

# **A Tool to Prioritize Contaminants of Emerging Concern by the ECOS Cross-Media Committee and the ECOS Emerging Contaminants Work Group**

**Final Version: December 15, 2009**

## **Overview:**

Established prioritization criteria provide a useful tool to assist ECOS and state agencies when a relatively quick initial determination of priorities is needed. This tool suggests key criteria to consider for prioritizing chemical contaminants of emerging concern. The proposed criteria have the flexibility to be applied when there is interest in prioritizing emerging contaminants as well as prioritizing chemicals associated with the increasing number of state legislative proposals to ban contaminants of emerging concern in consumer products. Building a common language and common use around key criteria for prioritizing contaminants of emerging concern builds the credibility and ultimately the utility of the tool.

## **Project Purpose:**

Develop a list of key criteria for public sector agencies to consider for prioritizing chemicals of emerging concern. Provide a model with the flexibility to be adapted to national, interstate and state efforts.

## **Justification:**

Based on the most recent information from EPA, the US produced or imported 42 billion pounds of chemical substances per day in 2002, increasing by 80% to 74 billion pounds per day in 2005 (Environmental Health Perspectives, 2009)<sup>1</sup>. It is estimated that there are approximately 82,000 chemicals used in the US commerce on a daily basis. With improved analytical methods to measure chemicals, many previously undetected chemicals are being found in the environment, consumer products, humans and biota. Little information exists regarding the potential human health and ecological risks posed by individual chemicals, mixtures and cumulative impacts. Publication of this information in scientific journals and in the popular press has elevated the issue of emerging contaminants to the general public who seeks government action to protect public health. A prioritization tool is valuable as it is difficult for states to keep up with the many human health and environmental risks posed by hazardous chemicals, given the sheer volume of chemicals created by the U.S. economy along with evolving toxicity information or new exposure pathways.

In addition, state legislatures are increasingly considering proposals to ban chemicals in consumer products with state agencies often required to commit significant staff time to monitor and respond to the legislative debate. "... bisphenol A (BPA), a chemical widely used in consumer and baby plastic products that is linked to fertility defects in laboratory studies, has had the largest increase—from one state bill introduced in 2006 to 90 bills introduced within the last three years. To date, two states, one county, and two cities have enacted policies that restrict the use of this chemical." "The states that have typically led chemical policy reform efforts include Maine, Washington, Connecticut, Minnesota, California, Massachusetts, New York, Oregon, and Michigan. A number of new players, including

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<sup>1</sup> Environmental Health Perspectives, Vol. 117 No. 8, August 2009. *Towards a New US Chemicals Policy: Rebuilding the Foundation to Advance New Science, Green Chemistry, and Environmental Health*, by University of CA Center for Occupational and Environmental Health staff.

Alabama, Louisiana, Mississippi, and Montana, have also proposed chemicals policy reforms ranging from bans on individual chemicals like lead and phthalates to broader reforms requiring data collection, identification, and prioritization of chemicals of concern in children's products" —excerpted from the July 20, 2009 U-Mass Lowell press release announcing a U-Mass Lowell paper analyzing recent trends in state chemicals policy legislation.

States are charged with protecting human health and the environment, but resources are limited. States would benefit from a credible tool for a streamlined process to assist them in an initial prioritization of contaminants of emerging concern. This prioritization process would help states prepare clear and consistent risk communication strategies.

### **Project Goals:**

The proposed pilot project has three main goals:

- Identify key criteria for prioritizing contaminants of emerging concern
- Illustrate examples using the tool
- Seek comments from states and ECOS on the criteria and utility of the tool

### **Model Emerging Contaminant definition**

1. Emerging Contaminants (EC): Hazardous materials or mixtures that are characterized by having:
  - A 'perceived' or real threat to human health, public safety or the environment
  - No published health standards or guidelines exist
  - Toxicological information is limited or is being re-evaluated
  - Significant new source, pathway, or detection limit information exists
  - ECs may be naturally occurring or manmade chemicals, microbial or radiological substances
2. Contaminants of emerging concern in consumer products
  - Emerging contaminants the present risks to human health and ecological life

### **Demonstration of the Tool**

Table 1 identifies and defines proposed key criteria to assist with prioritization. As indicated below, key criteria are:

- The contaminant is present in multiple media
- Indicators of widespread exposure exist
- Information exists on hazard/toxicity of the contaminant; concern exists about impacts to vulnerable/sensitive populations
- There are realistic possibilities for tangible outcomes including safer alternatives
- Agency authority to address each contaminant will vary considerably by jurisdiction

Table 2 serves as an example of how the tool might be applied from the perspective of the small subset of states who participated in the work group. It applies the criteria to some of the contaminants identified by states in a 2006 ECOS/DOD emerging contaminants survey and provides examples of what emerged as higher and lower priority contaminants.

While the Table 2 illustration is qualitative in nature, it is based on a compilation of quantitative data from environmental databases, professional experience of agency personnel and scientific literature. However Table 2 could be populated with quantitative data. As one state working on this project pointed out, levels of the pharmaceutical erythromycin in river water, streams,

wastewater effluent, surface waters etc. can be incorporated into the table, along with quantitative data on use, environmental half-life and fate in the environment.

Lastly, it is recognized that if states choose to objectively quantify the risk associated with each emerging contaminant it will vary greatly between states and chemistry of specific environments and that available data sets will not necessarily be universal. However, this prioritization framework is intended to offer a process for prioritization that will be most generally useful and sustainable as new emerging contaminants and materials of interest continue to be identified. This tool may be updated in the future to take into account new science and enhanced assessment tools.

**Table I  
Key Criteria Defined**

<b>Key Criteria</b>	<b>Definition</b>
<b>Cross Media Contaminant</b>	Contaminant is known to be present in more than one medium (e.g., air, drinking water, soil, sludge, etc.)
<b>Indicators of Widespread Exposure</b>	<ul style="list-style-type: none"> <li>-Widespread geographic distribution</li> <li>-US EPA High Production volume chemical</li> <li>-Biomonitoring data indicates widespread presence in human fluids or tissue;</li> <li>-Data indicating widespread presence in homes i.e. household dust, or wildlife</li> </ul>
<b>Hazard /Toxicity</b>	Inherent Hazards of concern i.e. Persistent, Bioaccumulative Toxin. Carcinogen, mutagen, reproductive & developmental toxicant, neurotoxin. Endocrine Disruptor, and/or Available toxicity information suggesting likely health/environmental concerns.
<b>Impacts Sensitive Populations</b>	<ul style="list-style-type: none"> <li>-Sensitive populations such as pregnant women, infants, young children, people with pre-existing disease, have been identified as being impacted</li> <li>-High profile wildlife concerns; (e.g., the fish we eat, endangered/special species of concern such as bald eagles, loons)</li> <li>-Environmental Justice concerns (e.g., impacts on traditionally under-served or highly impacted communities)</li> </ul>
<b>Tangible Outcomes Possible</b>	<ul style="list-style-type: none"> <li>- Within your agency's jurisdictional authority to take action</li> <li>-Resources to implement are available or can be obtained (budget line, grants partnerships etc)</li> <li>-Politically possible for the jurisdiction</li> <li>-known actions by others that you could adopt or adapt</li> <li>-Safer alternatives have been identified</li> </ul>

**Table 2**  
**Sample Application of Key Criteria to Some of the Emerging Contaminants**  
**Identified by States in a 2006 ECOS/DOD survey**  
*(Shaded rows for chemicals of lower priority)*

Contaminant	Cross Media Contaminant	Widespread Concern/ Exposure	Toxicity & Hazard	Impact Sensitive Populations	Tangible Outcomes Possible
Pharmaceuticals	Wastewater Biosolids Ambient waters Drinking water Aquatic life	Yes	Endocrine disrupting chemical (EDC), cardiac, neurological, other	Aquatic life Human fetuses?	-Public outreach on <i>Don't flush</i> -Set up collection or mail back programs -Other
Personal Care Products	Wastewater Biosolids Drinking water	Yes  Env. Half life (T ½) depends on compound*	Yes. EDCs, PBTs, etc	Consumers, Aquatic life	Yes. Product substitution
Endocrine disrupting compounds	Water Wastewater/Effluent Aquatic life Drinking water	Yes	Yes, effects on endocrine system	Human fetuses? Aquatic life	P2 activities Water treatment Increased water monitoring focus
Tetrachloroethylene (PCE)	Groundwater Residential indoor air Superfund sites (soil, water, air, sediment)	Yes	Yes, new toxicity information for updating standards. Under EPA review		-Surveys of legacy drycleaners use; prioritize cleanup at facilities co-located or near uses by children. -Other
Nanoparticles	Yes, air, consumer products, food.	People exposed. Widespread in consumer products	Lung effects, oxidative stress, limited information	Workers, consumers using products with nanoparticles	Yes, Best Management Practices
Brominated Flame Retardants	House dust Water Soil Biota	Amount distributed/yr  Also measured humans	PBT, Teratogenic	Production/Disposal workers, consumers, humans, aquatic life, benthic community	-12 states have enacted legislative bans on BFR's -Safer alternatives to deca have been identified and accepted by legislature for 2 state bans. - Other
Iron	Groundwater Drinking water Sites	Not of widespread concern	Blood effects	Individuals with elevated iron production	Lower priority
Carbaryl	Wastewater Streams	Not of widespread concern (USGS). Infrequently found	Liver and kidney toxicity	People with liver and kidney problems	Lower priority

\*A conceptual approach when toxicity or reference data is available