Selection of priority pollutants for monitoring campaigns in four European cities within the ScorePP project

Maria Pettersson[1], Marie-Louise Nilsson[1], Kemi Seriki[2], Tonie Wickman[1], Luis Castillo[2], Arne Jamtrot[1] and Eva Eriksson[3]

[1]Environment and Health Administration, City of Stockholm, Stockholm, Sweden
[2]Centre de Recherche sur l'eau - Veolia Environnement, Maison-Laffitte Cedex, France
[3]Department of Environmental Engineering, Technical University of Denmark, Lyngby, Denmark

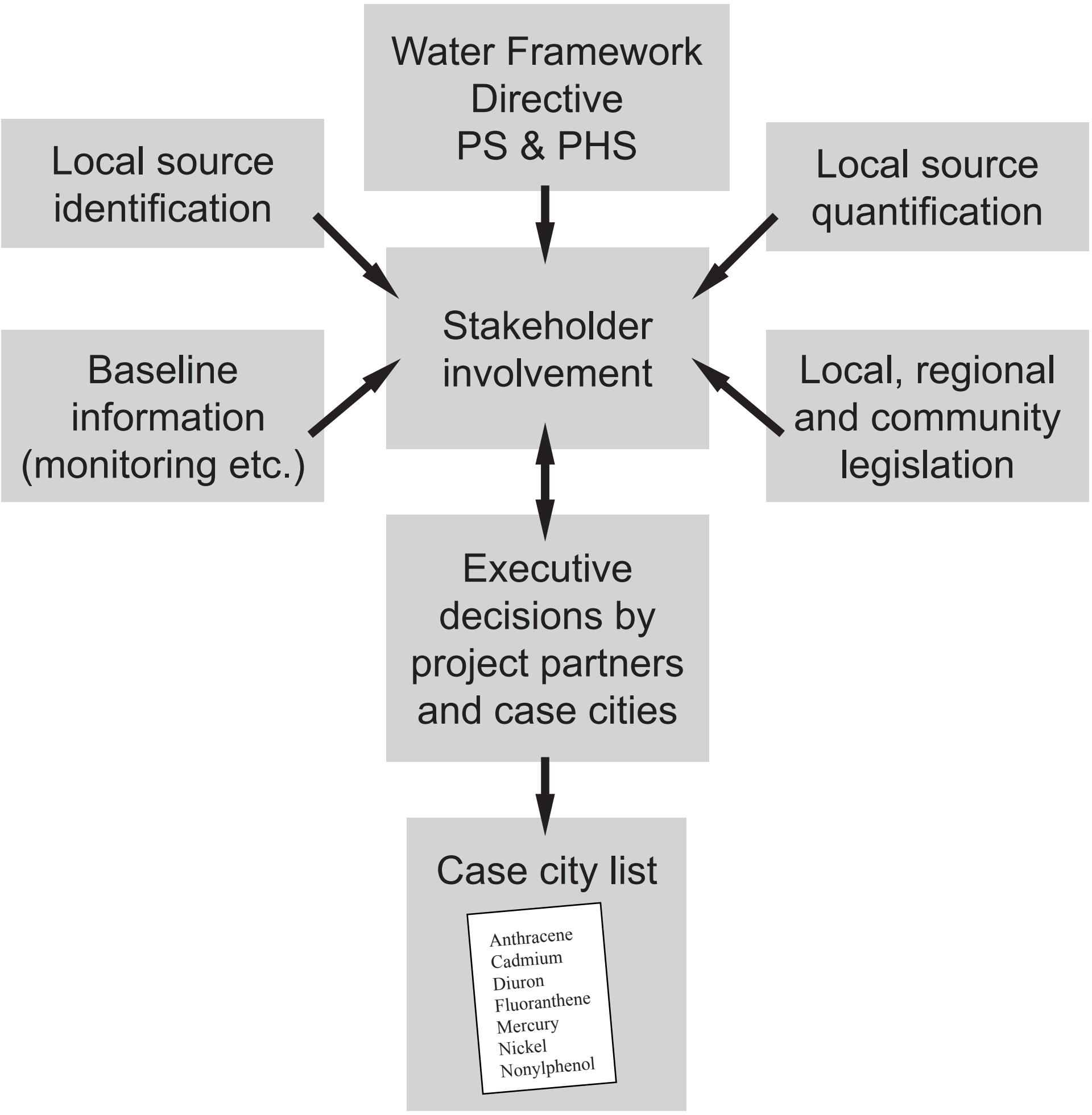email contact: maria.pettersson@miljo.stockholm.se

Aim

For improved case studies it is crucial to identify relevant priority pollutants (PPs) to study.
The aim of this study was to establish appropriate lists of PPs to be studied in the case cities within the ScorePP project.

Methods

The ScorePP Road Map

As a guide for selecting the most relevant PPs in each case city the ScorePP Road Map was used.
The ScorePP Road Map originates from the Chemical Hazard Identification and Assessment Tool (CHIAT) for prioritisation of pollutants, but is adjusted for the selection of substances within a local context.
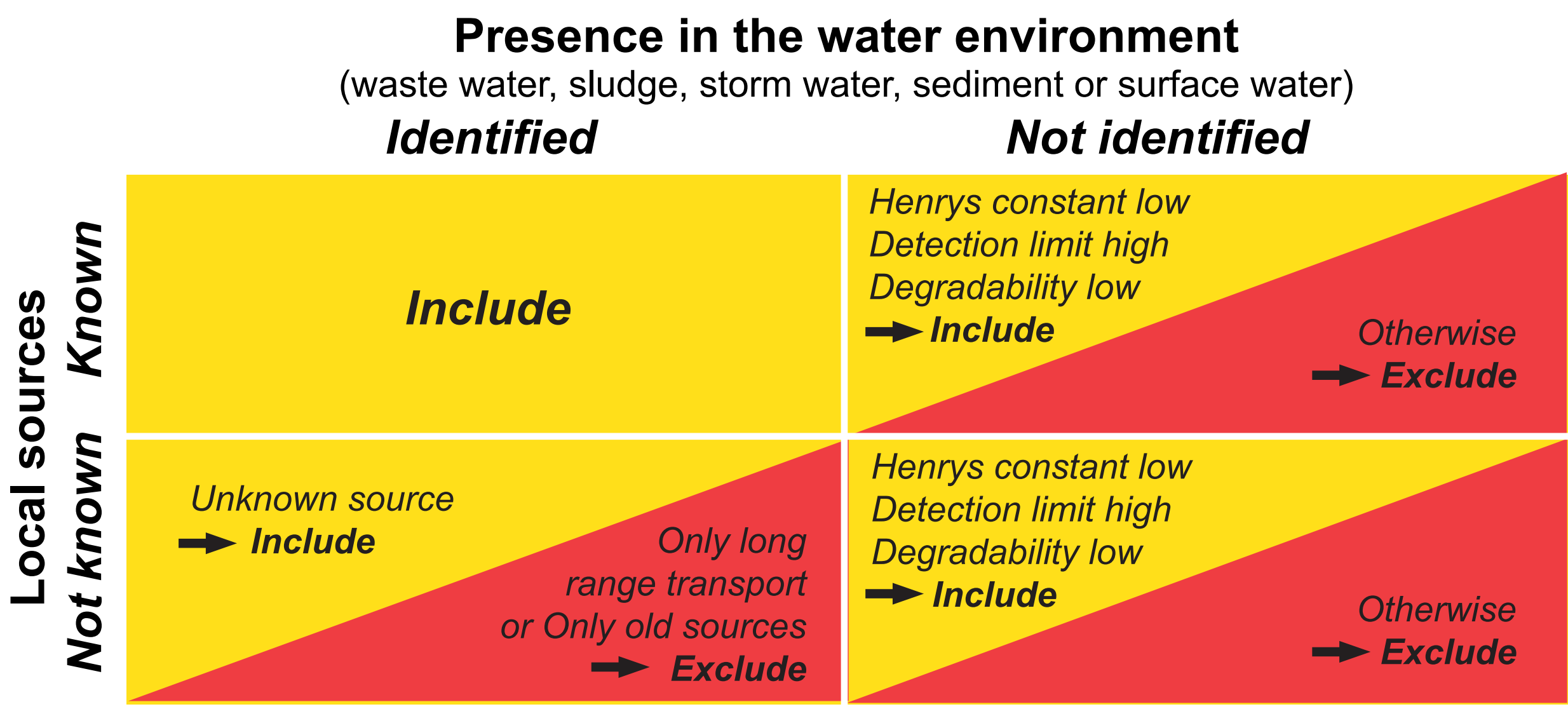

Introduction

The ScorePP project (Source Control Options for Reducing Emissions of Priority Pollutants) is a European project aiming to develop comprehensive and appropriate source control strategies that authorities, cities, water utilities and the chemical industry can employ to reduce emissions of priority pollutants (PPs) from urban areas into the receiving water environment. Focus is on the 33 priority and priority hazardous substances (PS and PHS) and substance groups identified in the European Water Framework Directive (WFD), and the substances for which Environmental Quality Standards (EQS) recently were adopted by the European Environment Council.
To ensure the development of efficient and appropriate source control strategies, four European case cities in Sweden, Spain, France and the Czech Republic are included in the project. Case studies are performed in these cities to provide information about the situation regarding PPs in each city.

Rationale for selection of priority pollutants

For the selection of relevant PPs for each case city the following criteria were used:

A) If a PP has a local source and is present in the city's water environment (wastewater, sludge, stormwater, sediment or surface water) it is selected.

B) If a PP has a local source but there is no data showing its presence in the city's water environment, the value of its Henry's law constant (K_H) is considered to estimate if the PP may be an issue in the water environment. Also results from monitoring studies in the water environment in other areas are considered.

C) If no local source is identified but the PP is present in the water environment within the case city, legislations, physico-chemical parameters and economic activities within the city are used to estimate the relevance of selecting the PP. For example, if a PP is banned and it is a persistent compound, its presence in the water environment most probably is due to old uses and it is not relevant to select the PP. If use of a PP within the case city is indicated or it is present in products imported into the case city the PP should be selected.

D) If no local source is identified and the PP is not identified in the city's water environment, legislation and the value of the Henry's law constant are used to estimate if the pollutant may be an issue in the water environment. For example, if it is indicated that a PP is in use within the case city or is present in products imported into the case city and the Henry's law constant or other monitoring studies indicate that the PP may be present in water, it is selected.

E) PPs assumed to be problematic by the government or stakeholders are selected.

Results

Due to lack of monitoring data and statistics in some of the case cities, the selection was made on different bases for different case cities. For the Swedish city, the monitoring data for PPs in the water environment was relatively comprehensive and therefore the presence of PPs in the water environment together with knowledge about local sources was considered to be most important when selecting the PPs. However, for the case cities in Spain, France and the Czech Republic, the selections were more often based on legislation and the physico-chemical parameters of the PPs, but also on economic activities in the cities. In the Spanish city the selection was also based on information about pollutant releases from industries to the sewage network, and in the Czech city monitoring data on surface water and air was also taken into consideration.
After selection of the most relevant PPs, further PPs were added to the lists to facilitate comparison of the case cities and to ensure that all PHS were included in at least two of the case city lists.
Overall, the lists include 29 PPs (13 PHS) and for 18 of them it is possible to compare all the case cities.

Conclusions

This study presents a prioritisation tool for the selection of pollutants to be studied in a local context, especially in urban areas.
It was shown that the data available in cities are not always sufficient for the selection of relevant PPs. There is often a lack of comprehensive monitoring data for the water environment within a city. In some cases there is no data at all, the available data is too old, or analyses are performed with too high detection limits. This resulted in extensive lists of PPs selected for monitoring and other studies in the case cities. This calls for further acquisition of knowledge about local sources and environmental levels in the cities.

Selected priority pollutants for studies in the case cities

Substance	PHS	City I Selected	City I Criteria	City I Added	City II Selected	City II Criteria	City II Added	City III Selected	City III Criteria	City III Added	City IV Selected	City IV Criteria	City IV Added
Alachlor					X	D		X	A				
Anthracene	X	X	A		X	B		X	B		X	B	
Atrazine								X	C				
Benzene													
Pentabromodiphenylether (PBDE)	X	X	A		X	B		X	D		X	D	
Cadmium and its compounds	X	X	A		X	D		X	B		X	A	
Chloroalkanes, C10-13	X	X	A		X	B		X	D		X	D	
Chlorfenvinphos													
Chlorpyrifos		X	C		X	D					X	B	
Ethylene dichloride													
Dichloromethane													
Di(2-ethylhehyl)-phthalate (DEHP)		X	A		X	B		X	D		X	D	
Diuron					X	D		X	D		X	D	
Endosulfan	X			X	X	E							
Fluoranthene		X	A		X	B		X	A		X	B	
Hexachlorobenzene	X			X							X	D	
Hexachlorobutadiene	X						X			X			
Hexachlorcyclohexane	X				X	E		X	D				
Isoproturon					X	B							
Lead and its compounds		X	A		X	D		X	B		X	A	
Mercury and its compounds	X	X	A		X	D		X	B		X	B	
Naphthalene		X	A		X	B		X	A		X	B	
Nickel and its compounds		X	A		X	D		X	B		X	A	
Nonylphenol	X	X	A		X	D		X	D		X	E	
Octylphenol		X	A		X	B		X	D		X	E	
Pentachlorobenzene	X	X	D		X	C		X	D				
Pentachlorophenol		X	C		X	D		X	D		X	C	
PAH	X	X	A		X	B		X	A		X	B	
Simazine													
Tributyltin compounds	X	X	A		X	D		X	D		X	D	
Trichlorobenzenes		X	D		X	D		X	C		X	B	
Trichloromethane													
Trifluralin					X	E		X	D		X	D	
DDT total					X	E							
Aldrin													
Endrin													
Isodrin		X	D		X	D		X	D		X	D	
Trichloroethylene													
Tetrachloroethylene													
Carbontetrachloride													
Dieldrin													

PHS = Priority Hazardous Substance according to Annex II of the Directive on Priority Substances (Directive 2008/105/EC)

References

1. European Commission (2000). Directive 2000/60/EC of the European Parliament and the Council of 23 October 2000 establishing a framework for Community action in the field of water policy, Official journal of the European Commission L 327/1-72.
2. European Commission (2006). Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on environmental quality standards in the field of water policy and amending Directive 2000/60/EC (presented by the Commission) COM/2006/397/Final.
3. Council of the European Union (2008)_2898th meeting of the COUNCIL OF THE EUROPEAN UNION| (Environment), 14164/08
4. Eriksson, E., A. Mikkelsen, P.S. & Ledin, A. (2005). Chemical hazard identification and assessment tool for evaluation of storm water priority pollutants. Water Science and Technology, 51, (2), 47-55.