2. Substances to be monitored

2.1 Background

The objective of the Stockholm Convention is to protect human health and the environment from POPs with the ultimate goal to eliminate them, where feasible.. An obvious way to evaluate the effectiveness of the Convention is to measure the concentration of the POPs listed in annexes A, B, and C of the Convention in relevant matrices (see chapter xx). The initial twelve persistent organic pollutants include the following substances or groups of substances:

- Aldrin
- Chlordane*
- Dichlorodiphenyltrichloroethane (DDT)*
- Dieldrin
- Endrin
- Heptachlor
- Hexachlorobenzene (HCB)
- Mirex
- Polychlorinated biphenyls (PCB)*
- Polychlorinated dibenzo-*para*-dioxins (PCDD)*
- Polychlorinated dibenzofurans (PCDF)*
- Toxaphene*

Substances marked with an asterix are mixtures of several congeners, for some of them several hundreds.

The above list is restricted to the 12 initial POPs, but the COP may decide to add additional POPs to either of the three annexes, in which case these additional POPs would be included in the global monitoring programme and this chapter would have to be modified accordingly.

2.2 Recommendations for POPs to be analysed

Based on recommendations from the GMP workshop in May 2003 and because it may not be necessary or even possible to analyse all individual congeners of the mixtures in the above list, the following substances are recommended for analysis (see Table 2.1). Substances in Table 2.1 include the parent POPs or selected parent congeners but also some major transformation products that are of interest for monitoring programmes to support the effectiveness evaluation.

For PCB, it is recommended to analyze and report on the seven congeners individually to allow calculation of the sums of six or seven PCB depending on the monitoring program.

For the reporting of Toxic Equivalency Factor (TEQ) (for PCDD, PCDF, and dl-PCB) it is recommended to report the concentrations of all 29 congeners and separately show the TEQ derived individually from PCDD, PCDF and dl-PCB as well as the total TEQ.

Table 2.1: Recommended analytes

Chemical	Parent POPs	Transformation products
Aldrin	Aldrin	
Chlordane	*cis*- and *trans*-chlordane	*cis*- and *trans*-nonachlor, oxychlordane
DDT	4,4'-DDT, 2,4'-DDT	4,4'-DDE, 2,4'-DDE, 4,4'-DDD, 2,4'-DDD
Dieldrin	Dieldrin	
Endrin	Endrin	
HCB	HCB	
Heptachlor	Heptachlor	heptachlorepoxide
Mirex	Mirex	
Polychlorinated biphenyls (PCB)	ΣPCB_7 (7 congeners: 28, 52, 101, 118, 138, 153, and 180	
	PCB with TEFs* (12 congeners): 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, and 189	
Polychlorinated dibenzo-*p*-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF)	2,3,7,8-substituted PCDD/PCDF (17 congeners)	
Toxaphene	Congeners P26, P50, P62	

* PCB with TEFs (Toxic Equivalency Factors) assigned by WHO

For the GMP, concentrations of POPs in various matrices have to be determined and changes in these concentrations need to be documented. This is to be undertaken regionally while also achieving global coverage. Highest requirements on analytical performance are therefore needed to identify small changes in concentrations.

Fort the first evaluation, it is recommended to collect data for all 12 POPs (parent compounds and transformation compound as shown in Table 2.1 above).

2.3 References

Web references:

GMP workshop (2003): http://www.chem.unep.ch/gmn/Files/popsmonprg_proc.pdf

PCB numbering and nomenclature:

PCB: http://www.epa.gov/toxteam/pcbid/table.htm

K. Ballschmiter and M. Zell (1980): Analysis of polychlorinated biphenyls (PCB) by glass capillary gas chromatography. Fresenius Z. Anal. Chem. **302**, 20-31

K. Ballschmiter, R. Bacher, A. Mennel, R. Fischer, U. Riehle, and M. Swerev (1992): Determination of chlorinated biphenyls, chlorinated dibenzodioxins, and chlorinated dibenzofurans by GC-MS. J. High Resol. Chromatogr. **15**, 260-270

Toxaphene numbering and nomenclature:

M. Coelhan and H. Parlar (1996) : The nomenclature of chlorinated bornanes and camphenes relevant to toxaphene. Chemosphere **32**, 217-228

Toxicity equivalency factors:

WHO re-evaluation (2005): http://www.who.int/ipcs/assessment/tef_update/en/index.html