Saltsjöbaden V

Working Group 6: POPs and Heavy Metals

Co-chairs: **John Munthe**, IVL Swedish Environmental Research Institute, Sweden; **Katja Kraus**, Federal Environment Agency, Germany; **Matthew Macleod**, Stockholm University, Sweden.

Participants: **Petra Hagström**, Swedish Environmental Protection Agency; **Agnes Petendi**, Ministry of Rural Development, Hungary; **Andreas Beguin**, Stockholm University, Sweden; **Tor Johannessen**, Climate and Pollution Agency, Norway; **Simon Wilson**, Arctic Monitoring and Assessment Programme, Working Group of the Arctic Council; **Ramon Guardans**, independent scholar, Spain; **Donatas Iliška**, Lithuanian Environmental Protection Agency, Lithuania.

Driving forces for continued work on heavy metals and persistent organic pollutants

Health impacts

Note: No health experts participated in the working group on persistent organic pollutants (POP) and heavy metals (HM). Information about health effects of HM and POP was summarized from external information sources and participants in the working group on health effects (Professor Lars Barregård). Some of the key health related aspects of HM and POP that provided a basis for discussions in the working group were:

- As for other air pollutants such as PM and NOx there is growing evidence of human health effects from **HM** and **POP** (and from chemicals in general) at low exposures. Given the increasing epidemiological evidence of low-dose effects, the present concepts of thresholds or safe exposure levels are not sufficient. The focus for future policies should be to reduce exposures to a minimum.
- The **cadmium** exposure level of the European population is above the effects level with increased risks for osteoporotic fractures and kidney effects (PHIME, 2011). Recent research also strongly indicates that Cd exposure increases cancer risks (WHO 2013) and the risk of cardiovascular disease. Biomonitoring shows that the levels of cadmium exposure are not declining.
- Exposure to **methylmercury** via fish consumption increases the risks for cardiovascular disease in adults but these effects are compensated by the positive effects of fish-eating. Negative effects on foetuses exposed via the mothers' consumption of fish can likewise be compensated unless exposure is high. Nevertheless, a recent EU study recommends to avoid consuming fish species high up in the food chain and fish from contaminated lakes to reduce risks of methylmercury exposure (PHIME, 2011).
- Reduced emissions of **Lead** are often described as a risk management success story with dramatically lowered general population exposure since the abolition of lead from petrol. Unfortunately, recent research reveals that adverse effects on children's cognitive ("IQ") function and behaviour are found at much lower lead exposure levels than was previously known. Also effects on risk of hypertension in adults have been

suggested. Therefore international bodies such as the US National Toxicology programme, The European Food Safety Authority (EFSA) and the WHO/FAO have recently revised their recommendations regarding intake of lead.

- For POP, as well as for organic contaminants in general, associations between environmental exposures and adverse health outcomes are difficult to quantify for a variety of reasons, including complex mechanisms, a multitude of potential sources for exposures and lack of knowledge of effects of mixtures. Nevertheless, concern about exposure and health effects has led to a number of international actions such as the WHO International Programme on Chemical Safety (WHO, 2013) and the UNEP Strategic Approach to International Chemicals Management (SAICM, 2013). For some substance groups, specific health effects have been identified such as dioxins (reproductive and developmental disorders, immune system damage and cancer) and PAH (cancer). The majority of the POPs listed in the Stockholm Convention are known to be endocrine disrupting chemicals (WHO/UNEP, 2012).

For both HM and POP, human and ecosystem exposures occur via a number of pathways including direct contact with chemical-containing products, exposure in the indoor environment, and exposure from the far-field environment through air, water and food. Science-based policies aimed at reducing exposure need to consider all relevant exposure pathways. Atmospheric emissions and long range transport contribute in varying degrees to the exposure either directly or indirectly (e.g. via uptake in food chains in remote areas). The concern for health effects caused by HM and POP warrants further policy action to reduce atmospheric emissions and long-range transport. It is very important to acquire good quality data and develop effective models to inform international policy and management actions for HM and POP and to assess the effectiveness of these policies and actions.

Short term priorities for actions on HM and POP

The HM and POP protocols under CLRTAP were signed in 1998 and were amended in 2009 (POP) and 2012 (HM). There are some outstanding issues from the revision of the HM protocol, i.e. setting requirements for mercury-containing products and specific emission limit values for HM from industrial sources that will be addressed at EB. At present there are no plans for further amendments of these protocols and parties should be encouraged to ratify the amended protocols on HM and POPs.

Specifically within the activities of the CLRTAP there is a great need for increased engagement and cooperation with the EECCA countries to support development of emission inventories, monitoring and modelling. Cooperation with EECCA countries should be improved on both the scientific and policy levels.

The Executive Bureau (EB) of the CLRTAP should make use of monitoring and modelling results on HM and POP to demonstrate the achievements of the HM and POP protocols. These results can be used to encourage further ratification of the convention and to illustrate the potential benefits of further action. The role played by the integrated scientific approach that combines emissions estimation, monitoring, modelling should be highlighted since it has the potential to allow progress to be charted, and to identify areas for improvement.

Priorities for further policy actions for HM are:

- Establish emission limit values for individual heavy metals
- Capping mercury emissions to avoid increase in total emissions due to increased activity or appearance of new sources (i.e. even if emission limit values are met at individual sources).

- Further regulation of products containing HM

Short term priorities for further policy actions on POP are:

- Initiate a process to enhance the synergies and cooperation between the CLRTAP and the Stockholm Convention and other international conventions, programs and policies.

CLRTAP HM and POP protocols in relation to other international conventions, policies and programs

Selected POPs are currently regulated under the UNEP Stockholm Convention on POPs and a new global convention on mercury, the Minamata Convention, will be signed in October 2013. HM and chemicals are also directly or indirectly regulated or monitored in various other international, EU-level and national legislations including the Basel and Rotterdam conventions, various EU directives on products, waste and industrial emissions and REACH. HM and PAH are also included in the EU Air Quality Daughter directive.

There are therefore overlapping policy frameworks that control the use and emissions of HM and POP and the future of CLRTAP work on these substance groups should be planned in relation to this.

In addition to policy frameworks, large efforts on monitoring and assessment are made under international programs such as the Arctic Monitoring and Assessment Programme under the Arctic Council. POP and HM are also in focus in regional sea conventions such as HELCOM and OSPAR.

The unique characteristics of CLRTAP among the various international conventions and programs are the strong links between science and policy and the integrated approach with an organizational system and expertise to develop emission inventories, monitoring programs, modelling activities and impact assessment on an international scale. CLRTAP can thus provide substantial support to other international conventions and programs focussed on either regulation or monitoring and assessment. CLRTAP can provide scientific assessments of abatement options for compounds restricted or banned under other conventions and agreements. Implementation of CLRTAP provides a mechanism by which parties can meet many of their obligations to other international agreements.

CLRTAP is the primary regional convention addressing air pollution by lead, cadmium and PAH and provides an international framework for research on these substances that could support possible future global work and the development of synergies.

Our recommendation is thus that CLRTAP should initiate cooperation with other conventions and programs working on different aspects of POPs and HM e.g. Stockholm Convention, Arctic Council/AMAP, Minamata Convention. An important part of this initiative is to evaluate and communicate the potentials for synergies and benefits in activities for a wide range of POP, HM and chemical contaminants in general.

A specific aspect is the benefits resulting from good monitoring and modelling practices as have been developed under e.g. CLRTAP, AMAP, OSPAR, HELCOM and proven useful to define and achieve environmental and public health objectives. Furthermore, joint efforts between international conventions and programs should promote ways to increase data sharing also with independent research activities e.g. by establishing routines for data storage in designated repositories.

As a first step, a strategic workshop on POPs focusing on enhancing synergies on e.g:

- Data storage, sharing and reporting

- Ecosystem and human health effects
- Monitoring and modelling
- Identification of emerging chemicals of concern

As a second step, a strategic workshop on Hg focusing on cooperation and enhancing synergies with the Minamata convention.

An additional issue to discuss is the funding of activities carried out by CLRTAP since the current protocols do not include funding arrangements for activities outside the scope of CLRTAP.

With a broadened perspective on chemical contaminants, it is also relevant to explore if legislation such as the EU REACH directive can be a driving force in efforts to combat environmental contamination of Persistent Toxic Substances (PTS).

CLRTAP can make significant contributions to the global assessment, management and governance of HM and POP and should initiate cooperation with other international conventions and programs.

Scientific Priorities for future work on HM and POP in CLRTAP

There is a need for an improved understanding of emissions, long range transport and exposure of HM and POP to allow for a systematic identification of risks and for evaluation of options for emission control. An integrated approach is necessary to exploit synergies in research i.e. including emissions, modelling and monitoring as well as impact assessment. Some prioritised areas for development are:

- Promote development of alternative methods for emission inventories for POPs. Current inventories are not complete and lack of emission data is a large source of uncertainty in modelling and assessment. Methodologies applied for air pollutants (i.e. based on activity data and emission factors for individual sources and compounds) cannot be applied for many POPs, and may not be the most effective approach even when they are applicable. New approaches based on either a combination of monitoring and modelling at regional and local scales, or on substance flow analyses, should continue to be developed, and incorporated into emission inventories. In addition, historical emission data and models are needed to be able to take into account re-emissions of POPs and mercury.
- Promote data sharing between CLRTAP monitoring programs and external research projects (i.e. short-term or project data) by developing data management and QA/QC procedures that build on existing systems. Original data from monitoring, modelling, and emission inventories should be stored in agreed formats on an effective distributed network of interoperative locations. Additional data sources can be linked through meta data specifications.
- Stimulate an increase of national and EU research funding directed at relevant issues for CLRTAP
- Stimulate an increase of funding for research and implementation for cooperation with non OECD countries in cooperation with e.g. UNEP, GEF, SAICM.

- Improve the scientific basis for identifying potential new POPs from among chemicals in commerce using high throughput screening methods that rely upon quantitative structure property relationships and target- and non-target chemical analysis.

Organisational issues

Contrary to the proposals contained in the document presented at WGSR 2013 (EB/Air/WG.5/2013/1) (Para 53), future work on heavy metals and POPs should be maintained and targeted as priority issues. (EB).

Form an ad-hoc group with representatives for WGE, EMEP, WGSR to enhance cooperation and synergies on POPs and HM with other conventions, programs and policies (EB).

Promote the CLRTAP work on HM and POPs among parties to secure financing and maintain relevant networks of policy and science experts under the convention. The ambition level of continued work on POP should be balanced between consolidating the current protocols and adding new substances.

References

PHIME (2011) Effects of exposure to metals: No margin of safety in Europe! Project summary available at: www.med.lu.se/labmedlund/amm/forskning/haelsorisker_av_metaller/phime.

SAICM (2013) www.saicm.org/index.php?option=com_content&view=article&id=71&Itemid=473

WHO (2013) www.who.int/ipcs/networks/ranetwork/en/index.html

WHO (2013). http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality/activities/health-aspects-of-air-pollution-and-review-of-eu-policies-the-revihaap-and-hrapie-projects

WHO/UNEP (2012). http://unep.org/pdf/9789241505031_eng.pdf

Additional information on HM and POP can be found in the presentations made in the plenary session at the workshop:

McLeod (2013): http://www.saltsjobaden5.ivl.se/download/18.439d807113f821c98c538b/1372672231840/MacLeod_SaltsjobadenV.pdf

Kraus (2013): http://www.saltsjobaden5.ivl.se/download/18.439d807113f821c98c534a/1372666627982/Kraus_SaltsjobadenV.pdf