POLYCHLORINATED NAPHTHALENES AND THE UN-ECE POP PROTOCOL

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Introduction

In June 1998 at the Fourth Pan-European Environmental Ministerial Conference in Aarhus, Denmark the UN-ECE POP Protocol was signed by its 33 member states and the European Union under the Convention on Longe-Range Transboundary Air Pollution (CLRTAP). The objective of the protocol is "to control, reduce or eliminate discharges, emissions and losses of persistent organic pollutants". The substances included in the POP Protocol are characterised as being persistent, bioaccumulating and toxic organic compounds prone to long-range atmospheric transport. Sixteen priority substances are included. The POP Protocol bans the production and use of some products outright (aldrin, chlordane, chlordecone, dieldrin, endrin, hexabromobiphenyl, mirex and toxaphene). Other POPs are scheduled for elimination at a later stage (DDT, heptachlor, hexachlorobenzene and PCBs). The use of DDT, HCH (including lindane) and PCBs is severely restricted. The UN-ECE POP Protocol obliges parties to reduce their emissions of dioxins, furans, PAHs and hexachlorbenzene below their levels of 1990.

During the preparation of the POP Protocol many of the substances suggested by the member states were not included due to a lack of adequate information. It was realised that more information would probably become available for these substances. Also it is was considered unlikely that the present 16 substances included in the POP Protocol are the only POPs released to the environment that have the potential to cause adverse effects at long distances from their points of release. For these two reasons Article 14 was included which states that Parties can propose amendments to add new substances to the UN-ECE POP Protocol. Hitherto, a procedure was included, which is described in Executive Body (EB) decision 1998/2 resulting in the drafting of a risk profile on the substance, which has to be submitted to the Executive Body. A risk profile is: "a comprehensive review of the scientific information related to the determination of general human health and environmental risks associated with the uses and releases of a substance". In the risk profile it must be shown that the substance complies with the criteria from EB decision 1998/2 as presented below.

Criterion

Potential long range atmospheric transport	Vapour pressure: < 1000 Pa Atmospheric half-life: > 2 days[a]	and
Toxicity	Potential to adversely affect human health the environment	and/or
Persistence	Half-life in water: > 2 months Half-life in sediment: > 6 months	or or

	Half-life in soil: > 6 months[b]	
Bioaccumulation	Log Kow: > 5	or
	Bioconcentration factor (BCF): > 5000	or
	Bioaccumulation factor (BAF): > 5000[c]	

[a] or monitoring evidence in remote regions
[b] or evidence that the substance is otherwise sufficiently persistent to be of concern within the scope of the protocol
[c] or if the bioaccumulation potential is significantly lower than these criteria, other factors, such as the high toxicity of the substance, that make it of concern within the scope of the protocol

At it's seventeenth session in 1999 the Executive Body of the UN-ECE CLRTAP decided that an Ad-hoc Expert Group on POPs should be formed. This expert group should review the evidence on specific POP compounds with a view to:

- making the best use of available knowledge to meet the existing obligations for substances listed in the POP Protocol;
- assist Parties in identifying which candidates may be given priority for inclusion in the POP Protocol.

Most of the substances included in the POP Protocol are already banned and subsequently not produced or used any more in the UN-ECE region. The Dutch Ministry of Housing, Physical Planning and Environment (VROM) therefore considered adding new substances crucial for the long term success of the POP Protocol. A project to select possible new candidates was started which is carried out by Royal Haskoning.

From a data-base on PBT substances a selection was made of four candidates, one of them being polychlorinated naphthalenes (PCNs). A risk profile was drafted and presented in three meetings of the Ad-hoc Expert Group on POPs. In the last meeting in Geneva in 2002 the final version was presented and agreed upon.

PCNs do clearly meet the UN-ECE POP criteria. PCNs are detected in remote areas and contribute a significant portion of the total dioxin-like activity in environmental samples. Much information has become available the last decade –and will probably continue to grow– on aspects like dioxin-like toxicity, monitoring data in biota, air, sediment and soil in industrialised as well as remote areas, and emission routes and estimates.

PCNs can enter the environment via the following routes:

- Production: there is no production any more of PCNs. The global production of PCNs has been estimated to be 150,000 tons;
- Use: there is no –maybe only minor– commercial use any more of PCNs. Most important uses, in terms of volume, were in: cable insulation, wood preservation, engine oil additives, electroplating masking compounds, feedstocks for dye production, dye carriers, capacitors and refracting index testing oils. More detailed –quantitative– data are not available;
- Technical PCB formulations: PCNs are formed in the production of PCBs. Recently several authors measured the PCN content in commercial PCBs up to approximately 1 mg/kg. A potential release of 100-169 tons can be estimated, being <0.1% of the total global production of PCNs of 150,000 tons;
- Thermal and other processes: PCNs have been measured in fly ash from waste incinerators, iron sintering plants and cement kilns. The congener spectra are different from commercial mixtures

like Halowax and contain mainly di- to heptachlorinated naphthalenes;

- Landfills: potentially a large source for PCNs due to their historical use pattern. Laboratory data show that PCNs are released from old capacitors and wires from electronic equipment. However, almost no actual measurements are available.

Due to their toxicological profile and the fact that PCNs are long-range transported chemicals in air, they are a candidate for the UN-ECE POP Protocol. An important issue is which measures can be taken to reduce the present environmental levels in addition to the ones already in the POP Protocol for POPs with a comparable emission pattern.

Reference:

E. van de Plassche and A. Schwegler (2002). Risk Profile Polychlorinated Naphthalenes. Prepared for the UN-ECE Ad-hoc Expert Group on POPs.