

OPPORTUNITIES FOR SMOC – PRTR LINKAGES

Dioxins, Furans and Hexachlorobenzene

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I have been invited to comment on linkages between the SMOC and PRTR initiatives, with reference to dioxins, furans and hexachlorobenzene (hereafter D/F/HCB's). I will do so by offering some thoughts based on my experience as a non-government member of the D/F/HCB NARAP development task force. My task, as I understand it, is to supply an aboriginal perspective on these programs, which I interpret broadly to refer to small and dispersed communities, often distant from major cities and, in Canada, frequently located in the sub-arctic and arctic forest and tundra regions.

I would like to make several observations and recommendations, which for convenience I have enumerated below.

1. The use of D/F/HCB release inventories in environmental policy development should reflect, and be consistent, not only with what we understand about the physical and chemical circumstances in which these compounds are produced and released to the environment (including atmospheric transport), but also the pathways of biological uptake and eventually of human exposure.
2. The SMOC initiative has an important role to play in coordinating government initiatives and in improving technical and scientific communications between the parties. I see this as including the promotion of relevant research needed to improve our current understanding both of production and release/transport mechanisms, and to elucidate pathways of human exposure. In this respect, and viewed from this perspective, SMOC and PRTR can be seen as complementary and indeed interdependent.
3. The feature of D/F/HCB's which distinguishes these compounds from the synthetic industrial chemicals included in national release inventories is the

considerable potential for production in the course of uncontrolled, open-air combustion. This property has far reaching implications. Our current understanding is that local combustion of municipal wastes (i.e. by households or by entire communities) may mean that dispersed rural and northern settlements may be found in the next few years to be a prominent, source of production and release of these compounds to the atmospheric environment. D/F/HCB's, however, are probably also generated in the course of forest fires and most likely also the use of fire in agriculture to regenerate mineral nutrients. These factors inevitable complicate the larger picture of the production and release of these substances to the environment.

4. This changing picture of the production of D/F/HCB's has some important practical consequences. The first is the sheer complexity of open-air combustion and the inherent difficulty in quantifying emissions (particularly of individual congeners) from such a range of sources. The second consequence is that we may be faced with a bewildering variety of both point and diffuse sources of potential atmospheric emissions, which presumably vary in importance rapidly, both in space and in time. This geographical situation also has implications for the loading (deposition) of these substances to agricultural and forest systems, and subsequent transport in stream and river systems.
5. Inventories will most likely have to evolve to deal with this complexity. When we think of emission or release inventories, we usually have in mind well-defined industrial sources as well as the financial and technical resources needed to quantify emissions from those sources. The problem, stated in this way, is essentially one of technology, and of the collaboration of the industry concerned to generate the necessary data. The problem that arises when we tackle D/F/HCB's is that we are dealing both with well-defined industrial point sources and with the much more diffuse problem of releases from uncontrolled and perhaps uncontrollable sources. This, I suggest, is an issue which will need to be tackled directly and explicitly, both by the PRTR and by SMOC in their respective areas of responsibility.
6. However, even in the case of the industrial sources, we are still faced with significant sampling and analytical issues, and with reliance on the use of 'emission factors' as a way of generalizing across industrial sectors on the basis of possibly limited and unreliable data. I would suggest that one of the major challenges in explaining and justifying the use of emission or release inventories lies precisely in explaining to the public the nature of the sampling and analytical issues and what can and cannot be done using

emission factors. I see this as a particular challenge for the more remote and isolated communities, among which I include aboriginal settlements.

7. Seen from this perspective, we can see why it is important that inventories be treated as evolving representations of knowledge, and that opportunities be found to seek public (and community) input into periodic reviews of analytical and sampling issues, as well as into the periodic review of emission factors. Inventories, in other words, should have the capacity to change as we achieve a more complete understanding of the processes involved in their production, release and transport.
8. D/F/HCB's have attracted attention because of their exquisite toxicity in experimental animals. One of the challenges in trying to explain their significance is the units in which human body burdens and rates of intake and excretion are measured. Setting aside this difficulty, though, the human exposure to D/F/HCB's originates with their presence in certain categories of foods, such as dairy products, poultry and beef. In other words, exposure is generally presumed to be from food, not inhalation or dermal contact.
9. This simple observation leads the user of pollutant release inventories to ask what the emission and release inventories tell us about geographical patterns of human exposure. It is here, I suggest, that we have some problems with the way that pollutant inventories and releases have been defined. We probably need to pay more attention, therefore, to concentrations in major foodstuffs and their geographical variation across different agricultural regions. It is my impression that this is currently a weak link in the chain. We do not have much information to work with on dietary exposure in different North American populations; nor do we have much information to work with on the geographical determinants of levels in contaminants in different food categories. What we do have is enough information from the United States on the regional significance of dietary sources to suggest that an agricultural and food supply perspective is likely to be important in Canada and Mexico as well. This leads me to add here that an appreciation of the importance of fishing, and of hunting terrestrial or marine mammals in aboriginal communities involved in subsistence food production should take into account dietary sources of exposure in the population at large (including the aboriginal communities).
10. This leads me to suggest that both SMOC and the PRTR process could usefully incorporate information or indices which can be used to inform public discussion about probable trends in pathways of human exposure and their relative importance for different populations and in different

geographical regions. This is particularly important for remote or northern communities where local or regional releases of D/F/HCB's may be substantial but where the significance of those releases for human exposure is at present much less clear.

11. These comments have dealt with dioxins, furans and hexachlorobenzene; similar arguments could be made with respect to mercury, which shares with D/F/HCB's the potential for large scale release and transfer from both point and diffuse sources. Storage in soils and subsequent release to watersheds in each case is important and human diets are the major determinant of human exposure.

Some recommendations:-

- Treat PRTR and SMOC as complementary initiatives, using the latter possibly as a framework for periodic critical review of the input to the PRTR data-bases and for their interpretation;
- Place more emphasis generally on the identification and evaluation of non-point or uncontrolled sources of release, with specific reference to open-air combustion – using SMOC to support and promote relevant research both on production processes as well as indicators that can be used to assess the local or regional significance of emissions;
- Ensure that the PRTR documents adequately explain key sampling and analytical issues relevant to the evaluation of the data, and that they also account fully for the use (and periodic re-assessment) of emission factors;
- Direct more attention to the evaluation of D/F/HCB's in food supplies and to the understanding of the major geographical influences on pathways of human exposure.
- Tackle the largely unresolved question of whether there are human populations which, by reason of geographical setting or the nature of the local food economy, should be seen as being particularly vulnerable to exposure to D/F/HCB's.

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