# Sediment Phthalates Work Group
# Technical Committee Meeting Notes
# February 15, 2007

## ATTENDEES

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This meeting summary was prepared by Kate Snider and Erin Murray. It is based on a transcription of the flip charts used during the meeting to document the discussion. Action items are identified in ***bold script***.

## PURPOSE OF THE MEETING

The purpose of this meeting was to reach agreement on and document the key messages that are apparent from the material collected and reviewed regarding the risks and receptors of phthalates to sediments.

## AGENDA

- Finalize 1/31 meeting notes.
- Schedule update and confirmation.

### General Points

- Outreach process emphasis needs to clarify our focus on phthalate in sediments.
- Human health concerns regarding phthalates in products and environmental matrices (other than sediments) are certainly a concern, but not the focus of this sediment group.

## KEY MESSAGES - RISK AND RECEPTORS FOR PHTHALATES IN SEDIMENTS

### Toxicity/Carcinogenicity of Phthalates Relative to Other Compounds

- Although phthalates are in the same class as PCBs and pesticides (DEHP—Class B2 Probable Human Carcinogen; BBP—Class C Possible Human Carcinogen), they are much less potent with respect to cancer risk than PCBs and other semi-volatile organic compounds (SVOCs).
- The potential for endocrine effects attracts a lot of attention; however, endocrine effects are not well studied. The data that exists suggests DEHP and BBP are several orders of magnitude less potent than other endocrine disruptors found in the environment.
- The ATSDR DEHP toxicity profile is useful in describing phthalate human health risk.
- Phthalates have not been a focus for bioaccumulation studies because they do not readily bioaccumulate (they are primarily metabolized).
- Two identified studies calculated biota-sediment accumulation factors (BSAFs) for phthalates. Both had results much less than 1. A value of 1 or greater is cause for concern.
- Phthalates dropped off Ecology's persistent, bioaccumulative, and toxic compound (PBT) list because they do not bioaccumulate to a great enough extent to be included.
- So far as we know, phthalate metabolites (breakdown products) do not have significant risk.
- DEHP (the most common phthalate of concern for sediments) is not a common phthalate in personal care products (Koo paper).
- Phthalates in personal care products may be a concern for human health based on direct contact exposure, but are different from the phthalates that we see in sediments.
- Would like to see figures depicting phthalate carcinogenicity and toxicity in comparison to other key sediment contaminants.

### Human Health Risk—Phthalates in Sediments

- The Lower Duwamish Study concludes that for high-end estimates of subsistence level tribal seafood consumption, phthalate human health risk just exceeds lower threshold of concern estimate by USEPA ($1x10^{-6}$). Phthalate risk is $6x10^{-6}$, in the Duwamish, whereas PCBs, for comparison are almost 3 orders of magnitude higher ($2x10^{-3}$). Risks from toxic effects are below thresholds (hazard quotients [HQs] less than 1).
- For this subsistence-level exposure scenario, the cancer risk from phthalates represents only 2 percent of the total excess cancer risk a consumer could get from consuming seafood from the Duwamish.

- To note—the group did not find other CERCLA type risk assessments that addressed phthalates, apparently because they have lower risk than other common pollutants and because they often occur with more toxic compounds at most sites.
- Lower Duwamish human health risk assessment uses fish tissue concentrations as a starting point. Both water and sediment concentrations affect fish tissue concentrations, but the relationship between concentrations in sediment and concentrations in fish tissue is hard to tie down. This is a key issue in determining whether to target sediment or water if fish tissue concentrations create unacceptable risk.
- For the Lower Duwamish, the surface weighted average sediment concentration (SWAC) for DEHP is 380 ppb (0.4 ppm), and for BBP is 45 ppb (0.05 ppm).
- Exposure to phthalates through direct contact with sediments containing phthalates did not generate unacceptable risk in the Lower Duwamish risk assessment. This was true for the most exposed population, tribal net fishers, and for beach play scenarios. This is primarily due to the fact that ASTDR shows that uptake of phthalates through the skin is low.

**Sediment Quality Standards**

- Sediment phthalate concentrations are not driving human health risk at the Lower Duwamish site; however, they are a risk to benthic invertebrates at some locations.
- Both Commencement Bay Sediment Quality Objectives (SQO) and the numeric Sediment Management Standards (SMS) are based on ecological (benthic) apparent effects—not human health.
- SMS numeric chemical criteria for phthalates are based on apparent effect thresholds (AETs) established by a series of acute and chronic effects biological tests including benthic infaunal abundance, larval abnormality and mortality, and amphipod mortality.
- The Sediment Quality Standards (SQS) correspond to a sediment quality that will result in no adverse effects to biological resources. The Cleanup Standard Level (CSL) is a less stringent standard than the SQS and is the threshold for minor adverse effects.
- Therefore, phthalate SQS and CSL numeric criteria were established for the protection of ecological health. The SMS also provides a narrative standard for the protection of human health, which must comply with Washington State Model Toxics Control Act (MTCA) human health risk levels.
- In the SMS, biological testing is provided to confirm sediment quality and overrides chemical results. Passing biological tests as described in the SMS overrides analytical chemical results that are above numeric criteria and serves as a site-specific demonstration of no apparent effects to the benthic community. Conversely, failing bioassay tests constitutes standards violations even when chemical tests results pass.

- The assumption behind the SMS numeric criteria for ecological risk is that by adversely affecting the benthic community, phthalate concentrations in the sediment have an effect on the larger ecosystem it supports. Although BSAF (biota-sediment accumulation factor) models are currently used, we do not completely understand the mechanisms well to make a direct correlation between sediment contamination concentrations and fish tissue contaminant levels.
- Important to note that in the SMS, protection of human health is a narrative requirement (evaluation is site-specific).
- Different risks and exposure pathways are evaluated with different methods and input data:
  - Benthic Community effects—comparison of sediment concentrations to SMS numeric standards that are based on benthic effects testing and AETs.
  - Benthic Community effects—bioassay testing–toxicity “pass” per Ecology guidance can trump SMS numeric chemical standards.
  - Human Health—site specific human health risk assessments utilizing site specific consumption and dermal contact assumptions (utilize fish tissue and sediment concentration data).
  - Ecological—site specific ecological risk assessments (using tissue and sediment concentration data).
- Several other sediment quality values (SQVs) have been developed for phthalates, but besides Washington State’s SMS, they are mainly just for DEHP. For marine sediments, SQVs are either based on AETs or probable effects levels (PELs). For freshwater sediments, SQVs have also been based on equilibrium portioning.
- These SQV are all meant to predict benthic community effects. In Washington, there are exceedances of these values in some of the sediment samples—mainly in urban areas. Results do not tend to be very different from SMS.

**Risk and Receptors in Sediments**

- The Lower Duwamish studies confirm that if SQS sediment concentrations for phthalates are met, sediments will be protective for all other exposure scenarios and receptors (including human health).
- Lower Duwamish studies do not indicate sediment effects to fish & wildlife, or human health due to the presence of phthalates. Suggests other urban and industrial sites unlikely to reach levels of concern for these receptors.
- At most sediment cleanup sites, phthalates appear coincidentally with other compounds, which tend to drive risk and cleanup. Consequently, phthalates are not typically identified in Records of Decision (RODs) because they are overshadowed by other, risk-driving contaminants.
- Sediment phthalates are a recontamination concern, which underscores both phthalates’ widespread presence and the rapid reaccumulation to levels of concern for benthic effects. Recontamination is not expected to cause risk to birds, fish,

mammals or human health, as the original cleanup conditions (with 100 years of accumulation) have not reached levels of concern for these receptors.

- Sediment recontamination by phthalates should be expected in urban environments with watershed and receiving environment characteristics typified by significant impervious runoff and depositional environments at outfalls.
- It is hard to separate sediment from water risk in an aquatic environment; however phthalates are not easily found in dissolved phase (water) because of their strong affinity for particles.
- Phthalates, however, are different from other chemicals with an affinity to sediments because they typically metabolize and thus, only weakly bioaccumulate (similar to PAH).
- Phthalates have a fairly high degradation rate (when compared to other chemicals) in air, soil, and water. In part, this is because they are easily metabolized.
- Phthalates persist much longer in soils and sediments than in water or air.

**Relative Risk**

- Consider development of calculations and/or diagrams that show relative importance of different human exposures to phthalates (e.g., sediments, inhalation of ambient indoor or urban air, etc.). Link to exposure and source diagram that has been discussed in previous meetings.
- Exposure and Source Diagram should be developed that illustrates multiple sources and exposure pathways—exposure from phthalates in sediment is very small part of the full picture.
- Relative exposure pie chart type diagram should be developed that illustrates:

  All phthalate exposure – DEHP/BBP percentage – percentage of DEHP/BBP from sediment and fish tissue

**PARKING LOT**

- Put phthalate concern in perspective with other sediment contaminants.
- Put phthalate risk in sediments in perspective with other phthalate pathways.
- Generate a table relating conclusions regarding phthalates to other chemicals.
- Acknowledge ‘apples and oranges’ issue regarding comparing CERCLA risk assessment with other human health risks of phthalate exposure.

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