT-properties.

[1] In practise KETU-register contains mainly data on chemicals officially classified in the EU according to Directive 67/548/EEC and established in Finland by the List of Dangerous Substances published by the Ministry of Social Affairs (Decree 624/2001).

5 The selection procedure

The selection procedure consisted of three basic steps: the compilation of an initial substance list, the prioritisation of the initial substance list and the final selection of national priority substances. Metals and pesticides were selected outside the main selection procedure (see chapters 6 and 7). The selection procedure is presented in Figure 5.1.



EE = Environmental evaluatation,
EFDB = Environmental Fate Database,
NCLASS = Database on Environmental Hazard Classification
NSDB = Nordic Substances Database,
KETU = Finnish Register of Chemical Products,
UV = Use Volume,
UPS = Use Pattern Score
WFD = Water Framework Directive.

Figure 5.1. The selection procedure

5.1 The initial substance list and its selection criteria

The initial substance list for the identification of National Priority Substances is presented in Annex 2. These substances were selected with several criteria. Part of the substances occur in various international lists for hazardous substances, part were selected on the basis of their intrinsic hazardous properties: on persistence, bioaccumulation and toxicity (criterion 4). Table 5.1 shows the selection criteria. The substance list in Annex 2 indicates which selection criterion each substance fulfils. In addition, substances that are included in the priority lists of the EU risk assessment procedure are indicated, as well as substances that are included in the list of pollutants to be reported to the European pollutant emission register (EPER) according to Commission Decision 2000/479/EC[2]. All individual metal and organic compounds on the EPER list are covered by the initial substance list. In Annex 3 some background information on the international priority substance lists and on the selection of PBT-substances is given.

Of the 5400 substances registered in KETU only about 900 chemicals have data on both toxicity, bioaccumulation and biodegradation, and were thus considered when the initial screening of PBT-substances from the Nordic Substances Data Base (NSDB) was conducted (criterion 4, see Annex 3B for details). In order to make the selection more extensive, substances that had information only on two properties (e.g. fulfilled the criteria for persistence and bioaccumulation, but lacked information on toxicity) where studied. With this exercise a further 600 chemicals were taken into consideration. Substances identified in this exercise are presented in Annex 1. Most of the substances identified were distillates of petroleum, and were not considered relevant for this selection, which concentrated in identifying individual hazardous substances. The environmental problems associated with petroleum based substance groups are well known and should be addressed as a group. Other substances identified in the exercise were compounds of metals, which will be assessed as their own group (see chapter 7), substances, like carbon monoxide, which are gases and not relevant for the water environment or substances that are not produced in or imported to Finland according to KETU-register.

Except for the Community Priority Substances established by the WFD (criterion 1), only substances that appear in the Finnish Register for Chemical Products (KETU-register) were included. All Community Priority Substances were included in the selection procedure in order to see what the relationship between substances identified on the community level and nationally is.

[2] *2000/479/EC Commission Decision of 17 July 2000 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)*

Table 5.1. Selection criteria for the initial substance list.

	Selection criterion	Number of substances selected /number of substances on the original list
1.	The substance belongs to the list of Community Priority Substances in the field of water policy established in Annex 10 (2455/2001/EC) to the Water Framework Directive (2000/60/EC). For details see Annex 3A.	33 / 33
2.	The substance belongs to List I of the Directive 76/464/EEC, and it is registered in the KETU-register.	10 / 18
3.	The substance belongs to the list of substances published in the Communication from the Commission to the Council on dangerous substances which might be included in List I of Council Directive 76/464/EEC (14.7.1982), and it is registered in the KETU-register.	56 / 129
4.	The substance is identified in the proposal for a priority list of hazardous substances in Finland (Koivisto, 2001a). For details see Annex 3B.	77 / 77
5.	The substance is identified in the proposal for criteria for the selection hazardous substances for environmental monitoring (Peltola, 2000).	37 / 37
6.	The substance belongs to the priority list of HELCOM (Recommendation 19/5), and it is registered in the KETU-register. For details see annex 3D.	18 / 45
7.	The substance belongs to the EU candidate list of endocrine disrupters (Groups I and II), and it is registered in the KETU-register. (BKH Consulting Engineers 2000)	32 / 116
8.	The substance belongs to the list of potential PBTs and vPvBs identified by a QSAR exercise, and it is registered in the KETU-register. For details see Annex 3C.	12 / 134
9.	The substance is included in the OSPAR list of substances of possible concern 2002-17, and it is registered in the KETU-register. For details see Annex 3D.	89 / 386
10.	The substance is included in the list of potential PBTs and vPvBs among the IUCLID high production volume chemicals, and it is registered in the KETU-register (EC 2002).	67 / 125

5.2 Prioritisation of the initial substance list

The initial substance list was prioritised according to exposure potential. Both use volumes and the use pattern of chemicals was assessed. Use volumes were obtained from the Finnish Register of Chemical Products (KETU-register) for year 2001.

5.2.1 Use pattern of chemicals

For industrial and consumer chemicals a Use Pattern Score estimating the potential of a chemical to be released into the environment was determined on the basis of the information obtained from the KETU-register. The Use Pattern Score (UPS) is the product of the emission factor (EF) and the number of activity sites on which the chemical can be used.

UPS= EF x number of activity sites

The amount of activity sites in each use category was obtained from the Business register of Statistics Finland. The data is from year 1999. As an example the calculation of the Use Pattern Score for Bisphenol-A is presented in table 5.2. As a chemical is not necessarily used on all activity sites of a specified use activity category, the Use Pattern Score is a worst case estimation of the use pattern of a chemical.

Emission factors

The emission factors were determined on the basis of the main use categories adopted from the Technical Guidance Document (TGD) for the risk assessment of existing chemicals (EC 1996) and the information on the use pattern obtained from KETU-register. For all chemicals in the KETU-register a list of products containing a specified chemical and information on the use mode and activity categories of the products is available. The main use categories in the TGD are "use in closed systems", "use resulting in inclusion into or onto a matrix", "non dispersive" and "wide dispersive use". The emission factors for these categories are 0.01, 0.1, 0.2 and 1, respectively. (see table 5.3)

Solvents, washing agents and lubricants typically represent product types having "wide dispersive use" (EF=1). Typical examples of chemicals with "non dispersive use" (EF=0.2) are resins in filling materials, glues, paints, lacquers and varnishes. Other use patterns in this category are some additives, softeners, flame retardants and laboratory chemicals.

Substances belonging to the category "use resulting in inclusion into or onto a matrix" (EF=0.1), react with or are bound so tightly to a matrix, that only a small proportion will end up in the environment. Resins and industrial additives belong to this category. Even smaller exposure is expected from raw materials which have been assigned to the category "closed use" with emission factor 0.01.

Biocides, which are used as preservatives in plastic or rubber industry (product group 9), have the emission factor 0.1, because only a small proportion of these biocides is believed to enter the environment. All other biocides have a emission factor of 1 due to the more or less direct release to the environment.

Table 5.2. Determination of the Use Pattern Score for Bisphenol A, an example

CAS	Name	Use, product group	Activity category		EF	Amount of activity sites	EF* amount of sites
80 057	Bisphenol A	Hardener	tolry275	Metal casting	0.1	73	7.3
80 057	Bisphenol A	Stabilizer, additive	tolry243	Production of paints and lacks	0.01	47	0.5
80 057	Bisphenol A	Stabilizer, additive	tolry246	Other production of chemicals	0.01	76	0.8
80 057	Bisphenol A	Stabilizer, additive	tolry25	Production of rubber and plastics products	0.01	730	7.3
80 057	Bisphenol A	Stabilizer, additive	tolry252	Production of plastic products	0.01	647	6.5
80 057	Bisphenol A	Stabilizer, additive	tolry313	Cable manufacture	0.01	36	0.4
80 057	Bisphenol A	Paper chemical	tolry211	Pulp and paper industry	0.01	97	1.0
80 057	Bisphenol A	Paint hardener, filler, resin	tolry351	Ship and boat manufacture and repair	1	564	564
80 057	Bisphenol A	Paint hardener, filler, resin	tolry353	Aircraft industry	1	17	17
80 057	Bisphenol A	Hydraulic fluid	tolry50	Automobile trade and repair	0.1	10658	1066
80 057	Bisphenol A	Hydraulic fluid	tolry502	Automobile service and repair	0.1	5167	517
Overall Use Pattern Score for Bisphenol A:							**2187**

Table 5.3. Emission factors used in determining Use Pattern Scores

Use pattern		Emission factor
1.	Industrial chemicals	
1.1	Use in closed systems	0.01
1.2	Use resulting in inclusion into or onto a matrix	0.1
1.3	Non-dispersive use	0.2
1.4	Wide dispersive use	1
4.	Biocides	
4.1	Biocides; product group PG 9	0.1
4.2	Biocides; all other product groups	1.0

5.2.2 Substances selected for further assessment

Use volumes and Use Pattern Scores were used to prioritise the initial substance list. Substances that fulfilled the following criteria were selected for further assessment:

- use volume > 10 tons and Use Pattern Score > 500
- use volume > 100 tons
- Use Pattern Score > 6000

A list of 50 substances was obtained for further assessment. These substances together with information on effects and exposure collected in the next step of the procedure are presented in Annex 4.

5.3 Final selection

5.3.1 Sources and validation of data

The NSDB-database used in the initial selection of PBT-substances (selection criterion 4) is possibly the largest existing data base on ecotoxicological properties of substances. It has been created by collecting ecotoxicological data from all possible sources available. The data presented in the database are of varying quality. When searching substances in the NSDB with a set of criteria for PBT-properties the database selects the substances on a "worst case" -principle. For instance if the data base contains several results on biodegradation tests and one of them indicates that the substance is not readily biodegradable, the substance will be automatically selected as a persistent substance. A more careful study on the test results might reveal solid evidence that the substance is readily biodegradable. In many cases additional information, e.g. on the test conditions of degradation tests is necessary in order to make a decision whether the substance actually fulfils the criteria for PBT-properties.

As well as ecotoxicological effects, the exposure potential of the substances selected in step 2 needed to be examined more thoroughly. The Use Pattern Score used as a selection tool in step 2 is a rough estimate of the exposure potential of chemicals and it is not suitable for the final assessment of the exposure of chemicals.

For these reasons additional information on the substances selected in the second step of the selection procedure was collated from the following sources:

- European Union Risk Assessment Reports when available
- National Ecotoxicological Evaluations on Biocides when available
- OSPAR fact sheets on substances of possible concern (http://www.ospar.org/eng/html/welcome.html)
- ECOTOX/AQUIRE Database (http://www.epa.gov/ecotox/)
- Hazardous Substances Database, HSDB (http://toxnet.nlm.nih.gov/)
- Environmental Fate Database, EFDB (http://esc.syrres.com/efdb.htm)
- Biodegradation and Bioaccumulation Data of Existing Chemicals based on the CSCL Japan (compiled under the supervision of Chemical Products Safety Division, Basic Industries Bureau, Ministry of International Trade & Industry, Japan) Edited by chemicals Inspection & testing Institute, Japan. October 1992 & Homepages of Chemicals Evaluation and Research institute, Japan (http://www.cerij.or.jp/ceri_en/index_e.shtml)
- N-CLASS Database on Environmental Hazard Classification, April 2002 (http://www.kemi.se/nclass/default.asp)
- Finnish Register on Chemical Products (KETU-register)

Since 2002 use volumes of chemicals, starting from year 2001, have been available from the KETU-register. The register is maintained by the National Product Control Agency for Welfare and Health, STTV http://www.sttv.fi/kemo/kemikaali_tuoterek.htm)

5.3.2 Final selection criteria

In the final selection both the exposure potential and the environmental effects of substances was taken into account. In many cases the decision was based on incomplete information both in quality and quantity. In all cases decision making was based on best possible information available. For some substances an EU risk assessment report was available. For those substances the decision was based on an extensive estimation on both exposure and effects.

The same criteria as used in the initial selection of PBT-substances (Annex 3B) was applied in the final selection with some modifications. Substances that are toxic (EC/LC50 value ≤ 10 mg/l), persistent (biodegradation ≤ 70 % in a ready test) and liable to bioaccumulate (BCF ≥ 500 or logKow ≥ 4) were selected. However, chemicals that are very toxic (EC/LC50 value ≤ 1mg/L) and fulfilled either the criteria for persistence or for bioaccumulation were also selected. If the use volume, use categories and/or the number of sites that use the chemical indicated that the risk for the chemical to enter the environment was very low or has significance only on a local level, the chemical was not selected.

The chemicals that passed the above mentioned criteria are proposed as National Priority Substances and are presented in Annex 4 Part 1. Chemicals that did not pass the criteria and chemicals that have already been identified on the Community level as priority substances are presented in Parts 2 and 3 to the Annex, respectively.

In Part 2 to Annex 4 two individual alkanes (heptane and octane) and the group of C9-C12 iso-alkanes are presented. Although heptane and octane fulfill the selection criteria for both PBT-properties and exposure potential, they are not proposed to be included on the list of priority substances at this stage for the following reasons. The aforementioned alkanes were selected in step 2 for further assessment on the basis of their use in e.g. paints, washing agents, glues, lubricants and seal materials. However, in general, it can be expected that petroleum use forms a significant source for alkanes. Therefore it is deemed important to assess alkanes as a group covering a wide range of both short and long chained alkanes.

This is convenient also for the purposes of analytics. It is also supported by the results of the exercise described earlier in the report (chapter 5.1) looking into substances that had information only on two properties. In the exercise several petroleum fractions containing long chained alkanes were identified. These substances fulfilled the initial selection criteria for persistence and toxicity, but lacked data on bioaccumulation in the NSDB. Further information is needed to assess these substances.

6 Selection of pesticides

National Priority Pesticides were selected by expert judgement. A draft Pesticide Risk Indicator, which is being developed in the Chemicals division of The Finnish Environment Institute was used to support the selection. The draft Pesticide Risk Indicator takes into account mobility, persistence, toxicity and potential for bioaccumulation of all pesticides used in Finland and combines this information with sales volumes. For details on the draft Pesticide Risk Indicator see Annex 5.

7 Selection of metals

7.1 Introduction

Because the properties of metals differ from both synthetic and naturally occurring organic substances, a different selections approach needed to be applied. Metals are naturally occurring elements that do not degrade. The liability of metals to bioaccumulate must be always determined experimentally as BCF modelling on the basis of Kow values is not applicable to metals. Many metals, e.g. copper, chromium and zinc are essential micro-nutrients. However, above essential concentration levels they can have toxic effects. In many environments naturally high concentrations of metals are encountered, to which organisms have adapted. Therefore the natural background levels of metals need to be taken into consideration when assessing limit values above which adverse effects are expected. In addition, environmental conditions (dissolved and particulate organic matter, water hardness and pH) and the chemical form of the metal (oxidation state, organic/inorganic forms) affect the bioavailability and toxicity of metals.

Acidification affects the occurrence of many metals to a large extent. Acidification can result from local activities (e.g. ditching of acidic soil layers has lead to elevated concentrations of metals in certain areas on the west coast of Finland) or it can be due to long range transport of air pollutants.

Main anthropogenic sources of metals are combustion of fossil fuels, mining and metal processing. Some metals are widely used in chemical products. E.g. copper, arsenic and chromium have been used in wood preservatives and organic tin compounds in anti-fouling agents. The occurrence of many metals is influenced by long-range transport of air pollutants.

On the community level four metals, cadmium, lead, mercury and nickel have been selected as priority substances (Annex X to WFD). These metals were selected by a Combined Monitoring-based and Modelling-based Priority Setting scheme (COMMPS, see Annex 3A).

In Finland a magnitude of monitoring data are available for many metals. This information, together with an evaluation of the adverse effects of metals to surface water ecosystems formed the basis for the identification of metals that should be included on the list of National Priority Metals.

7.2 Sources of monitoring data

Metal concentrations in the Nordic lakes

In autumn 1995 an extensive survey on metal concentrations in Nordic lakes was conducted (Skjelkvåle 1999 and 2001). In the study 11 metals (Cd, Pb, As, Zn, Cu, Ni, Co, Fe, Mn, Cr and V) were assessed in 464 lakes in Finland. Lakes were randomly selected from the national register with certain requirements for the proportion of lakes in different size categories and within any region. Therefore, the

results of the survey form an extensive picture of the situation in the whole country. However, the survey does not necessarily cover lakes that are influenced by specific point sources.

Metal concentrations in stream waters and sediments in Finland

During August-September 1990 the Geological Survey of Finland (GSF) conducted a survey of stream waters throughout Finland (Lahermo 1996). A total of 1166 samples were collected at a mean sampling density of one sample per 300 km^2. Each sampling point represented a drainage area of ca 30 km^2. In addition to general water quality parameters a array of metals was determined. The data produced by the survey may be used as background levels when estimating environmental changes and pollution.

The national surface water monitoring register (PIVET)

Monitoring results produced by the environmental administration are collated in the National Surface Water Monitoring Register (PIVET). The results originate from various monitoring and research programmes and monitoring due to conditions set in the environmental permits of industrial installations. Therefore they do not necessarily form a representative picture of metal concentrations in Finnish surface water or cover the whole country. However, the data collected in the PIVET-register was regarded as a valuable and useful tool for the selection of metals.

7.3 Selection procedure and criteria for National Priority Metals

The metals and metalloids on List II to the Dangerous Substances Directive served as a starting point in the selection of priority metals (table 7.1). Monitoring data for these, when available, and some other metals considered relevant (aluminum and iron) were collected from the PIVET-register for years 1998-2002 (table 7.2). As over 99 % of all results referred to total metal determinations, the assessment used solely total metal concentrations.

Environmental quality standards (EQS) set in different countries were searched from literature (table 7.3). A critical concentration level was selected on the basis of this information. This critical concentration was used as a reference point, when estimating whether the monitored concentration levels gave reason for concern. It is not indicative of the official EQS values, which are to be set for the National Priority Metals later.

If the proportion of results exceeding the set limit value was significant, the geographical distribution of the results was examined. The purpose of the selection procedure was to identify metals relevant for the whole country. Therefore, metals, for which high concentrations were detected only at certain and few regions, were excluded from the selection.

If the proportion of results exceeding the limit value was high, and the results did not clearly originate from certain few regions, the background levels were taken into consideration. On the basis of information from the GSF stream survey, background levels were roughly estimated and the monitoring data was compared to the sum of the critical concentration limit and the estimated background level.

The selection procedure for all metals assessed in presented in Annex 6.

Table 7.1. Metals and metalloids in List II to Dangerous Substances Directive (76/464/EEC)

Zinc (Zn)	Selenium (Se)	Tin (Sn)	Vanadium (V)
Copper (Cu)	Arsenic (As)	Barium (Ba)	Cobalt (Co)
Nickel (Ni)*	Antimony (Sb)	Beryllium (Be)	Thalium (Tl)
Chromium (Cr)	Molybdenum (Mo)	Boron (B)	Tellurium (Te)
Lead (Pb)*	Titanium (Ti)	Uranium (U)	Silver (Ag)

*Nickel and lead appear on the list of priority substances of Annex X to the Water Framework Directive. Mercury and cadmium appear on List I to the Directive.

Table 7.2. Number of results for total metal determinations registered in PIVET between years 1998-2002

	Lakes	Rivers	Estuaries	Sea	Total
Ag	14	1	0	0	15
As	1 516	3 446	4	3	4 972
Al	5 496	10 020	5	178	15 699
B	17	17	0	0	34
Ba	18	17	0	0	35
Be	15	0	0	0	15
Cd*	1 186	3 708	4	41	4 939
Co	577	246	0	0	823
Cr	1 211	3 526	4	360	5 101
Cu	1 728	3 847	4	105	5 684
Fe**	9717	7923	11	1932	19583
Hg*	40	876	4	41	961
Mo	3	17	11	0	31
Ni*	676	1 362	4	261	2 303
Pb*	1 238	3 512	2	39	4 791
Se	129	265	0	0	394
V	652	379	0	63	1 094
Zn	2 748	4 610	4	308	7 670

*Nickel, lead, cadmium and mercury appear on the list of priority substances of Annex X to the Water Framework Directive.
**For iron the results are for year 2000

Table 7.3. Environmental quality standards set in different countries for metals and the critical limit values selected for this assessment. The values refer to total metal concentrations in freshwater aquatic ecosystems and are expressed in μg/l.

	PNEC EU-RAR[1]	PNEC SYKE[2]	Sweden[3]	Netherlands[4]	Canada[5]	British Columbia[6]	Ontario[7]	Critical limit value selected for this assessment[8]
Ag	-	-	-	-	0.1	-	0.1	0.1
Al	-	-	-	-	5-100	-	15* (pH 4.5 – 5.5) **(pH 5.5 – 6.5) 75* (pH 6.5–9.0)	-
As	-	*	5	32 (bgl 7)	5	5	5 (interim value)	5
B	-	300	-	-	-	-	200(interim value	200
Ba	-	-	-	230 (bgl 76)	-	1000	-	230
Be	-	-	-	0.2 (bgl 0.02)	-	5.3	11 ($CaCO_3$ < 75 mg/l) 1100 ($CaCO_3$ > 75 mg/l)	0.2
Co	-	-	-	3.1 (bgl 0.2)	-	0.9	0.6	1
Cr	0.47 / 4.1 (CrVI) 4.7 (CrIII)	4.1 (CrVI) 4.7 (CrIII)	5	84 (bgl 1.6)	8.9 (CrIII)	9 (CrIII)	100	4
Cu		5	3	3.8 (bgl 1.1)	2-4	-	1 ($CaCO_3$ < 20mg/l) 5 ($CaCO_3$ > 20 mg/l	3
Fe	-	-	-	-	300	300	300	-
Mo	-	-	-	300 (bgl 1.4)	73	-	10 (interim value)	20
Se	-	-	-	5.4 (bgl 0.04)	1	-	100	1
V	-	-	-	5.1 (bgl 1)	-	-	7 (interim value)	5
Zn	23 (SPM 15 mg/l) 37 (SPM 30 mg/l)	-	20	40 (bgl 12)	30	-	20 (interim value)	20

[1] EU Risk assessment reports on zinc (EU-RAR 2001) and on chromium (EU-RAR 2002). The Predicted No Effect Concentration values (PNEC) do not take into account background levels. The lower PNEC value for chromium (VI) (0.47 μg/l) is derived by the standard assessment factor approach. The higher value (4.1 μg/l) is derived by the statistical extrapolation method. They refer to the dissolved water concentration. For zinc the given values refer to the total metal concentration taking into account the amount of suspended particulate matter (SPM). They are derived from the PNEC value for dissolved zinc (8.6 μg/l) set by the statistical extrapolation method.

[2] National risk assessment reports on chromium (Virtanen, V. 2001), copper (Koivisto, S. 2001) and boron (Koivisto, S. 1998). The Predicted No Effect Concentration values (PNEC) set in the national risk assessments do not take into account background levels. * The national risk assessment for arsenic compound does not use a PNEC value for surface waters (Assmuth & Ylä-Mononen 2001). However, it refers to a concentration value reported in an International Programme of Chemical Safety (2001) report of 5 μg/l as protective of all aquatic organisms but the most sensitive algae.

[3] Critical limits set in Sweden (Alm et al. 1999). The limit refers to a concentration where adverse effects on biota might occur in sensitive waters.

[4] Environmental quality standards in the Netherlands (1999). The values refer to MPC (maximum permissible concentration) values that take into account background (bgl) values. The MPCs are non-statutory limit values determined on scientific basis. They refer to a concentration above which no negative effects are expected for surface water ecosystems.

[5] Canadian Environmental Quality Guidelines (http://www.ccme.ca/publications/can_guidelines.html)

[6] A compendium of working water quality guidelines for British Columbia. 1998 edition, updated August 2001. Chronic criterion or 30 day average value is used. (http://wlapwww.gov.bc.ca/wat/wq/Bcguidelines)

[7] Ontario Provincial Water Quality Objectives (PWQO). (http://www.agatlabs.com/ontario1.htm) The limit values are provincial water quality objectives (PWQO) based on total concentrations of unfiltered samples. *if natural background concentrations in water bodies unaffected by man-made inputs are greater than the numerical PWQO, the aluminium concentration in clay-free samples may not be increased more than 10 % of the natural background level. **at pH > 5.5 – 6.5 no condition should be permitted which would increase the acid soluble inorganic aluminium concentration in clay-free samples to more than 10 % above the natural background concentrations for waters representative of that geological area of the Province that are unaffected by man-made inputs.

[8] The critical limit value selected for this assessment is not indicative of the official EQS values, which are to be set for the National Priority Metals later.

7.4 Summary

The selection procedure for the metals assessed is presented in Annex 6. In table 7.4 a summary of the selection procedure is presented. Chromium, copper and zinc are proposed as National Priority Metals.

Table 7.4. Summary of the selection procedure for metals.

	Number of results in PIVET	How many results exceeded the critical limit value set in this assessment ?	How many results exceeded the critical limit value set in this assessment after results originating from certain and few regions were excluded (see chapter 7.3)?	How many results exceeded the sum of the estimated background and the critical limit value set in this work ?	Is the amount of exceeding results significant?
Ag	15	0 (0 %)	-	-	NO
Al	15699	*	*	*	NO
As	4972	90 (2 %)	42 (0.8 %)	-	NO
B	34	1 (3 %)	-	-	NO
Ba	35	0 (0 %)	-	-	NO
Be	15	0 (0 %)	-	-	NO
Co	823	288 (35 %)	0 (0 %)	-	
Cr	5101	657 (13 %)	346 (7 %)	289 (6 %)	YES
Cu	5684	1801 (32 %)	1100 (19 %)	735 (13 %)	YES
Fe	19583	*	*	*	NO
Mo	31	0 (0 %)	-	-	NO
Se	394	0 (0 %)	-	-	NO
V	1094	4 (0.4 %)	-	-	NO
Zn	7670	1358 (18 %)	*	923 (12 %)	YES

(The proportion of result from all results is given in brackets. *not assessed. For details see Annex 6)

The proposed National Priority Substances

8

The proposed National Priority Substances are presented in table 8.1. For biocides and industrial and consumer chemicals a summary of effects and exposure data is given in Annex 4. A brief presentation of the substances is given below.

Table 8.1. Proposed National Priority Substances.

Cas-number	Name
1.Chlorobenzenes	
108 907	Chlorobenzene
95 501	dichlorobenzene, 1,2-
106 467	dichlorobenzene, 1,4-
2. Terpenes	
138 863	D/L-Limonene; Dipentene;
5 989 275	D-Limonene;
80 568	alpha-Pinene; Pin-2-(3)-ene
65 996 965	Terpenes and Terpenoids, turpentine-oil, alpha-pinene fraction
91 770 808	Terpenes and Terpenoids, turpentine-oil, 3-carene fraction
3. Benzothiazole-ringed compounds	
120 785	Benzothiazole disulfide (MBTS) and its degradation product mercaptobenzothiazole MBT (cas 149 304))
21 564 170	2-(thiocyanomethylthio)-benzothiazole (TCMTB) and its degradation product mercaptobenzothiazole (MBT) (cas 149 304))
4. Phtalates	
85 687	Butylbenzylphtalate (BBP)
84 742	Dibutylphtalate (DBP)
5. Other industrial and consumer chemicals	
793 248	1,4-Benzenediamine, N-(1,3-dimethylbutyl)-N'-phenyl-
9016459; 26027383; 37205871; 68412544; 127087870	Nonylphenol ethoxylates
556 672	Octamethylcyclotetrasiloxane
108 463	Resorcinol; 3-hydroxyphenol
6. Biocides:	
52 517	Bronopol; 2-Bromo-2-nitropropane-1,3-diol
59 507	4-chloro-3-methylphenol
7. Pesticides	
60515	dimethoate
8018017	mancozeb and its degradation product ethylenethiourea (cas 96457)
94746	MCPA
41394052	metamitron
67747095	prochloraz
101200480	tribenuron-methyl
8. Metals	
7440473	Chromium and its compounds
7440508	Copper and its compounds
7440666	Zinc and its componds

8.1 Chloro-benzenes

- chlorobenzene
- 1,4-dichlorobenzenes
- 1,2-dichlorobenzenes

Three chlorinated benzenes were selected as national priority chemicals: chlorobenzene and two isomers of dichlorobenzene. Chlorobenzene is used as a hardener in rubber and plastic processing. The dichlorobenzenes are used in washing agents, lubricants, as formulation agents in insecticides and in the production of ceramics.

Penta- hexa-, and trichlorobenzenes are included in the list of priority hazardous substances identified on the community level in the context of the WFD.

8.2 Terpenes

- D-Limonene
- D/L-Limonene; Dipentene
- Pin-2-(3)ene; Alpha-pinene
- Terpenes and Terpenoids, turpentineoil, 3-carene fraction
- Terpenes and Terpenoids, turpentineoil, alpha-pinene fraction

Terpenes are a group of unsaturated aliphatic cyclic hydrocarbons, which, unlike petroleum distillates, are derived from plants. Many are important plant defensive compounds. In the selection procedure five terpene chemicals on the initial substance list showed properties that fulfilled the selection criteria. Alpha-pinene and 3-carene fractions are side products from the pulp industry. They are formed as crude sulphate turpentine is distilled into fractions. Alpha-pinene and 3-carene fraction are used in washing agents, as solvents and as raw material in the chemical industry. The alpha-pinene fraction is also used as a wood preservative in wood paints. The optical isomers of Limonene have wide dispersive use as paint hardeners, solvents, washing agents and lubricants. D-Limonene has also biocidal use as a disinfectant. Limonene is associated with the 3-carene/dipentene fraction in the pulp industry.

8.3 Benzothiazole –ringed compounds

- MBTS (Mercaptobenzothiazole disulfide; Benzothiazole disulfide)
- TCMTB (2-(thiocyanomethylthio)-benzothiazole)

MBTS has industrial use in glues, binding materials and pigments and in the production of rubber products. TCMTB is used as a biocide in the paper industry and as a wood preservative. Both compounds are reported to degrade into mercaptobenzothiazole (MBT), which is classified R50-53 based on acute toxicity data and not ready biodegradability.

8.4 Phtalates

- Dibutylphtalate
- Butylbenzylphtalate

Two phtalates were assessed in the third step of the selection process. Both substances have wide dispersive use as additives in plastic and rubber products. They are readily biodegradable in aquatic conditions. For Butylbenzylphtalate the reported BCF value in the EU risk assessment report is just under the cut-off value

for the selection criteria. For Dibutylphtalate high BCF values obtained with C-14 method have been reported. However, the EU risk assessment uses a much lower value (< 500). For both substances logKow values are > 4. Strictly speaking, if measured BCF values are preferred over log Kow-values, neither of the phthalates in question fulfil the selection criteria. However, the toxicity exhibited by the substances, the fact that they are suspected endocrine disrupters, their potential for bioaccumulation and their wide use support the decision to include them on the national list. Also the fact that Di(2-ethylhexyl)phthalate (DEHP) is included on the community list of hazardous substances, encourages to assess all three phthalates concurrently.

8.5 Other industrial and consumer chemicals

- N-(1,3-dimethylbutyl)-N'-phenyl-1,4-benzenediamine
- Nonylphenol ethoxylate
- Octamethylcyclotetrasiloxane
- Resorcinol (3-hydroxyphenol)

N-(1,3-dimethylbutyl)-N'-phenyl-1,4-benzenediamine is used as a additive in rubber products. Octamethyltetrasiloxane has wide use in, e.g. the production of chemicals and pharmaceuticals, in cosmetics, paints, prints and in plastic and silicone products. Resorcinol has wide use in, e.g. the production of plywood and rubber products, and as a hardener in glues.

Nonylphenolethoxylate is synthesized from nonylphenol, which is mentioned on the community list of priority hazardous substances. Both nonylphenols and nonylphenolethoxylates have wide dispersive use in Finland. According to the EU risk assessment rapport, the primary degradation products of nonylphenolethoxylate are nonylphenol mono- and diethoxylates and the respective carboxylic acids. Nonylphenolethoxylates are further degraded into nonylphenol. However, the overall conversion has a long half-life, propably in the order of 100 days. Therefore it is suggested to include nonylphenolethoxylate in order to ensure that the assessment of nonylphenols in water bodies will be accompanied with the assessment of nonylphenolethoxylate.

8.6 Biocides

- Bronopol
- 4-chloro-3-methylphenol

Three of the proposed National Priority Substances are used as biocides: the two substances mentioned above and TCMTB, which is mentioned under Benzothiazole – ringed compounds. Bronopol is used as a slimicide in paper and pulp industry. 4-chloro-3-methylphenol is an industrial disinfectant. In addition, 1,4-dichlorobenzene and D-limonene have biocidal use as moth insecticides and disinfectants, respectively.

8.7 Pesticides

Six pesticides are proposed as National Priority Pesticides. According to the draft Pesticide Risk Indicator, the selected pesticides are among the most important pesticides in respect to the environmental pressure they exhibit. The selected pesticides represent different use categories and different intrinsic properties (table 8.2).

Table 8.2. Proposed National Priority Pesticides and their use purposes.

Cas	Name	Category	Use
60515	dimethoate	insecticide	
8018017	mancozeb (and its degradation product ethylenethiourea (cas 96457)	funficide	potato
94746	MCPA	herbicide	cereal
41394052	metamitron	herbicide	sugar beat
67747095	prochloraz	fungicide	cereal
101200480	tribenuron-methyl	herbicide	cereal

8.8 Metals

Chromium, copper and zinc are proposed as National Priority Metals. According to the monitoring data from the PIVET register, and with respect to reported EQS values and estimated background levels the proposed metals show concentration levels that give reason for concern.

9 Analytical methodology available

The analytical methodology available in the Nordic countries for water, sediment, sludge and biological matrixes is presented in table 9.1.

Table 9.1. Analytical methodology available for the proposed substances for different matrixes (W = water, SE = sediment, BM = biological matrix, SL = sludge, S = soil)

CAS	Substance name	Availability of analytical methods in the Nordic countries[1]	Availability of analytical readiness in the laboratory of SYKE[2]
Chlorinated benzenes			
108 907	Chlorobenzene	W, SE, BM, SL	W, SE, SL
95 501	dichlorobenzene, 1,2-	W, SE, BM, SL	W, SE, SL
106 467	dichlorobenzene, 1,4-	see dichlorobenzene, 1,2	W, SE, SL
Terpenes			
138 863	D/L-Limonene; Dipentene	W, SE, BM, SL	-
5 989 275	D-Limonene;	see D/L-Limonene	-
80 568	Pin-2-(3)-ene; alpha-Pinene)	W, SE, BM, SL	-
Benzothiazole-ringed compounds			
120 785	Benzothiazoledisulfide (MBTS) (and its degradation product MBT (cas 149 304))	not covered in the enquiry	-
21 564 170	2-(thiocyanomethylthio)-benzothiazole (TCMTB) (and its deg radation product MBT (cas 149 304))	W	-
Phtalates			
84 742	Dibutylphtalate (DBP)	W, SE, BM, SL	W, under development for other matrixes
85 687	Butylbenzylphtalate (BBP)	W, SE, BM, SL	W, under development for other matrixes
Other industrial and consumer chemicals			
793 248	N-(1,3-dimethylbutyl)-N'-phenyl-1,4-benzenediamine	not covered in the enquiry	-
9 016 459	Nonylphenol ethoxylates	not covered in the enquiry	W, SE, SL
556 672	Octamethylcyclotetrasiloxane	not covered in the enquiry	-
108 463	Resorcinol; 3-hydroxyphenol	not covered in the enquiry	under development
Biocides			
52 517	Bronopol; 2-Bromo-2-nitropropane-1,3-diol	not available	-
59 507	4-chloro-3-methylphenol	W, SE, BM, SL	under development

CAS	Substance name	Availability of analytical methods in the Nordic countries[1]	Availability of analytical readiness in the laboratory of SYKE[2]
Pesticides			
94 746	MCPA	W, SE, BM, SL	W, S
67 747 095	prochloraz	W, SE, BM, SL	-
60 515	dimethoate	W, SE, BM, SL	W, S
8 018 017	mancozeb (and ethylenethiourea)	W, SE, BM, SL	-
41 394 052	metamitron	not covered in the enquiry	-
101 200 480	tribenuron-methyl	not covered in the enquiry	-
Metals			
7 440 473	Chromium and its compounds	not covered in the enquiry	W, BM, SE
7 440 508	Copper and its compounds	not covered in the enquiry	W, BM, SE
7 440 666	Zinc and its compounds	not covered in the enquiry	W, BM, SE

[1]According to an enquiry covering environmental laboratories in the Nordic countries (Kalevi et al. 2002)
[2]Personal communications with Kirsti Kalevi, Kaija Korhonen and Pirjo Sainio).

10 Conclusions

The selections procedure aimed at identifying substances that are of primary concerns on a national level and should be taken into consideration in all river basin districts in the country. A more profound examination on possible sources of the substances and the risks they may exhibit must be done on a local level. This can be done to the national substances identified in this work and the community level priority substances in parallel. In addition to the substances specified on the community level and substances identified in this work, other substances that might have significance on a local level should be identified. A national guidance document on the identification of pressures for river basin district authorities is under preparation.

Process born substances were beyond the scope of this work. The selection procedure implied is based on the production and import volumes obtained from the Finnish Chemical Product register, and does not therefore suit the prioritisation of process born substances. However, it is well known that some process born substances, e.g. dioxins and furanes threaten the good status of water bodies in Finland. The prioritisation of process born substances, and possible inclusion of them on the national priority list needs to be done separately from this work.

The list of National Priority Substances needs to be revised, as new information becomes available. This may lead to exclusion of substances present on the current National Priority Substances list, e.g. if monitoring data show that particular substances are not of national concern. Similarly substances may be included on the list if new data on the intrinsic properties of substances or e.g. increased use volumes indicate that they should be added.

In future work special attention must be given to those substances not covered in this work. Presently only about 900 chemicals in the KETU-register have data on both toxicity, bioaccumulation and biodegradation, and about 600 chemicals have data on two of the above mentioned criteria. This means that about 3900 chemicals classified as harmful to human health or the environment are left outside this selection procedure. Another group of substances that needs to be examined in relation to their impacts on the aquatic environment are substances that are not registered in KETU and have thus been excluded from this study. Such substance groups are chemicals that appear in imported articles, human and veterinary pharmaceuticals and cosmetics. The latter two groups are regulated by other legislation than the Chemicals act. However, this legislation does not sufficiently take into account their impacts on the environmental.

References

Alm, G., Tröjbom, M., Borg, H., Göthberg, A., Johansson, K., Lindeström, L., Lithner, G. 1999. Metaller. In Wiederholm (ed.). Bedömningsgrunder för miljökvalitet, Sjöar och vattendrag. Bakgrundsrapport 1. Naturvårdsverket rapport 4920, p 109 – 203. ISBB 91-620-4920-8, ISSN 0280-7298.

Al Soufi, R. 1999. Analysis of macropore flow in Sjökulla research field. Helsinki University of Technology, Laboratory of Water Resources Engineering, Espoo. ISBN 951 22 4547 7.

Assmuth, T. and Ylä-Mononen, L. 2001. Ecotoxicological risk assesment of arsenic and arsenical compounds: Addendum to the assessment by Assmuth , Braunschweiler et al. 1996, and evaluation of the data for the risk assessment provided by the task force and Outokumpu Oy in connection with the application for re-approval. 14.11.2001. Finnish Environmental Institute, Chemicals Division.

BKH Consulting Engineers 2000. Towards the establishment of a priority list of substances for further evaluation of their role in endocrine disruption. Delft, the Netherlands.

Braunschweiler, H. & S. Koivisto 2000. Fate and effects of chemicals in the Nordic environments related to the use of biocides. TemaNord 2000:550.

COM(2001)262 final. Communications from the Commission to the Council and the European Parliment on the implementation of the Community Strategy for Endocrine Disrupters – a range of substances suspected of interfering with the hormone systems of humans and wildlife (COM(1999)706), Brussels 14.6.2001.

EC 1982. Communication from the Commission to the Council on dangerous substances which might be included in List I of Council Directive 76/464/EEC. Official Journal of the European Community, No C 176/3.

EC 1996. Technical guidance document in support of commission directive 93/67/EEC on risk assessment for new notified substances and commission regulation (EC) No 1488/94 on risk assessment for existing substances, Part II environmental Risk Assessment. European Communities, Luxembourg, 1996. ISBN 92-827-8012-0.

EC 1999. Study on the prioritisation of substances dangerous to the aquatic environment. I. Revised proposal for a list of priority substances in the context of the water framework directive (COMMPS procedure). II. Assessment of options on the statistical treatment and evaluation of monitoring data within the COMMPS procedure. European Communities, Luxembourg 1999.

EC 2000. Guidance Document on elements for pollution reduction programmes under Article 7 of Council Directive 76/464/EEC. European Commision. Adonis No 710651. Brussels 2000.

EC 2002. Identification of potential PBTs or vPvBs among the IUCLID high production volume chemicals. Doc. ECB 4/14/02. 30.8.2002.

ECETOC 1997. Ecotoxicology of some inorganic borates. Special Report N. 11, Brussels 1997. European Centre for Ecotoxicology and Toxicology of Chemicals (ECETOC). ISSN-0773-8072-11

EU-RAR 2001. European Union Risk assessment report on Zinc Metal. Draft of 29.6.2001.

EU-RAR 2002. European Union Risk assessment report on Chromium. Final report January 2002.

Environmental quality standards in the Netherlands – A review of environmental quality standards and their policy framework in the Netherlands. 1999. Alpen aan den Rijn, Kluwer & The Ministry of Housing, Spatial Planning and the Environment. 627 p. ISBN 9014 08189 8

FMI 2002. Finnish Meteorological Institute: Climatological statistics for the period 1971-2000. http://www.fmi.fi/weather/climate_6.html

Greve, M.H., A. Helweg, M. Yli Halla, O.M. Eklo, Å.A. Nyborg, E. Solbakken, I. Öborn, J. Stenström, and E.T. (eds.). 1998. Nordic reference soils. 1. Characterisation and classification of 13 typical Nordic soils. 2. Sorption of 2,4 D, atrazine and glyphosate. TemaNord Environment 537: 1 106.

IMPRESS 2002. Guidance for the analysis of Pressures and Impacts in accordance with the Water Framework Directive, version 5.1.
International Programme of Chemical Safety (IPCS) 2001. Arsenic and Arsenic compounds (second edition). Environmental Health Criteria 224. WHO. In Assmuth and Ylä-Mononen 2001.
Heino, R. 1999. Virtual Finland: Finland's climate. Finnish Meteorological Institute. http://virtual.finland.fi/finfo/english/ilmaeng.html#sola.
Kalevi, K., Luotola, M., Suortti, A.-M. 2002. Haitallisten prioriteettiaineiden analytiikkavalmiuksien selvitys vuonna 2001. SYKE No 267 (available only electronically in htttp:/www.ymparisto.fi/palvelut/julkaisu/elektro/symon267/symom267.htm).
KEMI 1994. Supplementary Ecotoxicological Evaluation of TCMTB by Wenell, T. National Chemicals Inspectorate of Sweden. Hazard and Risk Assessment Division.
Kemira Kemi Ab 1996. Pehmeää vettä Suomessa. [Soft water in Finland] Tvätt & Vatten 3.
Koivisto, S. 1998. Ecotoxicological Risk Assessment of the Wood Preservative TIM-BOR. Finnish Environment Institute. Chemicals division. Memorandum 6.7.1998.
Koivisto, S. 2001a. Selection of hazardous substances for the risk management. Suomen ympäristökeskuksen moniste 239.
Koivisto, S. 2001b. Ecotoxicological risk assesment of copper: Addendum to the ecotoxicological hazard assesment by Hannu Braunschweiler 1996. 13.11.2001. Finnish Environment Institute, Chemicals Division.
Kortelainen, P. 1993. Content of total organic carbon in Finnish lakes and its relationship to catchment characteristics. Can. J. Fish. Aquat. Sci. 50: 1477 1483.
Kähäri, J., V. Mäntylahti, and M. Rannikko. 1987. Suomen peltojen viljavuus 1981 1985. [Soil fertility of Finnish cultivated soils in 1981 1985]. Viljavuuspalvelu Oy, Helsinki. Pages 104.
Lahermo, P., Väänänen, P., Tarvainen, T., Salminen, R. 1996. .Geochemical atlas of Finland, Part 3: Environmental geochemistry – stream waters and sediments. Geological Survey of Finland. Espoo. ISBN 951-690-678-8.
Landrum, P.F., M.D. Reinhold, S.R. Nihart, and B.J. Eadie. 1985. Predicting the bioavailability of organic xenobiotics to *Pontoporeia hoyi* in the presence of humic and fulvic materials and natural dissolved organic matter. Environ. Toxicol. Chem. 4: 459 467.
Lydersen, E. & Löfgren, S. 2002. Potential effects of metals in reacidified limed water bodies in Norway and Sweden. *Environmental Monitoring and Assesment 73: 155-176.*
Mannio, J. 2001. Responses of headwater lakes to air pollution changes in Finland. Monographs of the Boreal Environmental Research No. 18, 2001.
Mannio, J., Verta, M., Järvinen, O. 1993. Trace metal concentration in the water of small lakes, Finland. App. Geochemistry. Suppl. Issue 2: 57-59.
Martikainen, E. 1998. Environmental factors influencing effects of chemicals on soil animals. Studies at population and community levels. Department of Biological and Environmental Sciences. University of Jyväskylä, Jyväskylä. ISBN 951 39 0373 7.
McLusky, D.S., V. Bryant & R. Campbell 1986. The effects of temperature and salinity on the toxicity of heavy metals to marine and estuarine invertebrates. Oceanogr. Mar. Biol. Ann. Rev. 24: 481-520.
MITI 1992. Biodegradation and Bioaccumulation Data of Existing Chemicals based on the CSCL Japan (compiled under the supervision of Chemical Products Safety Division, Basic Industries Bureau, Ministry of International Trade & Industry, Japan) Edited by chemicals Inspection & testing Institute, Japan. October 1992.
Oikari, A., J. Kukkonen, and V. Virtanen. 1992. Acute toxicity of chemicals to *Daphnia magna* in humic waters. Sci. Tot. Environ. 117/118: 367 377.
Peltola, J. 2000. Haitallisten aineiden ympäristöseurannan kehittäminen. Suomen ympäristökeskuksen moniste 209.
Seppälä, T. 1997. Torjunta-aineiden käyttäytyminen Suomen ympäristöoloissa (the fate of pesticides in the Finnish environment). Suomen ympäristö 140. ISBN 952-11-0160-1.
Seppälä, T. 2001. Indicator for the use of environmentally hazardous chemicals. Interim report. January 31 2001. Finnish Environment Institute, Chemicals Division.
Sirkka, S. 2001 Addendum to the environmental risk assessment of the wood preservatives TANALITHE (3491) and TANAMIX (3491) in relation to the applications for re-approval. Memorandum. Finnish Environment Institute. 21.11.2001.

Skjelkvåle, B.L., Mannio, J., Wilander, A., Johansson, K., Jensen, J.P. , Moiseenko, T., Fjeld, E., Andersen, T., Vuorenmaa, J., Røyseth, O. 1999. Heavy metal survey in Nordic lakes; harmonised data for regional assessment of critical limits, Norwegian Institute for Water Research.Report sno 4039-99.

Skjelkvåle, B.L., Andersen, T., Fjeld, E., Mannio, J., Wilander, A., Johansson, K., Jensen, J.P. Moiseenko, T., 2001. Heavy Metal Surveys in Nordic Lakes; Concentrations, Geographic Patterns and relation to Critical Limits. Ambio 30 (1): 1-10.

Tyle, H, Larsen, H., Wedebye, E., Sijm, D., Pedersen Krog, T., Niemelä, J. Identification of potential PBTs and vPvBs by use of QSARs. Danish EPA, SHC/TS 2-3/029, Copenhagen 6.7.2002.

Verta, M., Mannio, J., Iivonen, P., Hirvi, J.-P., Järvinen, O., Piepponen, S. 1990. Trace metals in Finnish headwater lakes – effects of acidification and air-borne load. In: Acidification in Finland (eds. P.Kauppi, P. Anttila and K. Kenttämies), 883-908. Springer Verlag.

Vuorinen, P., Vuorinen, M., Peuranen, S., Tigerstedt, C., Veden rauta-, alumiini- ja humuspitoisuudet sekä happamuuden vaikutus harjukseen ja taimeneen laboratoriokokeissa (Consentrations of iron, aluminum and humic substances in water, and the effect of acidity on grayling and trout in laboratory experiments). In Saukkonen & Kenttämies (Eds.). 1995. Metsätalouden vesistövaikutukset ja niiden torjunta. Helsinki, Finnish Environment Institute. Suomen ympäristö No 2. 420 p. [Final report of METVE-project]. ISBN 952-11-0007-9. ISSN 1238-7312.

Virtanen, V. 2001. Addendum to the ecotoxicological hazard assessment of chromium and chromium trioxide made in 1996. Memorandum 13.11.2001. Finnish Environment Institute, Chemicals Division.

WRc 2002. Draft report "Implementation and Achievements for List I and List II substances" Ref. 12847-3.

Annex 1. Substances that lacked data on either toxicity, persistence or bioaccumulation in NSDB.

The substances where not included in the selection process on the basis of other criteria and appeared in the Finnish Register of Chemical Products -register (KETU).
* confidential

Cas number	**Name**	**Number of products**	**Import and production, tonnes** (KETU 2001)
No data on persistence in NSDB (version 1_7_5)			
Bioaccumulation: BCF ≥ 500 or logKow ≥ 4; Toxicity: LC/EC50 ≤ 10 mg/l, NOEC ≤ 1mg/l or secondary posoning ≥ 7 on NSDB scale.			
7 440 484	Cobalt	34	4 023
7 789 062	Chromic acid, strontium salt (1:1)	39	564
10 124 364	Sulfuric acid, cadmium salt (1:1)	*	*
205 992	Benz(e)acephenanthrylene	*	*
10 099 748	Nitric acid, lead(2+) salt	*	*
10 045 940	Nitric acid, mercury(2+) salt	*	*
65 996 896	Tar, coal, high-temp.	*	*
No data on bioaccumulation in NSDB (version 1_7_5)			
Persistence: ready or inherent biodegradation £ 70 %; T50 ³ 5d, BOD/COD £ 1; Toxicity: LC/EC50£ 10 mg/l, NOEC £ 1mg/l or secondary posoning ³ 7 on NSDB scale.			
630 080	Carbon monoxide	19	1 111 020
64 742 489	Naphtha (petroleum), hydrotreated heavy	708	34 637
72 623 860	Lubricating oils, petroleum, C15-30, hydrotreated neutral oil-based	4	13 990
64 742 956	Solvent naphtha (petroleum), light arom.	842	6 495
74 869 220	Lubricating oils	62	1 938
7 789 120	Chromic acid (H2Cr2O7), disodium salt, dihydrate	6	1 086
64 741 657	Naphtha (petroleum), heavy alkylate	41	634
64 742 547	Distillates (petroleum), hydrotreated heavy paraffinic	18	368
64 742 525	Distillates (petroleum), hydrotreated heavy naphthenic	65	195
64 742 650	Distillates (petroleum), solvent-dewaxed heavy paraffinic	39	145
64 742 536	Distillates (petroleum), hydrotreated light naphthenic	29	128
101 316 727	Lubricating oils (petroleum), C24-50, solvent-extd., dewaxed, hydrogenated	15	73
72 623 871	Lubricating oils, petroleum, C20-50, hydrotreated neutral oil-based	*	*
64 742 558	Distillates (petroleum), hydrotreated light paraffinic	10	20
8 032 324	Ligroine (petroleum ether)	13	17
64 741 895	Distillates (petroleum), solvent-refined light paraffinic	14	10
64 742 569	Distillates (petroleum), solvent-dewaxes light paraffinic	5	10
10 124 433	Sulfuric acid, cobalt(2+) salt (1:1)	4	7
64 741 884	Distillates (petroleum), solvent-refined heavy paraffinic	30	5
64 741 975	Distillates (petroleum), solvent-refined light naphthenic	14	3
94 733 161	Lubricating oils (petroleum), C18-40, solvent-dewaxed hydrogenated raffinate-based	*	*
64 741 964	Distillates (petroleum), solvent-refined heavy naphthenic	11	1
64 742 627	Residual oils (petroleum), solvent-dewaxed	8	1
64 742 014	Residual oils (petroleum), solvent-refined	5	0
64 741 953	Residual oils (petroleum), solvent deasphalted	*	*
7 784 421	Arsine	*	*
64 741 760	Distillates (petroleum), heavy hydrocracked	0	0
72 623 859	Lubricating oils, petroleum, C20-50, hydrotreated neutral oil-based, high-viscosity	0	0
101 316 705	Lubricating oils (petroleum), C17-32, solvent-extd., dewaxed, hydrogenated	0	0
7 778 430	Arsenic acid, disodium salt	0	0
No data on toxicity in NSDB (version 1_7_5)			
Persistence: ready or inherent biodegradation ≤ 70 %; T50 ≥ 5d, BOD/COD ≤ 1; Bioaccumulation: BCF ≥ 500 or logKow ≥ 4.			
68 333 880	Aromatic hydrocarbons, C9-17	*	*
3 194 556	Cyclododecane, 1,2,5,6,9,10-hexabromo-	0	0
4 979 322	2-Benzothiazolesulfenamide, N,N-dicyclohexyl-	0	0

Annex 2. Initial substance list for the identification of National Priority Substances in Finland

1 Water Framework Directive, Annex X
2 Dangerous Substances Directive, List I substances
3 Communications from the comission 1982: substances that might be included in list I of 76/464/EEC (EC 1982)
4 Selection of hazardous substances for the risk management (S. Koivisto 2001a)
5 Proposal for criteria for the selection of hazardous substances for environmental monitoring (Peltola, 2000)
6 HELCOM priority substances (Recommendation 19/5)
7 EU candidate list of endocrine disrupters (BKH Consulting Engineers, 2000)
8 PBT and vPvB substances identified by a QSAR exercise (Tyle, H. et al. 2002)
9 OSPAR list of substances of possible concern (Ospar 2002-17)
10 PBT and vPvB substances identified among the IUCLID HPV chemicals (EC 2002)
11 Individual metals and organic compounds on the EPER list (Commission Decision 2000/479/EC)
12 on EU priority lists (1-3) for RA (not used as selection criteria)

	CAS	Substance name	Initial selection criterion
1	50 282	Oestradiol	9
2	50 328	Benzo(a)pyrene	1; 4; 6; 9
3	50 635	1,4-pentanediamine, N(4)-(7-chloro-4-quinolinyl)-N(1), N(1)-diethyl-, phosphate (1:2)	9
4	52 517	Bronopol; 2-Bromo-2-nitropropane-1,3-diol	5
5	52 686	Trichlorofon	3
6	53 167	Oestron	9
7	53 703	Dibenz(a,h)anthracene	4; 9
8	56 235	Carbon tetrachloride	2; 3; 9
9	56 359	Tributyltinoxide; TBTO	3; 4; 5; 7; 9; 10
10	56 553	Benz(a)anthracene	4; 9
11	57 636	17-ethynylestradiol	9
12	58 899	Lindane; gamma-HCH	1; 3; 6; 7; 9
13	59 507	4-chloro-3-metylphenole	3; 7
14	60 515	Dimetoate	3;7
15	67 663	Trichloromethane; chloroform	1, 2; 3; 4; 6; 12; 11
16	67 721	Heksachloroethane	3; 4; 9
17	70 304	hexachlorophene	9
18	71 432	Benzene	1; 4; 12; 11
19	75 092	Dichloromethane	1; 3; 11
20	75 150	Carbon disulphide	7
21	75 525	Methane, nitro-	9
22	77 587	Di-n-butyltin Dilaurate	5
23	79 005	Trichloroethane	11
24	79 016	Trichloroethylene	2; 3; 4; 12; 11; 10
25	79 118	Chloroacetic acid	3; 12
26	79 947	Tetrabromobisphenol A	5; 9
27	80 057	Bisphenol A	5; 7; 9; 12
28	80 433	Dicumyl peroxide	4
29	80 568	Pin-2-(3)-ene; alpha-Pinene	4; 9
30	84 695	1,2-Benzenedicarboxylic acid, bis(2-methylpropyl) ester	9
31	84 742	Dibutylphtalate; DBP	5; 6; 7; 9; 12
32	85 018	Phenanthrene	4
33	85 449	1,3-Isobenzofurandione; phtalic acidanhydride	4
34	85 687	Butylbenzylphtalate; BBP	4; 7; 9; 12
35	86 500	Atsinphos-Methyl	3
36	87 616	1,2,3-Trichlorobenzene	1; 2; 3; 9; 11; 10

	CAS	Substance name	Initial selection criterion
37	87 683	Hexachlorobutadiene	1; 2; 3; 9; 11; 10
38	90 302	1-Anilinonaphthalene	4
39	90 437	o-Phenylphenol	7
40	91 178	Decahydronaphthalene	4
41	91 203	Naphtalene	1,3; 4; 12
42	91 576	Naphthalene, 2-methyl-	9
43	92 524	Biphenyl	3
44	92 842	10H-Phenothiazine	4
45	94 746	MCPA	3;5
46	95 501	1,2-Dichlorobenzene	3
47	96 231	1,3-Dichloro-2-propanol	3
48	96 764	2,4-Di-tert-butyl phenol; 2,4 DTBP	4; 10
49	98 544	4-tert-butylphenol	7; 9
50	98 839	Isopropenylbenzene	3
51	100 414	Ethylbenzene	3; 12
52	100 425	Styrene	5; 7; 12
53	100 447	Benzylchloride	3
54	100 663	Anisole	4
55	101 815	Benzylbenzene	4; 9
56	101 848	Diphenylether	4
57	104 405	4(para)-Nonylphenol	1; 6; 9
58	106 467	Dichlorobenzene, 1,4-	3; 4; 12
59	106 898	Epichlorhydrine	3
60	106 934	1,2-Ethylenebromide	3; 6
61	107 062	Dichloroethane, -1,2	1; 2; 3; 11
62	107 131	Acrylonitrile	6; 12
63	108 429	3-Chloroaniline	3
64	108 463	Resorcinol	7
65	108 770	Cyanuric Chloride	3
66	108 883	Toluene	3; 12
67	108 907	Chlorobenzene	3; 4
68	109 897	Diethylamine	3
69	111 659	Octane	4; 10
70	115 297	Alpha-endosulfan	1; 3; 4; 7; 9; 10
71	115 866	Triphenylphophate	4; 5
72	117 817	Di(2-ethylheksyl)phtalate; DEHP	1; 6; 7; 9; 12
73	117 840	Dioctylphtalate	4; 9; 12
74	118 741	Hexachlorobenzene	1; 2; 3; 6; 7; 9; 11; 10
75	119 642	1,2,3,4-Tetrahydronaphtalene	4
76	120 127	Anthracene	1; 3; 4; 9; 12; 10
77	120 365	Diklorproppi	3
78	120 785	Benzothiazole disulphide; MBTS	4
79	120 821	1,2,4-Trichlorobenzene	2; 3; 4; 9; 12; 11
80	121 755	Malathione	3;7
81	122 349	Simazine	1; 3; 4; 7; 10
82	124 403	Dimethylamine	3
83	126 738	Tributylphosphate	3
84	126 998	Chloroprene	3
85	127 184	Tetrachloroethylene; perchloroethylene; PER	2; 3; 7; 12; 11
86	127 913	Pin-2(10)-ene; beta-Pinene	4
87	128 370	2,6-Ditertbutyl-p-cresole; Butylhudroxytoluene	4; 10
88	128 698	Perylo[3,4-cd:9,10-c'd']dipyran-1,3,8,10-tetrone	9; 10

	CAS	Substance name	Initial selection criterion
89	133 142	Peroxide, bis(2,4-dichlorobenzoyl)*	8
90	137 268	Thiram	7
91	138 863	Dipentene; Limonene	4
92	140 669	Para-tert-Octylphenol	1,7; 9
93	142 825	Heptane	4
94	152 114	Benzeneacetonitrile, alpha-[3-[[2-(3,4-dimethoxyphenyl)ethyl] methylamino] propyl]-3,4-dimethoxy-alpha-(1-methylethyl)-, monohydrochloride	8
95	180 703	1,3,5-Trichlorobenzene	2; 3
96	205 823	Benzo(j)fluoranthene	4
97	206 440	Fluoranthene	1; 9
98	207 089	Benzo(k) fluoranthene	4; 9
99	301 100	Tin 2-Ethylhexanoate	5
100	301 122	Oxydemeton-Methyl	3
101	302 170	Chloral hydrate	3
102	315 377	Androst-4-en-3-one;17-[(1-oxoheptyl)oxy]-, (17.beta.)-	9
103	330 541	Diuroni	1; 7
104	330 552	Linuroni	3; 7
105	333 415	Diazinon	4, 7
106	470 906	Chlorphenvinfos	1
107	608 731	Hexachlorocyclohexane	1; 6; 9; 11
108	608 935	Pentachlorobenzene	1;9
109	688 733	Tributyltin compounds	1, 7
110	732 263	2,4,6-Tri-tert-butylphenol	9
111	793 248	1,4-Benzenediamine; N-(1,3-dimethylbutyl)-N'-phenyl-	4; 9; 10
112	818 086	Dibutyltinoxide	5
113	886 500	Terbutryn	5
114	1 071 836	Glyphosate	5
115	1 163 195	Decabromodiphenyl ether	5; 9; 12; 11
116	1 192 525	Ditiol	5
117	1 241 947	2-Ethylhexyldiphenylphosphate	4; 5; 9
118	1 330 207	Xylene	3; 4
119	1 330 785	Tri(methylphenyl)phosphate	4; 5; 9
120	1 338 438	Sorbitan monooleate (mono-9-octadecenoate	4; 10
121	1 582 098	Trifluraline	1; 3; 9
122	1 675 543	2,2'-bis(4-(2,3-epoxypropexy)phenyl)propane (2,2'-[(1-methylethy-lidene)bis(4,1-phenyleneoxymethylene)]bisoxirane	7
123	1 698 608	Chloridazon	3
124	1 806 264	Octylphenols	1
125	1 912 249	Atrazine	1, 7; 9
126	2 212 819	Peroxide, [1,3-phenylenebis(1-methylethylidene)]bis [(1,1-dimethylethyl)*	8
127	2 921 882	Chlorpyrifos	1; 4; 9
128	3 081 149	1,4-Benzenediamine, N,N'-bis(1,4-dimethylpentyl)-	9
129	3 380 345	Triclosan (5-Chloro-2-(2,4-dichlorophenoxy)phenol)	5
130	3 648 202	Diundecyl phtalate	4
131	3 846 717	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-	8; 9
132	3 861 470	Ioxynil	4
133	3 864 991	Phenol, 2-(5-chloro-2H-benzotriazol-2-yl)-4,6-bis (1,1-dimethylethyl)-	8
134	4 051 632	[1,1'-bianthracene]-9,9',10,10'-tetrone, 4,4'-diamino-	9
135	4 098 719	Isophorone diisocyanate	4; 9

	CAS	Substance name	Initial selection criterion
136	5 124 301	Methylene-bis(4-cyclohexyl icocyanate)	4;10
137	5 285 609	Benzenamine, 4,4'-methylenebis[N-(1-methylpropyl)-	8;9
138	5 989 275	(R)-1-methyl-4-(1-methylethenyl)cyclohexene; D-limonene	4;9
139	6 317 186	Methylene-bis-thiocyanate	5
140	6 842 155	1-propene, tetramer	9
141	6 846 500	2,2,4-Trimethyl-1,3-pentanediel diisobutyrate	4
142	7 439 921	Lead and its compounds	1;4;11
143	7 439 976	Mercury and its compounds	1;2;3;4;6;11
144	7 440 020	Nickel and its compounds	1;4;12
145	7 440 053	Palladium and its compounds	5
146	7 440 064	Platinium and its compounds	5
147	7 440 382	Arsene and its compounds	3;4; 11
148	7 440 439	Cadmium and its compounds	1;2;3;4;6;12; 11
149	7 440 473	Chromium and its compounds	4; 11
150	7 440 508	Copper and its compounds	4
151	7 440 666	Zinc and its compounds	4; 11
152	7 782 492	Selenium and its compounds	6
153	7 786 347	Mevinphos	3
154	8 001 589	Creosote oil	4
155	8 018 017	Mankozeb	5
156	9 002 931	Octylphenol ethoxylate	
157	9 016 459	Nonylphenol ethoxylate	6; 9
158	10 108 642	Cadmium chloride	9
159	10 584 982	2-Ethylhexyl-4,4-dibutyl-10-ethyl-7-oxo-8-oxa-3,5-dithia-4 -stannatetradecanoate	5
160	10 605 217	Carbendazim	7
161	12 002 481	Trichlorobenzenes	1;3;11
162	13 356 086	Distannoxane, hexakis(2-methyl-2-phenylpropyl)-	9
163	13 475 826	Heptane, 2,2,4,6,6-pentamethyl-	9
164	13 680 358	Benzenamine, 4,4'-methylenebis[2,6-diethyl-	8;9
165	14 816 183	Phoxim	3;9
166	15 546 119	Di-n-Butylbis(methyl maleate)tin	5
167	15 571 581	Di-n-octyltin bis(ethylhexylthioglycolate)	5;10
168	15 972 608	Alachlor	1, 7
169	16 938 220	Hexane, 1,6-diisocyanato-2,2,4-trimethyl-	9
170	17 540 759	Phenol, 2,6-bis(1,1-dimethylethyl)-4-(1-methylpropyl)-	9
171	20241763	9,10-Anthracenedione, 1,8-dihydroxy-4-nitro-5-(phenylamino)-	8
172	21 087 649	Metribuzine	5
173	21 564 170	TCMTB; 2-(thiocyanomethylthio)-benzothiazole)	5
174	21 850 442	Benzene, 1,1'-(1-methylethylidene)bis[3,5-dibromo-4- (2,3-dibromopropoxy)-	9
175	22 832 877	1H-imidazole, 1-[2-(2,4-dichlorophenyl)-2-[(2,4-dichlorophenyl) methoxy]ethyl]-, mononitrate	9
176	22 916 478	1H-imidazole, 1-[2-(2,4-dichlorophenyl)-2-[(2,4-dichlorophenyl) methoxy]ethyl]-	9
177	23 593 751	Clotrimazole	9
178	25 013 165	Butylhydroxyanisol	9
179	25 057 890	Bentazone	5
180	25 154 523	Phenol, nonyl	7;9;12
181	25 155 253	Peroxide, [1,3(or 1,4)-phenylenebis(1-methylethylidene)] bis[(1,1-dimethylethyl)*	8
182	25 637 994	Hexabromocyclododecane	5;12; 10
183	25 973 551	Phenol, 2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylpropyl)-	8;9

	CAS	Substance name	Initial selection criterion
184	26 140 603	Terphenyl	4;9;10
185	26 225 796	Ethofumesate	5
186	26 354 187	2-Propenoic acid, 2-methyl-, methyl ester Stannane, tributylmeacrylate	7
187	27 107 897	Octyltin tris(thioglycolic acid) 2-ethylhexyl ester	5
188	28 772 567	Bromadioloni	4;9
189	32 534 819	Pentabromodiphenyl ether	1;5;9;12;11
190	32 536 520	Octabromodiphenyl ether	1;5;9;12;11
191	34 123 596	Isoproturon	1
192	36 643 284	Tributyltin-cation	1
193	38 640 629	Naphthalene, bis(1-methylethyl)-	9
194	41 556 267	Decanedioic acid, bis(1,2,2,6,6-pentamethyl-4-piperidinyl) ester	4
195	42 615 292	Linearalkyl benzene sulphonate; LAS	4
196	50 471 448	2,4-oxazolidinedione, 3-(3,5-dichlorophenyl)-5-ethenyl-5-methyl-	9
197	51 000 523	Neodecanoic acid, ethenyl ester	4;9;10
198	52 315 078	Cyclopropanecarboxylic acid, 3-(2,2-dichloroethenyl)-2,2-dimethyl-, cyano(3-phenoxyphenyl)methyl ester	9
199	52 645 531	Permethrin	4;9
200	52 918 635	Deltametrine	4;9
201	56 073 075	Difenacoum	4
202	56 073 100	Brodifacoum	4
203	60 207 901	Propikonazole	5
204	61 789 284	PAH from creosote oil	4
205	63 449 398	Paraffin waxes and hydrocarbon waxes, chloro	4;9
206	64 381 971	1,4-Benzenediamine, N,N,N'-tris(1-methylpropyl)-	9
207	64 742 047	Extracts, heavy paraffinic distillate solvent	4;10
208	64 742 058	Extracts (petroleum), light paraffinic distillate solvent	4
209	65 907 304	Furathiocarb	4
210	66 230 044	Esfenvaleraatti	4;9
211	66 332 965	Flutolanil	4
212	67 375 308	Alpha-cypermethrin	4;9
213	67 564 914	Fenpropimorph	4
214	67 747 095	Prochloraz	5, 7
215	67 762 258	Alcohols, C12-18	4
216	67 969 691	1-Octanesulfonamide, N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-[2-(phosphonooxy)ethyl]-, diammonium salt	9
217	68 359 375	Cyfluthrin	4;9
218	68 515 480	1,2-Benzenedicarboxylic acid, di-C8-10-alkyl esters, branched	9;12
219	68 937 417	Phenol, isopropylated, phosphate (3:1)	8
220	79 622 596	Fluazinam	5
221	84 852 153	4-Nonylphenol, branched	1;4;9;12
222	85 409 172	Tributyltin naphthenate	4;5,7;9
223	85 535 848	Alkanes, C10-13, chloro	1;4;6; 9;12; 10
224	85 535 859	alkanes, C14-17, chloro	9;12
225	89 347 091	1,3,4-Thiadiazole, 2,5-bis(tert-nonyldithio)-	8
226	90 640 827	Anthracene oil, anthracene-low	9;10
227	91 465 086	Lambda-cyhalotrin	4
228	106 990 436	1,3,5-Triazine-2,4,6-triamine, N,N'''-[1,2-ethane-diylis[[[4,6-bis [butyl(1,2,2,6,6-pentamethyl-4	4
229	111 479 051	Propaquizafop	4
230	65996965	Terpenes and Terpenoids, turpentineoil, alphapinene fraction	10
231	78795	Isoprene	10
232	25103586	Tertdodecanethiol	10

	CAS	Substance name	Initial selection criterion
233	91770808	Terpenes and Terpenoids, turpentineoil, 3-carene fraction	10
234	93685815	Hydrocarbons, C4, 1,3butadienefree, polymd., triisobutylene fraction, hydrogenated	10
235	25155300	Sodium dodecylbenzenesulphonate, pure	10
236	90622574	Alkanes, C9-12iso	10
237	556672	Octamethylcyclotetrasiloxane	10
238	112903	(Z)Octadec9enylamine	10
239	12578120	Dioxobis(stearato)trilead	10
240	127479	Retinyl acetate	10
241	91082176	Sulfonic acids, C1021alkane, Ph esters	10
242	6683198	Pentaerythritol tetrakis(3(3,5ditertbutyl4hydroxyphenyl)propionate)	10
243	74895	Methylamine, in aqueous solution	10
244	84617	Dicyclohexyl phthalate	10
245	61788327	Terphenyl, hydrogenated	10
246	5102830	2,2'[(3,3'dichloro[1,1'biphenyl]4,4'diyl)bis(azo)]bis [N(2,4dimethylphenyl)3oxobutyramide]	10
247	557051	Zinc distearate	10
248	68526863	Alcohols, C1114iso, C13rich	10
249	1843056	Octabenzone	10
250	88062	2,4,6-Trichlorophenol	10
251	110305	N,N'ethylenedi(stearamide)	10
252	112845	(Z)docos13enamide	10
253	112925	Octadecan1ol	10
254	2082793	Octadecyl 3(3,5ditertbutyl4hydroxyphenyl)propionate	10
255	5567157	2,2'[(3,3'dichloro[1,1'biphenyl]4,4'diyl)bis(azo)]bis [N(4chloro2,5dimethoxyphenyl)3oxobutyramide]	10
256	11138606	Decanoic acid, ester with 2ethyl2(hydroxymethyl)1,3 propanediol octanoate	10
257	25311711	Isofenphos	10
258	26898179	Dibenzyltoluene	10
259	27193868	Dodecylphenol	10
260	61789795	Amines, bis(hydrogenated tallow alkyl)	10
261	61790510	Resin acids and Rosin acids, sodium salts	10
262	67989235	1,2,4-Benzenetricarboxylic acid, decyl octyl ester	10
263	68442682	Benzenamine, Nphenyl, styrenated	10
264	68515402	1,2-Benzenedicarboxylic acid, benzyl C79branched and linear alkyl esters	10
265	68515479	1,2-Benzenedicarboxylic acid, diC1114branched alkyl esters, C13rich	10
266	83846439	Benzoic acid, 2hydroxy, monoC>13alkyl derivs., calcium salts (2:1)	10
267	84989413	2Oxetanone, 3C1216alkyl4C1317alkylidene derivs.	10
268	91745469	Amines, C1214alkyl, reaction products with hexanol, phosphorus oxide (P2O5), phosphorus sulfide (P2S5) and propylene oxide	10
269	121 142	Benzene, 1-methyl-2,4-dinitro-	9; 10
270	603 350	Triphenyl phosphine	9; 10
271	3 147 759	Phenol, 2-(2H-benzotriazol-2-yl)-4-(1,1,3,3-tetramethylbutyl)-	9
272	17 354 142	9,10-Anthracenedione, 1,4-bis(butylamino)-	9
273	28 553 120	1,2-Benzenedicarboxylic acid, diisononyl ester	9
274	74 070 465	Benzenamine, 2-chloro-6-nitro-3-phenoxy-	9
275	90 640 861	Distillates, coal tar, heavy oils	9; 10
276	301020	Oleamide	10
277	30399849	Isooctadecanoic acid	10
278	91081537	Rosin, reaction products with formaldehyde	10
279	87 865	Pentachlorophenol	1, 2

Annex 3A. Selection of WFD priority substances by COMMPS procedure

[Modified from Koivisto 2001a]
The Water Framework Directive (WFD) requires the Commission to establish a priority list of substances based on their risk to the aquatic environment and to human health via the aquatic environment. For those priority substances the Commission has to propose community wide environmental quality standards (EQS) and measures to progressively reduce releases. The first list has been established by Decision 2455/2001/EC of the European Parliament and of the Council amending Annex 10 to the WFD Directive. A Combined Monitoring-based and Modelling-based Priority Setting scheme (COMMPS) was used to select the substances (EC1999).

COMMPS procedure

The COMMPS procedure is based on an approach to combine an automated relative risk-based ranking and subsequent expert judgement (simplified risk assessment). The COMMPS procedure comprises the five steps:

1. Selection of candidate substances subject to the ranking procedure,
2. Calculation of exposure scores,
3. Calculation of effects scores,
4. Computation of the risk-based score,
5. Recommendation of priority substances.

The candidate substances are selected from various official lists and monitoring programmes and included 658 substances. The exposure score is based on monitoring or modelling data, while effects scores are derived from test data. Risk scores are calculated by multiplying the exposure and effect score for each substance. Different lists are established; monitoring-based list for the water phase, modelling based list, monitoring based list for sediment, several monitoring based lists for metals and metal compounds. 320 substances occurring on the different lists were accepted for the ranking. A final selection of priority substances are made from these lists by expert judgement.

Table 1. List of priority substances in the field of water policy (Annex X to the Water Framework Directive). *

	CAS number	EU number	Name of priority substance	Identified as priority hazardous substance
(1)	15972-60-8	240-110-8	Alachlor	
(2)	120-12-7	204-371-1	Anthracene	(X)***
(3)	1912-24-9	217-617-8	Atrazine	(X)***
(4)	71-43-2	200-753-7	Benzene	
(5)	n.a.	n.a.	Brominated diphenylethers (**)	X****
(6)	7440-43-9	231-152-8	Cadmium and its compounds	X
(7)	85535-84-8	287-476-5	C_{10}-$_{13}$-chloroalkanes (**)	X
(8)	470-90-6	207-432-0	Chlorfenvinphos	
(9)	2921-88-2	220-864-4	Chlorpyrifos	(X)***
(10)	107-06-2	203-458-1	1,2-Dichloroethane	
(11)	75-09-2	200-838-9	Dichloromethane	
(12)	117-81-7	204-211-0	Di(2-ethylhexyl)phthalate (DEHP)	(X)***
(13)	330-54-1	206-354-4	Diuron	(X)***
(14)	115-29-7	204-079-4	Endosulfan	(X)***
	959-98-8	n.a.	(alpha-endosulfan)	
(15)	206-44-0	205-912-4	Fluoroanthene(*****)	
(16)	118-74-1	204-273-9	Hexachlorobenzene	X
(17)	87-68-3	201-765-5	Hexachlorobutadiene	X
(18)	608-73-1	210-158-9	Hexachlorocyclohexane	X
	58-89-9	200-401-2	(gamma-isomer, Lindane)	
(19)	34123-59-6	251-835-4	Isoproturon	(X)***
(20)	7439-92-1	231-100-4	Lead and its compounds	(X)***
(21)	7439-97-6	231-106-7	Mercury and its compounds	X
(22)	91-20-3	202-049-5	Naphthalene	(X)***
(23)	7440-02-0	231-111-4	Nickel and its compounds	
(24)	25154-52-3	246-672-0	Nonylphenols	X
	104-40-5	203-199-4	(4-(para)-nonylphenol)	
(25)	1806-26-4	217-302-5	Octylphenols	(X)***
	140-66-9	n.a.	(para-tert-octylphenol)	
(26)	608-93-5	210-172-5	Pentachlorobenzene	X
(27)	87-86-5	201-778-6	Pentachlorophenol	(X)***
(28)	n.a.	n.a.	Polyaromatic hydrocarbons	X
	50-32-8	200-028-5	(Benzo(a)pyrene),	
	205-99-2	205-911-9	(Benzo(b)fluoroanthene),	
	191-24-2	205-883-8	(Benzo(g,h,i)perylene),	
	207-08-9	205-916-6	(Benzo(k)fluoroanthene),	
	193-39-5	205-893-2	(Indeno(1,2,3-cd)pyrene)	
(29)	122-34-9	204-535-2	Simazine	(X)***
(30)	688-73-3	211-704-4	Tributyltin compounds	X
	36643-28-4	n.a.	(Tributyltin-cation)	
(31)	12002-48-1	234-413-4	Trichlorobenzenes	(X)***
	120-82-1	204-428-0	(1,2,4-Trichlorobenzene)	
(32)	67-66-3	200-663-8	Trichloromethane (Chloroform)	
(33)	1582-09-8	216-428-8	Trifluralin	(X)***

* Where groups of substances have been selected, typical individual representatives are listed as indicative parameters (in brackets and without number). The establishment of controls will be targeted to these individual substances, without prejudicing the inclusion of other individual representatives, where appropriate.

** These groups of substances normally include a considerable number of individual compounds. Presently, appropriate indicative parameters cannot be given.

*** This priority substance is subject to a review for identification as possible "priority hazardous substance".

The Commission will make a proposal to the European Parliament and Council for its final classification not later than 12 months after adoption of this list. The timetable laid down in Article 16 of Directive 2000/60/EC for the Commission's proposals of controls is not affected by this review.

**** Only Pentabromobiphenylether (CAS number 32534-81-9)

***** Fluoranthene is on the list as an indicator of other, more dangerous Polyaromatic Hydrocarbons

Annex 3B. Selection of PBT-substances used in Finland

The following is a brief summary of the selection procedure described in Koivisto 2001a. Toxic substances that are not readily biodegradable and have liability to bioaccumulate were searched from the Nordic Substances Database version 1.7.5. The cut-off values used in the selection were the following:

Table 1. PBT-criteria used in the selection of PBT-substances.

Category	Criteria	Cut-off values
Biodegradation	Substances that are not readily biodegradable	Degradation $\leq$ 70 % in the ready test, DT50 $\geq$ 5 days or BOD/COD $\leq$ 1
Bioaccumulation	Substances having liability to bioaccumulate	BCF $\geq$ 500 or Log $K_{ow} \geq$ 4
Toxicity	Acute or chronic aquatic toxicity	LC/EC50 $\leq$ 10 mg/l, NOEC $\leq$ 1 mg/l or R50

Not readily biodegradable substances may be persistent in the Finnish conditions and should be selected as priority chemicals. Hence, also chemicals that pass the criteria for inherent biodegradation were selected. The inclusive criteria on biodegradation is based on the assumption that biodegradation is retarded in most part of the year in the Finnish environmental conditions. Substances that are easily hydrolysed, but not readily biodegradable, are considered as persistent because hydrolysis does not necessarily lead to complete degradation. Hydrolysis, however, contributes to degradation in the biodegradation experiments of organic compounds and is, thus, taken into account to some degree. Photolytical degradation is ignored in the selection of Finnish priority chemicals due to the negligible phototransformation during winter, which is the longest season in Finland.

Annex 3C. Selection and prioritisation of hazardous substances in OSPAR and HELCOM

[Modified from Koivisto, S. 2001a and http://www.ospar.org/eng/html/welcome.html]

The international agreements, OSPAR (the Convention for the protection of the Marine Environment of the Northeast Atlantic, http://www.ospar.org) and HELCOM (Convention on the Protection of the Marine Environment of the Baltic Sea Area (http://www.helcom.fi), obligate the contracting states including Finland to protect marine waters from pollution. The objective of both HELCOM and OSPAR strategies with regard to hazardous substances is to prevent pollution of maritime area by continuously reducing discharges, emissions and losses of hazardous substances, with the ultimate aim of achieving concentrations in the marine environment near background values for naturally occurring substances and close to zero for man-made synthetic substances.

In order to tackle the hazardous substances which are of possible concern to the marine environment, and to prioritise the substances of highest concern for immediate action, OSPAR has developed a selection and prioritisation mechanism. This is described in the publication on the Dynamic Selection and Prioritisation Mechanism for Hazardous Substances (DYNAMEC) as published on the OSPAR web site (http://www.ospar.org/eng/html/welcome.html).

The selection and prioritisation mechanism consists of 3 basic steps:

step 1: an initial selection step which by a worst case screening procedure identifies certain hazardous substances on the basis of their intrinsic hazardous properties of persistence, liability to bioaccumulate and toxicity (P, B and T). These have been placed on the "List of Substances of Possible Concern" because they could adversely affect marine ecosystems;

step 2: a step which ranks these substances of possible concern according to their actual occurrence and effects in the marine environment;

step 3: a step which selects those substances from the ranked list judged to require priority action by OSPAR. Current OSPAR List of Chemicals for Priority Action.

A number of substances which do not meet the full P, B and T criteria have already been added to the List of Substances of Possible Concern because it has been recognised that they give rise to a similar level of concern (for example, endocrine disruptors). The procedures with which OSPAR may add further substances to the list on the basis of equivalent concern are still under development.

The List of Substances of Possible Concern consists of the substances which have been selected on the basis of their intrinsic hazardous properties (step 1). The substances on the List of Chemicals for Priority Action are those which the OSPAR Commission has determined to require priority action, based primarily on recommendations from DYNAMEC's ranking process and expert judgement as to which substances represent the highest concern due to the amount produced, the degree of hazardous properties and/or the actual occurrence in the marine environment (steps 2 and 3). As the work of OSPAR progresses, it is envisaged that the List of Chemicals for Priority Action will be further updated with substances from the List of Possible Concern in order that the objectives of the Strategy can be progressively met.

The substances on the OSPAR List of Substances of Possible Concern have been identified by a worst case screening of a number of databases with experimental data on P, B and T. However, when experimental data are not available, substances have been identified by employing different models (QSARs: Quantitative Structure Activity Relationships) which estimate these values on the basis of chemical structure. The screening is not exhaustive as not all possible data sources have been available or because of limitations in the models employed. Furthermore, some substances may falsely have been selected due to data errors or outliers.

The HELCOM list of priority substance (recommendation 19/5) is based on the DYNAMEC procedure and covers all substances on the OSPAR priority list for Action (1998-16).

Annex 3D. Identification of potential PBTs and vPvBs by use of QSARs

In the work accomplished by Danish EPA QSAR algorithms were used to identify potential vPvBs and PBTs (Tyle, H. 2002). The substances considered were basically all discrete organic substances on EINECS, i.e. around 50 000 chemicals. Most focus was put on substances with a total European production volume of more than 10 tons per year per manufacturer. The criteria presented in the revised TGD (chapter on the marine environment) was used as criteria for PBT and vPvB substances (table1). The exercise identified 134 potential PBT and vPvB substances. Of these only 66 are actually registered on the Nordic market.

Table 1. Criteria for identification of PBT and vPvB substances

	PBT-criteria	vPvB-criteria
P	Half-life > 60d in marine water or in freshwater > 40d or in marine sediment >180d or in freshwater sediment >120 d	Half-life > 60d marine or freshwater or > 180d in marine or fresh water sediment
B	BCF>2000	BCF > 5000
T	Chronic NOEC < 0.01 mg/l or CMR or endocrine disrupting effects	Not applicaple

Annex 4. Substances selected in step 2 of the selection procedure for further examination (metals and pesticides are not included)

Abbreviations used in Annex 4 (see also general abbreviations, data sources listed in chapter 5.3.1 and references)

Column 3: Initial selection criterion

1	Water Framework Directive
2	Dangerous Substances Directive, List I substances
3	Communications from the Comission 1982: substances that might be included in list I of 76/464/EEC (EC 1982)
4	Selection of hazardous substances for the risk management (Koivisto, 2001a)
5	Proposal for criteria for the selection of hazardous substances for environmental monitoring (Peltola, 2000)
6	HELCOM priority substances (Recommendation 19/5)
7	EU candidate list of endocrine disrupters (BKH Consulting Engineers, 2000)
8	PBT and vPvB substances identified by a QSAR exercise (Tyle, H. et al. 2002)
9	OSPAR list of substances of possible concern (Ospar 2002-17)
10	PBT and vPvB substances identified among the IUCLID HPV chemicals (EC 2002)
11	Individual metals and organic compounds on the EPER list (Commission Decision 2000/479/EC)
12	Included on EU priority lists (1-3) for RA (not used as selection criteria)

Column 7: Classification according to Annex I of EU Directive 67/548/EEC

N	Dangerous to the environment
R50	Very toxic to aquatic organisms
R51	Toxic to aquatic organisms
R52	harmful to aquatic organisms
R53	May cause long-term adverse effects in the aquatic environment
N.C.	not classified based on data
NF	not found

Column 9: PBT-properties / other comments

EU-RAR	European Union Risk Assessment Report: conclusion i) There is need for further information and/or testing conclusion ii) There is at present no need for further information and/or testing and for risk reduction measures beyond those which are being applied already conclusion iii) There is need for limiting the risks; risk reduction measures which are already being applied shall be taken into account
SYKE-EE	Finnish Environmental Institute, National Ecotoxicological Evaluation
*	Use volume information on substances that occur in products produced or imported by less than four companies is confidential
CERIJ	Data from the homepages of Chemicals Evaluation and Research institute, Japan (http://www.cerij.or.jp/ceri_en/index_e.shtml)
OSPAR	Ospar fact sheet (http:/www.ospar.org)
QSAR	Result based on QSAR modelling
MITI I	ready biodegradation test in MITI 1992
MITI II	inherent biodegradation test in MITI 1992
COM(2001)262 table 2	Substances with evidence of ED or potential ED which are neither restricted nor currently being addressed under existing Community legislation
COM(2001)262 table 4	Substances with insufficient data in the BKH Report
IUCLID	International Uniform Chemical Database
Aquire	Ecotox/Aquire Database (http://www.epa.gov/ecotox/)
ND	Not defined

ANNEX 4/2

Part I. Substances proposed as National Priority Substances

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
I. Chloro-benzenes									
108 907	Chlorobenzene	3;4	599	14	550	R10 Xn; R20 N; R51-53	Polyurethan hardener component in aircraft industry, hardener in rubber and plastic processing, in glues and binding materials.	Toxic to aquatic organisms (R51). Not inherently biodegradable in MITI II test (0 % by BOD, MITI1992). BCF 0.25 - 450 (HSDB), 3-40 (MITI 1992).	Reported BCF values $<$ 500. However, due to wide use and significant use volume inclusion deemed necessary.
95 501	dichlorobenzene, 1,2-	3	6793	9	3	Xn; R22 Xi; R36/37/38 N; R50-53	Use in washing agents, lubricants, production of ceramics	Very toxic to aquatic organisms (R50). Not readily biodegradable (0% by BOD in MITI I test, MITI 1992). Bioaccumulation: logKow $=$3.4 (CHEMFATE), BCF $=$90-260 (MITI 1992), 270-560 (HSDB). See also 1,4-dichlorobenzene.	Very toxic and persistent
106 467	dichlorobenzene, 1,4-	3;4;12	85	5	105	Xi; R36 N; R50-53	Use in washing agents, production of cosmetics, in moth repellents.	Very toxic (R50). Not readily biodegradable MITI-test (38% by BOD, MITI, CERIJ). Bioaccumulation: BCF $=$ 33-190 (MITI, CERIJ), 60-720 (HSDB).	Very toxic and persistent
2. Terpenes									
138 863	D/L-Limonene; Dipentene; (R/S) -1-methyl-4- (1-methylethenyl) cyclohexene	4	9005	66	392	R10 Xi; R38 R43 N; R50-53	Use as paint hardener (automotive services, boat and ship manufacture and repair), solvent in washing agents.	Very toxic to aquatic organisms (R50). Biodegradation Results from MITI I-test inconsistent (41-98%). Based on estimated logKow (4.2) bioconcentration factors 246, 262 (HSDB), 661 (QSAR/Danish EPA) have been calculated.	Very toxic and bioaccumulable, probably persistent.
5 989 275	D-Limonene; (R)-1-methyl-4- (1-methylethenyl) cyclohexene	4;9	6946	43	44	R10 Xi; R38 R43 N; R50-53	Biocidal and industrial use. Biocidal use as a desinfectant in washing agents. In lubricants.	Very toxic to aquatic organisms (R50). Inconsistent data on biodegradation (OSPAR). Not inherently biodegradable (OSPAR). Bioaccumulation:log Kow$=$ 4-5 (OSPAR), BCF$=$661 (QSAR/OSPAR).	Very toxic and bioaccumulable, probably persistent.
80 568	Pin-2-(3)-ene; alpha-Pinene	4;9	77	4	5 925	NF	Side product in paper and pulp industry. Solvent and washing agent. Raw material for chemicals industry.	Very toxic to aquatic organisms (OSPAR, IUCLID). Not readily biodegradable (OSPAR). Not inherently biodegradable (OSPAR). Bioaccumulation: logKow$=$4.8 (HSDB, IUCLID), BCF$=$718, 1047 (OSPAR).	Very toxic, persistent and bioaccumulable
65 996 965	Terpenes and Terpenoids, turpentine-oil, alpha-pinene fraction	10 (vPvP)	ND	7	7 268	NF	Side product in paper and pulp industry. Wood preservative (used as a paint). Solvent, washing agent, raw material for chemical industry.	Toxic to aquatic organisms (IUCLID). Not readily biodeg radable (2.2 % in OECD301D test, IUCLID). Bioaccumulation: logKow$=$5.3-5.7 (IUCLID), no BCF values available.	See alpha-pinene

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
91 770 808	Terpenes and Terpenoids, turpentine-oil, 3-carene fraction	10 (vPvB)	ND	*	*	NF	Side product in paper and pulp industry. Solvent, washing agent. Raw material in chemical industry.	Toxic to aquatic organisms (IUCLID). Bioaccumulation: logKow = 4.5-5.5 (IUCLID). Not readily biodegradable (3.8 % degradation in OECD301 test, IUCLID).	
3. Benzothiazole-ringed compounds									
120 785	Benzothiazole disulfide (MBTS) (and its degradation product mercapto-benzothiazole MBT (cas 149 304))	4	12	10	131	R31 R43 N; R50-53	In glues, binding materials and pigments. Used in production of rubber products.	Very toxic to aquatic organisms. Not readily biodegradable in MITI test (0.8 % by BOD, MITI 1992). (Hydrolyses to form mercaptobenzothiazole (MBT) which is classified as N; R50-53. MBT is also a degradation product of TCMTB). Bioaccumulation: BCF = 1-51 (MITI1992), 776 (QSAR/NSDB).	Very toxic and persistent.
21 564 170	(2-(thiocyanomethylthio) -benzothiazole TCMTB (and its degradation product mercaptobenzothiazole MBT (cas 149 304))	5	2236	14	14	T+; R26 Xn; R22 Xi; R36/38 R43 N; R50-53	Biocidal use in paper industry. Wood preservative, desinfectant.	Very toxic to aquatic organisms (R50, KEMI 1994). Not readily biodegradable (0 % by BOD, MITI1992). Photolysis seems to be the major fate pathway in waters, biodegradation rate not studied in low sunlight conditions. Transformation products of TCMTB appear to be recalcitrant to degradation in natural waters. MBT reported as the major transformation product. Studies on the toxicity to microorganisms indicate that the transformation products are toxic. (KEMI 1994). Bioaccumulation: BCF = 11-268 (MITI1992), 184 (KEMI 1994).	Very toxic and persistent.
4. Phtalates									
85 687	Butyl-benzylphtalate (BBP)	4; 7;9; 12		10	101	postponed	Additive in plastics, glues and binding materials.	EU-RAR (Draft 12/2000): Very toxic to aquatic organisms. Potential endocrine disrupter (COM(2001)262table2, OSPAR). Metabolites suspected to cause endocrine effects (NCLASS). Readily biodegradable meeting the 10d window. Bioaccumulation: logKow = 4.84, BCF = 449.	Does not fulfil selection criteria. However, the substance is very toxic and its potential for bioaccumulation is significant. The wide dispersive use of the substance further supports the decision to include the substance on the list of priority chemicals.

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
84 742	Dibutylphtalate (DBP)	5;6;9;12	15015	110	248	Repr.2; R61 Repr.3; R62 N; R50	Adhesive, hardener, additive in rubber products, construction materials, used in automotive repair, leather manufacture, textile processing, carpentry.	Very toxic to aquatic organisms (R50, EU-RARfinal draft 6/2001). Potential endocrine disrupter (COM(2001)262;table2,OSPAR). Readily biodegradable under aerobic conditions, biodegradation in anaerobic conditions might be considerable slower (EU-RAR). Bioaccumulation: Log Kow=4.57 (EU-RAR), BCF=2.1 - 6700 (EU-RAR, OSPAR). EU-RAR uses BCF=1,8 l/kg. PEC/PNEC <1 except for grouting activities.	Very toxic and bioaccumulable.
5. Other industrial and consumer chemicals									
793 248	1,4-Benzenediamine, N-(1,3 -dimethylbutyl) -N'-phenyl-	4;9;10	8	*	*	NF	Import. Production of rubber products. Preservative.	Toxicity: Very toxic to aquatic organisms (OSPAR, IUCLID). Persistence: Not readily biodegradable (QSAR/OSPAR). In IUCLID dataset degradation rates 7.2% (activated sludge, method similar to Glendhill), 13-40% (modified MITI) and 97% (river water inoculum) from three biodegradation tests are reported. Bioaccumulation: logKow=5.4 (IUCLID), BCF= 794 (QSAR/OSPAR).	Very toxic, persistent and bioaccumulable.
9016459; 26027383; 37205871; 68412544; 127087870	Nonylphenol ethoxylates	6;7;9;12	8499 (for cas 9016459)	123	413	NF	In washing agents, hardener in resins. Emulgator in production of paints, washing agents, chemicals. Stabilisator in paper industry.	Very toxic to aquatic organisms (OSPAR). Potential endocrine disrupter (OSPAR, COM(2001)262 table4). Not readily biodegradable (MITI1992, OSPAR), not inherently biodegradable (MITI1992, OSPAR). Readily biodegradable in OECD301B-test, not fulfilling the 10 day window. Bioaccumulation: log Kow=3, 6 (QSAR/OSPAR), BCF=87 (QSAR/OSPAR). EU-RAR: Overall conclusion iii) applies to i.a. NPE production, formulation and use.	Very toxic and persistent
556 672	Octamethylcyclotetrasiloxane	10 (PBT)	ND	7	11	Repr.3; R62 R53	Production of chemicals and pharmaceuticals, cosmetics, paints, prints, plastic products. In shoe production, silicone products.	Toxic to aquatic organisms (IUCLID). Persistence: no degradation in sediment/water test after 42 d under aerobic conditions. Bioaccumulation: log Kow=4.45 (IUCLID), BCF=12400 (IUCLID), 1698 (QSAR/NSDB).	Toxic, persistent and bioaccumulable.

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
108 463	Resorcinol; 3-hydroxyphenol	7	ND	43	376	Xn; R22 Xi; R36/38 N; R50	Hardener in glues. In the production of plywood, in metal industry, in production of rubber products.	Very toxic to aquatic organisms (Aquire). Potential endocrine disrupter (COM(2001)262table2). Not readily biodegradable in MITI I test (67% by BOD, MITI1992). Bioaccumulation: estimated logKow = 0.8, estimated BCF = 2 (HSDB).	Very toxic and persistent
6. Biocides:									
52 517	Bronopol; 2-Bromo-2 -nitropropane -1,3-diol	5	920	30	317	Xn; R21/22 Xi; R37/38-41 N; R50	Use as slimicide e.g. in paper industry. As desinfectant and preservative in cosmetics, in glues (construction work, furniture), printing	Very toxic to aquatic organisms (R50). Not readily biodegradable in OECD 301B test (SYKE-EE). DT50 in modified 304A/302B test with activated sludge approx. 25d (SYKE-EE). The ready test result provided for environmental classification did not fulfil the 10d window) Based on LogKow = 0.17 bioaccumulation not expected to be important. (SYKE-EE)	Very toxic and persistent.
59 507	4-chloro-3-methylphenol	3	1477	11	13	Xn; R21/22 Xi; R41 R43 N; R50	Use as desinfectant, preservative in cleaning agents, chemicals, fibre production, lubricants, metal processing.	Very toxic to aquatic organisms (R50). Potential endocrine disrupter (COM(2001)262, table2). Not readily biodegradable (0 % by BOD, MITI1992). In IUCLID dataset biodegradation rate of 61% in a modified ready test (301D) with adapted activated sludge reported. Bioaccumulation: Based on logKow (3.1) BCF values 5.9-134.9 have been estimated(HSDB). BCF = 11-49 (NSDB).	Negative result in MITI I test possible due to toxicity. However, available information on biodegradation (IUCLID dataset) does not support the conclusion that 4-chloro-3-methyl-phenol would be readily biodeg-radable. Wide dispersive use and the fact that 4-chloro-3-methylphenol is propably included also in imported goods support the necessity to include 4-chloro-3-methylphenol in the list of NPS.

ANNEX 4/6

Part 2. Substances not proposed as National Priority Substances

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
Alkanes									
142 825	Heptane	4		128	3 726	F; R11 Xn; R65 Xi; R38 R67 N; R50-53	Use in lubricants, glues, washing agents.	Very toxic to aquatic organisms (R50). Readily biodegradable (101 % by BOD, MITI I). Bioaccumulation: Based on log Kow (4.66) BCF values 339 and 2042 have been calculated (HSDB)).	Heptane fulfils the selection criteria for both PBT -properties and exposure potential. However, due to considerations conserning the analytics and source identification, heptane should be assessed together with other alkanes, including petroleum based long chained alkanes. Therefore heptane is not proposed to be included on the list of National Priority Substances at this stage.
111 659	Octane	4;10	761	5	10	F; R11 Xn; R65 Xi; R38 R67 N; R50-53	Use in glues and paints. In automotive services and paint industry.	Very toxic to aquatic organisms (R50). Persistence: in two tests readily biodegradable, in two tests not readily biodegradable (NSDB). Bioaccumulation: log Kow = 5.18, BCF = 776-5129 (HSDB).	Octane fulfils the selection criteria for PBT-properties. It has wide use, although the use volume of octane in products other than petroleum is only 10 tonnes. However, due to considerations conserning the analytics and source identification, octane should be assessed together with other alkanes, including petroleum based long chained alkanes. Therefore heptane is not proposed to be included on the list of National Priority Substances at this stage.
90 622 574	Alkanes, C9-C12, iso	10 (vPvB)	ND	40	40	NF	In washing agents, degrasers, lubricants, corrosion protection agents, glues and binding materials, solvents, pigments, seal materials. In metal treatment and coating, motorvehicle production, trade and services, shoe production, printing, construction, textile finishing, treatment of wood.	Toxicity: reported LC50 values > 1000 mg/l. Persistence: not readily biodegradable in OECD 301F test (21.9 % degradation, IUCLID). Bioaccumulation. logKow = 4.9-6.9 (IUCLID). BCF = 3152-100000 (IUCLID).	Does not fulfil selection criteria for toxicity.

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
96 231	1,3-dichloro -2-propanol	3	14	4	104	Carc.2; R45 T; R25 Xn; R21. Aquatic classification: N.C.	Used in the production of paper.	Harmful for aquatic organisms (Aquire). Conflicting results in aerobic aquatic biodegradation results (HSDB). Not readily biodegradable in MITI test (inconsistent results: 0; 0; 21 % by BOD, MITI1992). Bioaccumulation: estimated logKow =0.78 (HSDB), 0.20 (CHEMFATE), BCF=3 (calculated, HSDB).	Does not fulfil initial selection criteria.
85 449	1,3-Isobenzo-furandione (phtalic acidanhydride)	4		7	5 094	N.C.	Additive in paints. Production of rubber products.	Toxic to aquatic organisms (Aquire). Readily biodegradable (85% by BOD, MITI 1992). Bioaccumulation: logKow= -0.62 (chemfate).	Does not fulfil selection criteria.
90 302	1-Anilinonaphthalene	4	7768	11	0.17	NF	Additive in lubricants and motor oil.	Toxic to aquatic organisms (Aquire). Not readily biodeg radable (0% by bod in MITI1992). Bioaccumulation: LogKow=4.23, BCF=427-2730 (MITI1992).	Use volume not significant.
6 846 500	2,2,4-Trimethyl-1,3 -pentanediel diisobutyrate	4	154	8	220	NF	Hardener in plastics. Use in metal processing, in construction materials, in pigments.	Toxic to aquatic organisms (IUCLID). Readily biodegradable (IUCLID). LogKow=4.1 (calculated, IUCLID), BCF= 1202 (Danish EPA/NSDB).	Does not fulfil selection criteria.
108 429	3-chloroaniline	3	4	*	*	T; R23/24/25 R33 N; R50-53	Production of pharmaceuticals, chemicals and fibres.	Very toxic to aquatic organisms (R50). Little data on biodeg radability: classification R53 refers to mono-, di- and trichloroanilines, of which the mono-isomers are considered readily biodegradable where as the di- and tri-isomers are not readily biodegradable. Bioaccumulation: logKow=1.72-2.99, BCF=5.62-11.5 (HSDB, chemfate).	Use limited to two production sites, which shall be taken into consideration locally.

ANNEX 4/8

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
107 131	Acrylonitrile	6; 12	ND	5	1000	F; R11 Carc.2; R45 T; R23/24/25 Xi; R37/38-41 R43 N; R51-53	Used in production of rubber products and paper chemicals, in pigments for textile industry, in glues for electronics industry, in construction materials	EU-RAR: Toxic to aquatic organisms. Not readily biodeg radable. Bioaccumulation: Kow =0.25, BCF=1 (calculated), 48 (measured). Conclusion iii). The conclusion applies to the aquatic compartment including sediment for the production of acyclic fibres at one site only. Conclusion ii) applies for all other other production and processing sites. However the RAR states that the conclusion applies only to a particular point in time (release data was collected for the period 1994-1996) and cannot be extrapolated generally for the aquatic environment.	Does not fulfil selection criteria for bioaccumulation.
80 057	Biphenol A	5;9;12	2187	89	386	Postponed	Stabilizer and additive in plastic and rubber production, paper chemical, paint hardener.	EU-RAR (Draft 7/2002): Toxic. Potential endocrine disrupter (COM(2001)262;table2, OSPAR). Biodegradation test results inconsistent. Readily bio-degradable in OECD 301F test. Slightly bioaccumulating (logKow=3.4, BCF=67). Conclusions for water and sediment compartment: Conclusion i) applies to Bisphenol -A, epoxy resin and thermal paper production and phenoplast cast processing, PVC processing. Conclusion iii) applies to: Thermal paper recycling, use as inhibitor in PCV production, preparation for additive packages for PVC processing, use as anti-oxidant in the production of plasticisers for use in PVC processing.	Does not fulfil selection criteria for bioaccumulation and persistance. The use categories where risk was identified will be taken into consideration locally.

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
92 524	Biphenyl	3	1276	5	195	Xi; R36/37/38 N; R50-53	Component of creosote oil (biocidal use). Solvent (production of chemical products). Heat transfer fluid. Releases also from combustion processes.	Very toxic to aquatic organisms (R50). Not readily biodegradable in MITI-I test (66% by BOD, MITI1992). Bioaccumulation: BCF = 280-4500 (HSDB).	The main use of Biphenyl is as a component of creosote oil. The use of creosote oil is already strictly restricted. Releases of Biphenyl from heat transfer liquid use and raw material use in the chemicals industry are expected to be very low. PAH-compounds are covered in the Community list of priority substances.
75 150	Carbon disulphide	7		4	4 848	F; R11 Repr.3; R62-63 T; R48/23 Xi; R36/38. Aquatic classification: N.C	Laboratory chamical, solvent in fibre production, additive in metal processing.	Toxic to aquatic organisms (Aquire). Potential endocrine disrupter (COM(2001)262, table2). Not readily biodegradable in MITI-I test (0 % by GC, MITI1992). Bioaccumulation: BCF=6.6 and 60 (MITI1992).	Does not fulfil selection criteria for bioaccumulation.
79 118	Chloroacetic acid (MCAA)	3;12	1019	*	*	T; R25 C; R34 N; R50	Use in production of chemicals and pharmaceuticals, in washing agents used in metal production	EU-RAR (Draft 9/2002): Very toxic to algae. Readily biodegradable (OECD/301B-E). No bioaccumulation expected (logKow=-1). Overall result: conclusion i) further research is needed to investigate the sources of MCAA (anthropogenic/natural), conclusion iii) local PEC exceeded PNEC for two production/processing sites.	Does not fulfil selection criteria for persistence and bioaccumulation. Risk identified in the EU risk assesment refers to production/ processing sites. The processing of MCAA is limited to a few sites in Finland, which will be taken into consideration locally.
8 001 589	Creosote oil	4	1527	4	7 165	NF	Wood preservative.		The substance has only one use category, which is already strictly restricted. PAH -compounds are covered in the Community list of priority substances.

ANNEX 4/10

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
109 897	Diethylamine	3	4	4	101	F; R11 Xn; R20/21/22 C; R35. Aquatic classification: : N.C	Production of chemicals and pharmaceuticals.	Harmful to aquatic organisms (Aquire, IUCLID-dataset). Readily biodegradable in MITI test (69 % by BOD, MITI1992). Bioaccumulation: logKow= 0.58, estimated BCF=3 (HSDB), 1.62 (IUCLID).	Does not fulfil selection criteria criteria.
77 587	Di-n-butyltin Dilaurate	5	6748	24	1.0	NF	In glues and binding materials. In production of textiles, plastic products, in construction work, in aircraft industry.	Toxic to aquatic organisms (Aquire). Not readily biodegradable (50% by BOD in MITI I test, MITI1992). Bioaccumulation: logKow=3.1 (chemfate), BCF= 31-138 (HSDB).	Does not fulfil selection. Use volume not significant.
106 898	Epichlorhydrine	3	458	14	18 439	R10 Carc.2; R45 T; R23/24/25 C; R34 R43. Aquatic classification: N.C	In glues and binding materials. Paper chemical. Production of pharmaceuticals, chemical products, synthetic fibres. In metal and aircraft industry.	Potential endocrine disrupter (COM(2001)262, table4). Toxic to aquatic organisms (Aquire). Persistence: Not readily biodegradable (18 % by BOD, MITI 1992). Bioaccumulation: logKow=0,45, estimated BCF=3 (HSDB).	Does not fulfil selection criteria for bioaccumulation.
100 414	Ethylbenzene	3;11;12	7820	953	1 685	F; R11 Xn; R20. Aquatic classification: N.C (due to ready biodeg radation)	Use in solvents, cleaning agents, binding agents, pigments. In production of paints, printing inks, glues, pesticides, chemicals and synthetic fibres. In aircraft industry, manufacture and repair of automo-biles and boats. In construction work.	In EU-RA priority list 1 (D). No EU-RAR available. Toxic to aquatic organisms (IUCLID). Biodegradation data inconsistent: 50, 69, 69 % in modified (C.7) MITI tests (IUCLID), 0, 0, 116 % by BOD in MITI I test (CERIJ). Inherently biodegradable: 81-126% by BOD (MITI1992). Bioaccumulation: LogKow=3.1 (IUCLID), BCF= 1- 79 (IUCLID), 0.67 - 15 (HSDB).	Does not fulfil selection criteria
64 742 047	Extracts, heavy paraffinic distillate solvent	4	21	11	2 244	NF			See chapter 5.3.2 of the report and Annex 1. See also reasoning for alkanes.
93 685 815	Hydrocarbons, C4, 1,3butadienefree, polymd., triiso-butylene fraction, hydrogenated	10 (vPvB)	ND	*	*	NF	Use in paint industry. In washing agents for production of chemicals, chemical products and fibres.	Aquatic toxicity: EC0 values 100-1000 mg/l reported in IUCLID dataset. Persistence: no data available. Bioaccumulation: log Kow=6.4.	Does not fulfil selection criteria for toxicity.
4 098 719	Isophorone diisocyanate	4;9	6203	38	1.2	T; R23 Xi; R36/37/38 R42/43 N; R51-53	In glues, binding materials, paints. In automotive services, construction work, aircraft industry.	Toxic to aquatic organisms (R51, OSPAR). Not readily biodeg-radable (OSPAR, MITI/CERIJ). Bioaccumulation: log Kow=5 (OSPAR), 4.75 (CERIJ), BCF= 912 (OSPAR, value based on QSAR).	Use volume not significant. Reacts in polyurethane based glues.

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
78 795	Isoprene; 1,3-Butadiene, 2-methyl	10 (PBT)	ND	4	3 001	F+; R12 R52-53	Production of rubber products. In seal materials for construction work. Raw material for chemical industry.	Harmful to aquatic organisms (R52). Persistence: not readily biodegradable (ECB/classification & labelling, MITI1992). Bioaccumulation: logKow=2.42-3.01 (NSDB), 2.3-4.5 (IUCLID), BCF= 5-20 (MITI1992). Selection as PBT-substance among IUCLID based on logKow value and data from NSDB and IUCLID. Toxicity result based on one result for fish toxicity obtained from NSDB (BUA 1989) showing aqute toxicity in the range 1.-10 mg/l. Four other studies on fish show aqute toxicity >10 mg/l.	Does not fulfil selection criteria for toxicity.
98 839	Isopropenyl benzene	3	8	5	2 602	R10 Xi; R36/37 N; R51-53	Used in production of paper chemicals, plastic products.	Toxic to aquatic organisms (R51). Not readily biodegradable (0% by BOD, MITI1992). Bioaccumulation: BCF=30 (HSDB), 12-140 (MITI1992).	Does not fulfil selection criteria
42 615 292 68411300 25155300 26264062 27176870	Linearalkyl benzene sulphonate (LAS); Na-salt; dodecyl, Na- and Ca-salts; dodecyl	4; 10 (vPvB for cas 25155300)	5902 (for LAS)	84 (for all)	370.5 (for all)	NF	In washing agents, paper chemicals, additive in plastic products and diesel oil.	Very toxic/toxic to aquatic organisms (Aquire). Dodecyl: Not readily biodegradable in MITI I test (47% by BOD, CERIJ). Bioaccumulation: BCF=64-130 (HSDB), 94-280 (Aquire). According to Nordic Ecolabelling (C11,5-11,8) : toxic, readily biodegradable, not biodegradable in anaerobic conditions. Identification as vPvB substance among IUCLID (criterion 10) based on NSDB data)	Does not fulfil selection criteria. According to Nordic Ecolabelling the LAS compounds presently on the market are readily biodegradable.
6 317 186	Methylene-bis-thiocyanate	5	2189	23	121	T+; R26 T; R25 C; R34 R43 N; R50	Biocidal use in paper industry, textile industry. Wood preservative.	Very toxic to aquatic organisms (R50). Not readily biodegradable in MITI I test (0% by BOD, CERIJ). Hydrolyses rapidly (< 1 day) above pH 7 and rather slowly but significantly between pH 5 and 7. When pH= 5, DT50 for hydrolyses > 30 days. In water-sediment system DT50 for estimated to be 7 d (SYKE 17.11.1998). Bioaccumulation: logKow= BCF=24 (SYKE 17.11.1998).	Negative result in MITI I test propably due to toxicity. According to TGD the TD50 value in the water-sediment-test (7 days) indicates that the substance is readily biodegradable. Reported EC/LC50 values for degradation products, thiocyanates > 10 mg/l (Aquire).

ANNEX 4/12

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
91576	naphthalene, 2-methyl-	9	ND	*	*	NF	In coal tar. Use as fuel and raw material in chemical industry	Very toxic to aquatic organisms (Aquire, OSPAR). Data on bio-degradation inconsistent (OSPAR). Bioaccumulation: BCF =186-23500 (Aquire, OSPAR).	PAH-compounds are covered in the Community list of priority substances.
85 018	Phenanthrene	4	7	*	*	NF	Fuel (Coal tar) . Production of basic chemicals.	Very toxic to aquatic organisms (Aquire). Not readily biodegradable in MITI I test (54 % by BOD, MITI1992). Bioaccumulation: BCF=11-3700 (Aquire).	PAH-compounds are covered in the Community list of priority substances.
100 425	Styrene	5;12	832	230	236 963	R10 Xn; R20 Xi; R36/38. Aquatic classification: N.C	Trading chemical, solvent, resin, thinner, binding agent in chemical processing, paint processing, automotive services, ship production, electronics.	Toxic to aquatic organisms (EU-RAR). Potential endocrine disrupter (COM(2001)262table2). Readily biodegradable under aerobic conditions (EU-RAR). Bioaccumulation: logKow=3 (EU-RAR), BCF= 74. EU-RAR: overall result: Conclusion ii). Aquatic classification: N.C (based on ready biodegradation, BCF<100)	Does not fulfil selection criteria.
25 103 586	Tetradodecanethiol	10 (vPvB)	ND	*	*	NF	Production of paper chemicals, latex.	Toxic to aquatic organisms (IUCLID). Persistence: not readily biodegradable (0% deg radation in OECD301D test, IUCLID). Bioaccumulation: logKow=6.1 (IUCLID), BCF= 295 (QSAR, NSDB).	Does not fulfil selection criteria on bioaccumulation (based on BCF). Use limited to two production sites, which shall be taken into consideration locally.

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products *	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
108 883	Toluene	3;11;12	8941	855	8 234	F; R11 Xn; R20. Aquatic classifcation: N.C (based on ready biodeg radation, BCF < 100)	Solvent , thinner, cleaner, pigment component, in chemicals processing, plastic processing, automotive services, manufacture of machinery and appliences.	Toxic to aquatic organisms. Readily biodegradable. Under aerobic and oligotrophic conditions seems not to be biodegradable if concentration < 0.05 mg/l. Bioaccumulation: log Kow = 2.7, BCF = 8-90 (EU-RAR). Overall result in EU-RAR: conclusion iii) The conclusion applies in relation to releases from two production sites, one combined production and processing site, one off site processing site and a number of downstream processing sites according to generic assessments for the following use categories: Industry use as intermediate and as basic chemical, mineral oil and fuel formulation, formulation of polymers, formulation of paints, textile processing. [EU-RAR]	Does not fulfil selection criteria.
126 738	Tributylphosphate	3	635	11	10	Xn; R22. Aquatic classification: N.C.	Use in hydraulic fluids, drying agents, pigments, in plastic processing, electronics industry, textile industry, auto-mobile services, airplanes, automotive manufacture.	Toxic to aquatic organisms (aquire). Data on biodegradation inconsistent: Not readily bio-degradable (0% by BOD, MITI1 992). Not inherently biodegradable (0-41%, MITI II/CERIJ). Biodegradable (HSDB, IUCLID/ECB, class.) Not expected to bio-concentrate: BCF 6-35 (HSDB, CERIJ). According to environmental classification readily biodegradable and BCF < 100.	Does not fulfil selection criteria
1 330 207	Xylene	3;4;11	7348	2 760	22 316	R10 Xn; R20/21 Xi; R38. Aquatic classification: N.C. (based on data)	Used as solvent. Used in production of paints, in washing agents, automotive services, manufacture and repair of ships and boats, in aircraft industry, construction work, metal processing, production of plastic products.	Toxic to aquatic organisms (Aquire, OECD/SIAP). Persistence: Not readily biodegradable (39 % by BOD, MITI I/CERIJ). m- and p-xylenes readily biodegradable, but o-xylene much more persistent ("mixed" xylenes contain 20% o-xylene) (OECD/SIAP). Bioaccumulation: logKow = 2.8-3.2, BCF = 0.6-740 (IUCLIDDataset), 1.8 -14.8 (OECD/SIAM).	Does not fulfil selection criteria for bioaccumulation

ANNEX 4/14

Part 3. Substances that are already included in the community list of priority substances according to Water framework Directive (2000/60/EC)

CAS	Substance name	Initial selection criterion	Use Pattern Score	Number of Products	Use volume/ tonnes in 2001 (KETU)*	Classification according to Annex I of EU Directive 67/548/EEC	Use purposes in Finland	PBT-properties /other comments	Reasoning for inclusion/exclusion to the list of NPS
50 328	Benzo(a)pyrene	1;4; 9	1843	18	46	Carc.2; R45 Mut.2; R46 Repr.2; R60-61 N; R50-53			
71 432	Benzene	1;4;11	2206	39	1 341 986	N.C.			
117 817	Di(2-ethylheksyl) phtalate; DEHP	1;6;9	5552	61	227	Repr.2; R60-61. Aquatic classification: N.C			
75 092	Dichloromethane	1;3	24267	151	4 328	N.C			
91 203	Naphtalene	1;3;4	6787	12	3 930	Xn; R22 N; R50-53			

Annex 5. Use of Pesticide Risk Indicator for the selection of National Priority Pesticides

The Draft Pesticide Risk Indicator is a further modification of the Hazardous Chemicals Indicator presented by Timo Seppälä (2001). The risk indicator was used in addition to expert judgement when selecting priority pesticides. Although the indicator is not finalised, it was used in the selection procedure as no better tools for the systematic assessment of the environmental pressure caused by the use of pesticides are available. Therefore, the presented draft indicator should not be considered as a final tool nor be used in other contexts.

A Risk Index value is designated to all pesticides used in Finland. The substance property data is mostly based on studies submitted for the pesticide registration procedure. The Risk Index is the product of the Hazard Index (HI) and the sales volume of the pesticide:

RI = HI*sales volume

The Hazard Index has been determined with the following equation:

$$HI = S_{logKow} * S_{BioDeg} * S_{Mob} + S_{AquaT} + S_{TerrT},$$

where S_{logKow}, S_{BioDeg}, S_{Mob}, S_{AquaT} and S_{TerrT} are scaled values for bioaccumulation, persistence, mobility and aquatic and terrestrial toxicity, respectively. The scaling rules are presented in table 1. In cases where data on bioaccumulation, persistence, mobility or toxicity were not available the highest possible respective scaled value was given. This is reflected in higher than realistic Risk Index values for some substances lacking data on properties (e.g. mineral oil).

Table 1. Scaling rules (draft) for determining the Hazard Index for pesticides.

	Properties	Interpretation	Scaled values
Biodegradation		Readily degradable	
	T½ < 30 d	Degradable	1
	T½ 30-90 d	Fairly persistent	2
	T½ 90-240 d	Persistent	5
	T½ >240 d	Very persistent	10
Bioaccumulation	log Kow <3	Slightly bioaccumulative	1
	BCF <100		1
	log Kow 3-4	Bioaccumulative	2
	BCF 100 - 500		2
	log Kow 4-5		3
	BCF 500 -1000		3
	BCF 1000 - 5000		4
	log Kow 5-6	Very bioaccumulative	7
	BCF 5000-10000		7
	log Kow ≤ 6	Highly accumulating	10
	BCF >10 000		10
Aquatic toxicity	acute >1000	Very slightly toxic	50
	chronic >100		
	acute 100-1000	Slightly toxic	50
	chronic 10-100		
	acute 10-100	Toxic	100
	chronic 1-10		
	acute 1-10		150
	chronic 0,1-1		
	acute 0,1-1		200
	chronic 0,01-0,1		
	acute <0,1	Highly toxic	250
Terrestrial toxicity	acute >1000	Very slightly toxic	50
	acute 100-1000	Slightly toxic	100
	acute 10-100	Moderately toxic	150
	acute 1-10	Toxic	200
	acute <1	Highly toxic	250
Mobility	Koc >5000	Immobile	1
	Koc 2000-5000	Slightly mobile	2
	Koc 500-2000	Low mobility	3
	Koc 150-500	Intermediate mobility	6
	Koc 50-150	High mobility	8
	Koc <50	Very high mobility	10

Table 2. Thirty most important pesticides in respect to their environmental pressure according to the draft Pesticide Risk Indicator. The pesticides selected as National Priority Pesticides are shown in bold. (*Pesticide sale volumes were obtained from the statistics compiled by the Plant Production Inspection Centre, Pesticides Office.)

	CAS	Name	Sales (kg) in 2000*	Risk Index (RI)
1	1071836	Glyphosate	305456	96218640
2	**94746**	**MCPA**	**250240**	**89585920**
3	**8018017**	**Mancozeb**	**80241**	**26479530**
4	81591813	Glyphosate (trimesium)	66973	16944169
5	120365	Dichlorprop-P	45047	16216920
6	**41394052**	**Metamitron**	**48629**	**14977732**
7	1582098	Trifluralin	19572	11156040
8	**60515**	**Dimethoate**	**27100**	**11111000**
9	999815	Chlormequat chloride	39032	10928960
10	**67747095**	**Prochloraz**	**20928**	**7952640**
11	0	Mineral oil	4548	5912400
12	79622596	Fluazinam	9783	4695840
13	60207901	Propiconazole	8184	4583040
14	93652	Mecoprop-P	20735	4354350
15	5234684	Carboxin	16545	4268610
16	0	Paraffin	6218	3233360
17	13684634	Phenmedipham	12074	3163388
18	121755	Malathion	5279	2692290
19	26225796	Ethofumesate	9918	2380317
20	731271	Tolylfluanid	6877	2269410
21	24307264	Mepiquat chloride	5261	1872916
22	330552	Linuron	5985	1867320
23	69377817	Fluroxypyr	5160	1821480
24	87820880	Tralkoksidiimi	4445	1813560
25	74070465	Aclonifen	4956	1808940
26	67973678	Flamprop-isopropyl	5590	1732900
27	121552612	Cyprodinil	3540	1557600
28	**101200480**	**Tribenuron-methyl**	**2342**	**1405200**
29	21087649	Metribuzin	3779	1398230
30	79241466	Fluazifop-P-butyl	2609	1343635

Annex 6. Metals assessed in the selection procedure

In the following the selection procedure as described in chapter 7.3 is presented for each. As a conclusion a proposal for the inclusion or exclusion of the metal in question is given.

Silver (Ag)

In Canada a limit value of 0.1 µg/l has been set for the protection of aquatic life. 0.1 µg/l was selected as the critical limit value for this selection procedure.

In the GSF stream water survey levels of silver detected were low: in only 1.5 % of the samples concentrations exceeded 0.01 µg/l.

The Nordic lakes survey did not cover silver.

In the PIVET register there were only 15 results available for silver. Except for one river water result they represented lake samples from south and south-west Finland. All of the results were below the detection limit of 0.06 µg/l.

On the basis of the available information there seems to be no reason to include silver on the list of National Priority Metals.

Aluminum (Al)

The concentration and chemical forms of aluminum are highly dependent on pH, temperature and concentration of inorganic and organic ligands. The acute toxic forms of aluminum are the inorganic monomeric and polymeric aluminum cations. Aluminum present in the ionic form in natural waters is expected to occur as free Al^{3+}, hydroxide-, fluoride- and silicate complexes and as sulphate complexes in waters with low pH and high SO_4^{2-} concentrations. In waters with pH>6, or in high organic carbon waters, the concentrations of these monomers are low, while polymerized Al-hydroxides and Al-organic aggregates of colloidal and subcolloidal size predominate. (Lydersen and Löfgren 2002)

The toxicity of acidic waters is often a result of aluminum toxicity. E.g. in Norwegian and Swedish lakes where the pH was below 6, labile aluminum concentrations were generally above the critical level of 20 µg/l (Lydersen 2002). In Finland 2 200 - 4 400 fish populations mainly in small (< 10 ha) lakes have been estimated to be damaged by acidification (Rask et al. 1995). Acidity and inorganic (labile) aluminum can be more critical for biota in lake waters than trace metal levels. Median concentrations of labile aluminum have been measured in headwater lakes as 19, 15 and 6 µg/l in South, Central and North Finland, respectively. (Mannio 2001).

Environmental quality objectives for aluminum set in Canada are in the range of 5-100 µg/l. Similar critical concentration levels have been reported on the basis of research on Nordic fish species. Lydersen and Löfgren (2002) have concluded that effects on fish species might be expected within the concentration range of 20-80 µg/l for labile inorganic aluminum. However, as the PIVET result refer to total metal concentrations, and it was not considered meaningful to compare these with critical concentration levels referring to the most toxic (labile inorganic) forms of aluminium, no critical limit value was set for this assessment. In the following the monitoring data is presented, and a comparison to the concentration levels observed in the GSF stream survey is made.

In the GSF stream water survey typical concentrations (90 % of results) were 20-250 µg/l. In Ostrobothnia and Central Finland concentrations were 200-1 000 µg/l, whereas in other parts of the country concentrations varied between 20-30 µg/l.

The Nordic lakes survey did not cover aluminium.

In the PIVET register there were 15 999 result available. Typical concentrations (90 % of results) were between 13-2 000 µg/l. The number of relatively high concentrations, >1 000 µg/l, was 2 022 (13 % of all results). The vast majority of the 'high' concentrations (95 %) originated from rivers. Most likely the aluminium present in the samples is bound to mineral and organic compounds. In the total determination of aluminium the samples are acidified and the aluminium will be dissolved. Although most of the "high" concentrations originated from the regions of West-Finland, South-West Finland and Uusimaa regional centre, there were similar results from other parts of the country too.

The data and literature assessed indicate that aluminium can presents an environmental risk in aquatic surface waters in Finland. It is difficult to estimate to which extent the problem is limited to certain areas (e.g. West Finland with acidic soil layers). However, the environmental risks posed by aluminium are closely related to acidification, which determines to a large extent the chemical form of aluminium. As there are no standard methods for determining the relevant chemical forms of aluminium (inorganic labile aluminium), the assessment of other parameters, e.g. acid neutralising capacity, pH, total organic carbon, might be a more appropriate approach to assess the environmental risk caused by aluminium.

For the above mentioned reasons aluminium is not proposed as a National Priority Metal. The possible environmental risks posed by aluminium should be assessed on the local level.

Arsenic (As)

The toxicity of arsenic depends on it's chemical form. The reduced inorganic forms of arsenic are most toxic, whereas the organic forms of arsenic are less toxic. On the basis of the EQS values set in different countries (table 7.3), 5 µg/l was chosen as the critical limit value for the selection procedure.

In the COMMPS procedure arsenic was selected in the first phase of the procedure. However, on the basis of expert judgement it was not included in the final list of priority substances (Annex X to WFD).

According to the GSF stream water survey typical concentrations (90 % of results) of arsenic were between 0.06-1.6 µg/l. Highest concentrations were detected in south-west Finland.

In the Nordic lakes survey maximum concentrations of arsenic were measured in central west Finland and were about 4 µg/l. The level of arsenic in these areas is explained by bedrock geology.

For arsenic a total of 4 972 results were available from the PIVET register. Of these 90 results (2 %) were above the chosen critical limit value of 5 µg/l. 10 results were at the critical limit value. In addition to these 140 results were reported as below the detection limit of 5 µg/l. Of the 100 results exceeding or at the limit value of 5 µg/l, 40 results originated from the Ylöjärvi commune near Tampere, and 18 results originated from the Outokumpu area (Outokumpu, Polvijärvi, Kaavi communes). The remaining results originated from different parts of Finland.

As only a limited number of monitoring data exceeded the set critical value, there seems to be no reason to include arsenic on the list of National Priority Metals for the protection of surface waters. In ground water the situation might be different. Concentrations exceeding 10-100 times the limit value for drinking water (10 µg/l) have been measured from well water (Lahermo 1996).

Boron (B)

Boron is a metalloid. However, as it is mentioned in list II to the Dangerous Substances Directive (76/464/EEC) it is assessed in this connection. Boron occurs in the nature in the form of inorganic borates. Boron is an essential nutrition for plants. Boron is acutely slightly toxic to algae, crustaceans and fish. For early life stages of rainbow trout (*Oncorhynchus mykiss*) LC50 values as low as 100 µg/l have been reported. In an Ecetoc report on inorganic borates these studies on the toxic effects of borates on early life stages of fish have been reviewed (Anon. 1997) . On the basis of both laboratory and field studies conducted on the most sensitive species, rainbow trout, the report proposes, that a NOEC of borate to all freshwater aquatic life is at least 1 mgB/l. The SYKE risk assessment of a boron containing wood preservative uses a PNEC value of 560 µg/l for surface waters (Sirkka 2001). In Canada 200 µg/l has been set as a water quality objectives for the protection of fresh water organisms. 200 µg/l was selected as the critical limit value for the selection procedure.

In the GSF stream water survey typical concentrations (90 % of results) were between 0.8-30 µg/l. The marine origin of boron could be seen in the results of the stream water survey, where highest concentrations, 20-100 µg/l, were measured in costal areas.

The Nordic lake survey did not cover boron.

In the PIVET register there were only 34 results for boron. Of these half represented lake samples, and half river samples. Except for one result the concentrations were below the critical concentration level of 200 µg/l.

On the basis of the available information, there seems to be no reason to include boron on the list of National Priority Substances.

Barium (Ba)

Barium can have toxic effects on aquatic organisms. The smallest reported EC/LC50 value is 0.1 mg/l for fish (NSDB), whereas other reported values are above 100 mg/l. The EQS value set in the Netherlands (230 µg/l) was chosen as the critical concentrations for the selection procedure.

In the GSF stream water survey typical concentrations (90 % of results) were between 3-30 µg/l.

The Nordic lake survey did not cover barium.

There were only 35 results available in the PIVET register of which about half were from lake samples and half were from river samples. Typical concentrations (90 % of results) were between 0.5 -87 µg/l. The maximum concentration,140 µg/l, is well below the chosen critical concentration limit.

On the basis of the available information, there is no reason to include barium on the list of National Priority Substances.

Beryllium (Be)

Beryllium has chronic and acute toxic effects for humans and other animals already at the concentration level of 1 µg/l. It is also suspected to be carcinogenic. Beryllium resembles aluminum and it is released under acidic conditions. (Lahermo 1996). On the basis of the EQS values collated in table 7.3, 0.2 µg/l was selected as the critical limit value for the selection procedure.

In the GSF stream water survey 95% of results were below 0.1 µg/l.

Beryllium was not covered in the Nordic lake survey.

In the PIVET-register there were 15 results for beryllium, of which 10 where below the detection limit of 0.15 µg/l. The maximum concentration detected was 0.17 µg/l.

On the basis of the available information, there seems to be no reason to include beryllium on the list of National Priority Substances.

Cobalt (Co)

Cobalt is an essential micro-nutrient for plants. High concentrations of cobalt have toxic effects. On the basis of EQS values reported in literature, 1 µg/l was chosen as the critical limit value for the selection procedure.

Typical concentrations measured in the GSF stream water survey varied between 0.03-1.0 µg/l. High levels of cobalt (up to 5 µg/l) were measured around Vaasa. The high levels of cobalt in this area were explained by the occurrence of Ni-Co rich sulphide minerals and cobalt rich former marine sediments.

In the Nordic lake survey over 99.5 % of the results were under 2.4 µg/l.

In the PIVET register there were 823 results for cobalt. Of these over 596 (72 %) were under the detection limit which varied between 0.03-5 µg/l. 288 results (35 %) showed concentrations above the selected critical limit value (1 µg/l), and 11 results were at the selected critical limit value. However, almost all results (284) that exceeded the critical limit originated from the Outokumpu area (communes Outokumpu, Liperi, Joensuu, Kaavi, Pyhäselkä). The Outokumpu area is characterized by mining activities.

On the basis of the available information, there seems to be no reason to include cobalt on the list of priority substances. The possible environmental problems caused by cobalt in the Outokumpu area should be addressed locally.

Chromium (Cr)

Chromium as chromium (III) is an essential element in animal nutrition. It is considered to be non-essential for plant growth, although it is essential for some microbes. Due to the high mobility in biological systems and powerful oxidizing properties of chromium(VI) compounds, these are considered to be much more toxic than the chromium (III) forms. (EU-RA 2002)

On the basis of EQS values reported in literature, 4 µg/l was chosen as the critical limit value in the selection procedure.

In the GSF stream survey typical concentrations (90 % of results) were between 0.15-1.4 µg/l. High concentrations (over 1 µg/l) measured around Vaasa and Kemi-Tornio, and between Pyhäsalmi and Raahe are explained by the geology of the areas.

In the Nordic lake survey all results measured in Finland were below 3 µg/l.

In the PIVET Register there were 5101 results available for chromium. 657 results (12.9 %) were above or at the set limit value 4 µg/l. However, of these 265 results were reported as under the detection limit of 5 µg/l or 10 µg/l.

Most of the results exceeding the set limit value represented rivers, 387 results, whereas only 18 results were from lake samples. Of these 53 and 6 results, respectively, were below the reported detection limit of 5 µg/l or 10 µg/l. 250 results represented sea water samples. Of these most, 206 results, were reported as under the detection limit of 5 µg/l. All sea water samples were taken either from outside Helsinki (37 results) or from outside Tornio and Kemi. The Tornio-Kemi -area is rich in chromium, and it has ferrochrome production.

Excluding the marine samples, which represented areas in the influence of a major population centre or ferro-chrome industry, and the samples which were reported as below the detection limits, 334 river water samples and 12 lake water samples, in which the set limit value was exceeded remained. This represents 6.8 % of all results.

In order to take into consideration natural background concentrations of chromium, 1.4 µg/l was taken as a maximum estimation of background levels on the basis of the GSF stream water results. Of all results 289 showed concentrations bigger than 5.4 µg/l (critical limit value (4 µg/l) + 1.4 µg/l). Of these the majority, 230 results, represented river samples. 12 represented lake waters, 43 marine samples and 4 river estuaries.

On the basis of the available data, it is proposed to include chromium on the list of National Priority Substances.

Copper (Cu)

Copper is an essential micro-nutrient for plants and animals. However, copper is highly toxic to many aquatic organisms, e.g. algae, even at relatively low concentrations. In the aquatic environment most of the copper occurs bound to dissolved organic substances and inorganic particles. Acidification increases the amount of dissolved copper. (Lahermo 1996) On the basis of the EQS values reported in the literature, 3 µg/l was chosen as the critical limit value for the selection procedure.

In the COMMPS procedure copper was selected in the first phase of the procedure. However, on the basis of expert judgement it was not included in the final list of priority substances (Annex X to WFD).

Typical concentrations (90 % of results) in the GSF stream water survey were between 0.17-2.35 µg/l. In the Nordic lake survey 99.5% of the results were below the 2.73 µg/l.

In the PIVET-register there were 5684 results available for lake, river and sea samples. 1801 of the results (31.7 %) exceeded the set limit value of 3 µg/l. Of these 434 results were below the reported detection limit, which varied between 3-20 µg/l. The results that exceeded the limit value were from lakes (446) or rivers (1246). Part of the results originated from areas around Vaasa and Kokkola (169 results from Ilmajoki, Kokkola, Kristiinankaupunki, Maalahti, Mustasaari, Närpiö, Uuskaarlepyy and Pietarsaari communes) and near Outokumpu (442 results from Outokumpu, Liperi, Leppävirta, Kaavi, Pyhäselkä communes). The remaining over 1100 results (19.4 %) exceeding the set limit value of 3 µg/l originated from different parts of Finland.

In order to take into consideration natural background concentrations of copper, 2.35 µg/l was taken as a maximum estimation of background levels on the basis of the GSF stream water results. Of all results 735 showed concentrations bigger than 5.35 mg/l (critical limit value (3 µg/l) + 2.35 µg/l). Of these the majority, 532 results, represented river samples. 165 represented lake waters, 35 marine samples and 3 river estuaries.

On the basis of the available data, it is proposed to include copper on the list of National Priority Substances.

Iron (Fe)

In Canada environmental quality guidelines of 300 µg/l have been given for iron. In Vuorinen et al. (1995) a concentration of 2 mg/l was found to be acutely toxic to juvenile fish in acidic non-humic waters. However, according to Vuorinen et al. (1995) the toxicity of iron is highly dependent of the pH and content of humic

substances. Therefore it is not considered meaningful to compare the PIVET results without knowledge of prevailing environmental conditions, and no critical limit value was set for this assessment.

In the following the monitoring data is presented, and a comparison to the concentration levels observed in the GSF stream survey is made.

In the GSF stream water survey typical concentrations (90 % of results) were between 0.06-2.6 mg/l. Highest concentrations (1-4 mg/l) were detected in Ostrobothnia between Vaasa and Oulu. The levels of iron correlated clearly with the colour and $KMnO_4$-values of the waters, that is the level of humic acids.

The Nordic lakes survey did not cover iron.

Due to excess of data only results for 2000 were obtained from the PIVET register. For 2000 there were 19 580 result available. Typical concentrations (90 % of results) were between 37 – 4 200 µg/l. 2 223 results (11 % of all) showed relatively high concentrations, > 2.6 mg/l. Most of these, 1 605 or 72 %, were from rivers.

For similar reasons as given for aluminium, iron is not proposed as a National Priority Metal. The possible environmental risk posed by iron should be assessed locally.

Molybdenum (Mo)

Molybdenum is an essential micro-nutrient for plants and animals. On the basis of EQS values set in different countries (table 7.3), 20 µg/l was selected as the critical limit value for this assessment.

Typical concentrations (90 % of results) found in the GSF stream water survey were between 0.03-0.85 µg/l.

The Nordic lake survey did not cover molybdenum.

In the PIVET-register there were 31 results for molybdenum. Of these a third (10 results) were below the determination limit 0.06 µg/l. The remaining results showed concentrations between 1-18 µg/l. All the results were below the set critical limit value.

On the basis of the available data, there seems to be no reason to include molybdenum on the list of National Priority Substances.

Selenium (Se)

Selenium is an essential micro-nutrient for animals, but in higher concentrations it has toxic effects. (Lahermo 1996). On the basis of EQS values reported in literature, 5 µg/l was chosen as the critical limit value.

In the GSF stream water survey measured concentrations were mostly under 0.1 µg/l.

The Nordic lake survey did not cover selenium.

In the PIVET-register there were 394 results available. Of these most (381 results) were below the determination limit of 0.4 µg/l. The rest of the results (13) showed concentrations below 1µg/l.

On the basis of the available information, there seems to be no reason to include selenium on the list of National Priority Substances.

Vanadium (V)

Vanadium is an essential micro-nutrient for humans. It may also play a role in plant metabolism. On the basis of EQS values reported in literature, 5 µg/l was chosen as the critical limit value for the selection.

Typical concentrations (90 % of results) measured in the GSF stream survey were between 0.1-1.6 µg/l.

In the Nordic lake survey highest concentrations of vanadium measured were below 3 µg/l.

In the PIVET-register there were 1094 results. Of these only 4 (0.4 %) exceeded the set limit value of 5 µg/l. Most results, 1007 (91 %), were below 1 µg/l.

On the basis of the available information, there seems to be no reason to include vanadium on the list of National Priority Substances.

Zinc (Zn)

Zinc is an essential micronutrient for organisms. Above a certain limit it has toxic effects. The PNEC values given in the draft EU risk assessment report do not take into consideration soft waters. Testing of ecotoxicological effects in soft waters is being conducted at the time of writing, but the results are not yet available. On the basis of the PNEC-values a limit value of 20 µg/l was chosen for the selection procedure.

In the GSF stream water survey typical concentrations (90 % of results) were between 1.5 – 25 µg/l. The higher concentrations (>15 µg/l) were measured in the Vaasa region.

In the Nordic lake survey 99.5 % of the lakes in Finland had zinc concentrations below 15 µg/l.

In the PIVET-register there were 7 670 results available. 1 358 (18 %) exceeded the set critical limit value of 20 µg/l. Of these 207 were reported as under a detection limit of 50 µg/l and 9 were reported as under a detection limit of 30 µg/l. 76 results (1 %) gave results at the critical limit value. 756 results (10 %) were reported as under a detection limit of 20 µg/l. In conclusion at least 1 142 results (15 % of all results) exceeded the set critical limit value of 20 µg/l. The exceeding results originated from different parts of the country.

In order to take into account the natural background levels of zinc, the monitoring data was divided into four geographic regions and each region was assigned a background concentration level on the basis of the GSF stream survey mapping. For the exercise all results reported as below the detection limit values of 30 or 50 µg/l were excluded from the data. In table 1 the estimated regional background levels and the proportion of results exceeding the background corrected critical levels are presented. Although the estimated background levels are a rough estimation of the regional distribution of zinc levels, the exercise shows that a large part of monitored results exceed the critical concentration level even when the background is taken into consideration. Of the results exceeding the background corrected concentration limits most were from river water samples. However, a large amount, 377 results, were from lake samples.

On the basis of the available data it is proposed to include zinc on the list of National Priority Substances.

Table 1. Number of zinc results exceeding background + 20 µg/l in different regions. (Results reported as under detections limit were excluded from the data, when the detection limit was over the sum of the critical limit value and estimated background).

	Estimated background level µg/l	Background + 20 µg/l	Number of results exceeding background + 20 µg/l / number of results	Percentage results exceeding background + 20 µg/l
1. Parts of West Finland regional centre (communes Vaasa, Mustasaari, Maalahti)	20	40	21 / 71	30 %
2. Parts of West Finland regional centre (communes Kokkola, Pietersaari, Uuskaarlepyy, Nurmo, Närpiö, Ylistaro, Ilmajoki, Vähäkyrö)	10	30	80 / 295	27 %
3. All other regions, including Kemi and Tornio	5	25	820 / 6687	12 %
4. Lapland (except Kemi and Tornio)	1	21	2 / 401	0.5 %
Total	-	-	923 / 7454	12 %

Documentation page

Publisher	Finnish Environment Institute	Date 17.4.2003
Author(s)	Susan Londesborough	
Title of publication	Proposal for a Selection of National Priority Substances fulfilling the requirements set by the Dangerous Substances Directive (76/464/EEC) and the Water Framework Directive (2000/60/EC)	
Parts of publication/ other project publications	The publication is available in the Internet: www.environment.fi/publications	
Abstract	The purpose of this work was to develop a systematic method for the prioritisation and selection of chemicals used in Finland, and present a well-founded list of National Priority Substances in the context of the Water Framework Directive (WFD) and the Dangerous Substances Directive (DSD). The proposed list of National Priority Substances comprises of 18 industrial chemicals, six pesticides and three metals. For the National Priority Substances environmental quality standards will be determined. Their concentrations will be monitored in the environment, and if necessary they will be included in monitoring programmes in accordance with the Water Framework Directive. When needed, pollution reduction programmes will be established for the priority substances. The selection procedure covered intentionally produced chemicals. Process born substances were excluded from the selection procedure. Their prioritisation and possible inclusion on the list of National Priority Substances must be done separately. Also chemicals present solely in imported products and chemicals regulated by other that the chemicals and pesticide acts, such as cosmetics and pharmaceuticals, were excluded from the selection procedure. The selection procedure aimed at identifying substances that are of relevance in the whole country. Substances that might cause adverse effects locally, need to be addressed on the local level. The selection criteria used served the identification of substances that are expected to exhibit environmental risks in surface waters. For groundwaters a different approach should be used. The selection procedure was based on the intrinsic properties of the chemicals (persistence (P), liability to bioaccumulate (B) and toxicity (T)) and their exposure potential. The selection of metals was based on existing monitoring data. The list of National Priority Substances needs to be revised as new information becomes available. This may lead to exclusion of substances present on the current National Priority Substances list, e.g. if monitoring data show that particular substances are not of national concern. Similarly substances may be included on the list if new data on the intrinsic properties of substances or e.g. increased use volumes indicate that they should be added. In future work special attention must be given to those substances not covered in this work, e.g. pharmaceuticals, cosmetics and chemicals occurring in imported products.	
Keywords	chemicals, pesticides, harmful substances, selection, prioritisation, Dangerous Substances Directive (76/464/EEC), Water Framework Directive (2000/60/EC)	
Publication series and number	The Finnish Environment 622	
Theme of publication	Environmental protection	
Project name and number, if any	Vaarallisten aineiden direktiivin prioriteettiaineita koskevat kansalliset velvoitteet - pilottiprojekti VC05044	
Financier/ commissioner	Ministry of Environment	
Project organization		
	ISSN 1238-7312	ISBN 952-11-1386-3 952-11-1387-1 (PDF)
	No. of pages 80	Language English
	Restrictions Public	Price 12 EUR
For sale at/ distributor	Edita Publishing Ltd.- P.O.Box 800, FIN-00043 EDITA, Finland, Phone + 358 20 450 00. Mail orders: Phone + 358 20 450 05, fax + 358 20 450 2380. Internet: www.edita.fi/netmarket.	
Financier of publication	Finnish Environment Institute	
Printing place and year	Edita Prima Ltd, Helsinki 2003	

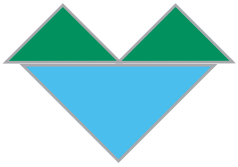
Kuvailulehti

Julkaisija	Suomen ympäristökeskus	Julkaisuaika 17.4.2003
Tekijä(t)	Susan Londesborough	
Julkaisun nimi	Proposal for a Selection of National Priority Substances fulfilling the requirements set by the Dangerous Substances Directive (76/464/EEC) and the Water Framework Directive (2000/60/EC)	
Julkaisun osat/ muut saman projektin tuottamat julkaisut	Julkaisu on saatavana myös Internetistä: http://www.ymparisto.fi/eng/orginfo/publica/electro/fe622/fe622.htm	
Tiivistelmä	Työn tarkoituksena oli kehittää systemaattinen menetelmä haitallisten kemikaalien priorisointiin sekä soveltaa menetelmää vesipuitedirektiivin (2000/60/EC) ja vaarallisten aineiden direktiivin (76/464/EEC) edellyttämään haitallisten aineiden valintaan. Työn tuloksena esitetään ehdotus kansallisten prioriteettiaineiden listaksi. Ehdotus sisältää 18 teollisuuskemikaalia, kuusi torjunta-ainetta sekä kolme metallia. Kansallisille prioriteettiaineille määritetään ympäristönlaatunormit. Niiden ympäristöpitoisuudet kartoitetaan, ja jos aineita esiintyy vesiympäristössä, ne sisällytetään vesipuitedirektiivin mukaisiin seurantaohjelmiin. Tarvittaessa prioriteettiaineille valmistellaan päästönvähennysohjelmat. Valintaprosessi keskittyi tietoisesti tuotettuihin aineisiin, joita käytetään Suomessa. Tarkastelun ulkopuolelle jätettiin siten prosesseissa syntyvät aineet, kuten esimerkiksi dioksiinit. Niiden osalta priorisointi ja mahdollinen sisällyttäminen kansalliselle prioriteettilistalle tulee tehdä erikseen. Myös yksinomaan tuontituotteissa esiintyvät kemikaalit sekä kemikaali- ja torjunta-ainelainsäädännön ulkopuolelle jäävät aineryhmät, kuten mm. lääkeaineet ja kosmetiikassa käytettävät aineet jäivät tarkastelun ulkopuolelle. Valintaprosessissa pyrittiin tunnistamaan haitallisia aineita, jotka ovat merkittäviä valtakunnallisella tasolla. Paikallisella tasolla mahdollisesti vesistöhaittoja aiheuttavat kemikaalit, esim. harvojen tuotantolaitosten käyttöön rajoittuvat kemikaalit, tulee huomioida paikallisella tasolla. Valinta kohdistui aineisiin, joiden voidaan epäillä aiheuttavan ympäristöhaittoja nimenomaan pintavesissä. Pohjavesien suojeluun tähtäävässä aineiden priorisoinnissa tulee käyttää muuta lähestymistapaa, joka ottaa huomioon pohjavesien erityispiirteet. Esitetty kemikaalien valintamenettely perustui sekä aineen ominaisuuksiin (pysyvyys (P), kertyvyys (B), toksisuus (T)) että altistuspotentiaaliin. Metallien valinta pohjautui olemassa olevaan pitoisuustietoon. Esitetty kansallisten prioriteettiaineiden luettelo tulee tarkistaa ja uudistaa määräajoin. Kemikaalien käyttömäärien ja käyttötapojen muuttuessa sekä tiedon lisääntyessä käytössä olevista aineista tulee joidenkin aineiden poistaminen ja toisten lisääminen listalle tarpeelliseksi. Tulevaisuudessa on syytä kiinnittää erityistä huomiota tämän tarkastelun ulkopuolelle jääviin aineryhmiin, esim. lääkeaineisiin, kosmetiikkatuotteisiin sekä yksinomaan tuontituotteissa esiintyviin aineisiin.	
Asiasanat	kemikaalit, torjunta-aineet, haitalliset aineet, valinta, priorisointi, vaarallisten aineiden direktiivi (76/464/EEC), vesipuitedirektiivi (2000/60/EC)	
Julkaisusarjan nimi ja numero	Suomen ympäristö 622	
Julkaisun teema	Ympäristönsuojelu	
Projektihankkeen nimi ja projektinumero	Vaarallisten aineiden direktiivin prioriteettiaineita koskevat kansalliset velvoitteet - pilottiprojekti, VC05044	
Rahoittaja/ toimeksiantaja	Ympäristöministeriö	
Projektiryhmään kuuluvat organisaatiot		
	ISSN 1238-7312	ISBN 952-11-386-3 952-11-1387-1 (PDF)
	Sivuja 80	Kieli Englanti
	Luottamuksellisuus Julkinen	Hinta 12 e
Julkaisun myynti/ jakaja	Edita Publishing Oy, PL 800, 00043 EDITA, vaihde 020 450 00. Asiakaspalvelu: puhelin 020 450 05, faksi 020 450 2380. Sähköposti: asiakaspalvelu@edita.fi. www.edita.fi/netmarket	
Julkaisun kustantaja	Suomen ympäristökeskus	
Painopaikka ja -aika	Edita Prima Oy, Helsinki 2003	

Presentationsblad

Utgivare	Finlands miljöcentral	Datum 17.4.2003
Författare	Susan Londesborough	
Publikationens titel	Proposal for a Selection of National Priority Substances fulfilling the requirements set by the Dangerous Substances Directive (76/464/EEC) and the Water Framework Directive (2000/60/EC)	
Publikationens delar/ andra publikationer inom samma projekt	Puplicationen finns tillgänglig på Internet: http://www.ymparisto.fi/eng/orginfo/publica/electro/fe622/fe622.htm	
Sammandrag	Rapporten presenterar en systematisk metod för att prioritera och välja farliga ämnen enligt de krav som ställs i ramdirektivet för vattenpolitik (2000/60/EC) och direktivet om utsläpp av vissa farliga substansen i vattenmiljön (76/464/EEC). Som resultat presenteras ett förslag till en lista om nationellt prioriterade farliga ämnen. Förslaget innehåller 18 industriellt använda kemikalier, sex pesticider och tre metaller. För de utvalda prioriterade ämnena kommer gränsvärden för ytvattenkvalitet att fastställas. Deras halter kommer att mätas i den akvatiska miljön, och om de förekommer i miljön, kommer de att inkluderas i programmen för miljöövervakning. Vid behov kommer man att bereda program för minskning av utsläpp av de prioriterade ämnena. Urvalsmetoden koncentrerade sig på avsiktligt tillverkade ämnen. Ämnen som bildas vid processer, t. ex. dioxiner, beaktades inte. Meningen var att identifiera sådana ämnen som är relevanta för hela landet. Ämnen som förekommer endast i importerade produkter, och ämnen som inte omfattas av kemikalielagen eller lagen om bekämpningsmedel, blev inte heller beaktade i den här genomgången. Urvalsproceduren inriktades speciellt på sådana ämnen, som kan misstänkas förorsaka miljöskador i ytvattenekosystemen. För att identifiera farliga ämnen relevanta för grundvattnet, bör man använda en annan metod, som tar hänsyn till grundvattnets särskilda egenskaper. Den använda urvalsproceduren var baserad på ämnenas egenskaper (persistens (P), bioackumulerbarhet (B) och giftighet dvs. toxicitet (T)) och på den potentiella exponeringen för dem. De prioriterade metaller blev identifierade på basen av existerande data om halterna i den akvatiska miljön. Eftersom kemikaliernas användningssätt och de använda mängderna förändras, bör listan uppdateras regelbundet. I fortsättningen måste särskild uppmärksamhet ägnas de ämnen som inte beaktades i det här arbetet.	
Nyckelord	kemikalier, pesticider, farliga ämnen, urvalsprocedur, ramdirektivet för vattenpolitik (2000/60/EC), direktivet om utsläpp av vissa farliga substansen i vattenmiljön (76/464/EEC)	
Publikationsserie och nummer	Miljö i Finland 622	
Publikationens tema	Miljövård	
Projektets namn och nummer	Vaarallisten aineiden direktiivin prioriteettiaineita koskevat kansalliset velvoitteet - pilottiprojekti VC05044	
Finansiär/ uppdragsgivare	Miljöministeriet	
Organisationer i projektgruppen		
	ISSN 1238-7312	ISBN 952-11-1386-3 952-11-1387-1 (PDF)
	Sidantal 80	Språk Engelska
	Offentlighet Offentlig	Pris 12 EUR
Beställningar/ districution	Edita Publishing Ab, PB 800, 00043 EDITA, växel 020 450 00. Postförsäljningen: Telefon 020 450 05, fax 020 450 2380. Internet: www.edita.fi/netmarket	
Förläggare	Finlands miljöcentral	
Tryckeri/ tryckningsort och -år	Edita Prima Ab, Helsingfors 2003	

The Finnish Environment



ENVIRONMENTAL PROTECTION

Proposal for a Selection of National Priority Substances

About 30 000 chemical products containing more than 5000 chemicals classified dangerous to the environment or human health are produced in or imported to Finland yearly. For the majority of these insufficient data on their effects in the environment exist. Similarly for only a very limited number of the chemicals monitoring data are available.

The purpose of this work was to develop a systematic method for the identification of chemicals that can pose environmental risk to surface waters in Finland. The prioritisation and selection procedure developed is based on the intrinsic properties of the chemicals (persistence, liability to bioaccumulate and aquatic toxicity) and their exposure potential. The selection concentrated on intentionally produced chemicals. For the selection of priority metals existing monitoring data were used. As a result a well-founded list of National Priority Substances is proposed. The proposed list of National Priority Substances comprises of 18 industrial chemicals, six pesticides and three metals.

The list of National Priority Substances needs to be revised, as new information on the effects and exposure potential of chemicals becomes available. In future work special attention must be given to those substances that could not be covered in this work, for example, pharmaceuticals, chemicals occurring in imported products and chemicals that lacked data on their intrinsic properties.

The publication is available in the internet:
www.environment.fi/publications

ISBN 952-11-1386-3
ISBN 952-11-1387-1 (PDF)
ISSN 1238-7312

Edita Publishing Ltd.
P.O.Box 800, FIN-00043 EDITA, Finland
Phone +358 20 450 00
Mail orders:
Phone +358 20 450 05, fax +358 20 450 2380
Edita-bookshop in Helsinki:
Annankatu 44, phone +358 20 450 2566

9 789521 113864

FINNISH ENVIRONMENT INSTITUTE P.O.BOX 140, FIN-00251 HELSINKI