Sediment Phthalates Work Group  
Technical Committee Meeting

Recommendations
Notes from Policy Group Meeting  
May 31, 2007

Attendees

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This meeting summary was prepared by Kate Snider. It is based on a transcription of the flip charts used during the meeting to document the discussion.

PURPOSE OF THE MEETING

Material discussed and developed at the meeting includes a comprehensive problem statement and draft recommendations. This material will be discussed with key stakeholders on June 21, and discussed within each member organization.

A meeting of the full work group (technical and policy members) is scheduled for 6/26 to discuss potential next steps.
Key Points re: Work Group Mission

Stimulated by phthalate recontamination at sediment cleanup sites, the cities of Tacoma and Seattle, King County, Washington Department of Ecology, and U.S. Environmental Protection Agency voluntarily came together in 2006 to better understand how phthalates are reaching Puget Sound sediments and what the related impacts to humans and animals are.

During 10 months and 17 technical work sessions, the work group collected, summarized, and evaluated existing information to:

- Document where phthalates are found and identify potential sources.
- Define phthalate concerns within current regulations.
- Place sediment phthalate concerns in perspective with other sediment contamination risks and within the broader issue of phthalate risks from other exposure pathways.
- Identify source control and treatment options.
- Provide recommendations on next steps.
- Share findings with the public.

The work group goal was to develop recommendations to address phthalate sediment contamination for regulatory agencies and the community to consider. They recognized that any regulatory decisions would be made by state and federal agencies. Possible types of recommendations were identified as:

- Further study to fill any key information gaps.
- Source identification and control measures applicable to Puget Sound.
- How to address uncertainty and risks due to potential for phthalate contamination following cleanups.
- Policy and regulatory changes to address human health and environmental risks from sediment phthalate contamination.

Research and technical discussions by the “Technical Committee” were completed in May 2007. Draft recommendations defined by the Policy Group are presented in this document.
Comprehensive Problem Statement
Regarding Phthalates in Sediments

About This Problem Statement

This “comprehensive problem statement” is a general summary of findings from the research performed by the Technical Committee on Sediment Phthalate Occurrence, Sources, Risk & Receptors, Source Control & Treatment Potential and Regulatory Framework.

It is important to note that this project is focusing on phthalates in sediment and so, as with all previous notes from this work group, the term “phthalate” in the following discussion refers to either Di-(2-Ethylhexyl) Phthalate (DEHP) or Butyl Benzyl Phthalate (BBP). The workgroup found that phthalates in cosmetics, medical apparatus, toys, etc. are often not DEHP or BBP. Not only do these other phthalates pose different health risks but they have not generated concerns at sediment sites known to the Sediment Phthalate Work Group and so were not evaluated.

Phthalates Move from PVC Products into the Air and then to Sediments

Certain phthalates accumulate in sediments in localized areas at the end of urban stormwater outfalls. These phthalates, primarily DEHP and BBP, are plasticizers used in plasticized PVC throughout urban commercial and residential neighborhoods and are present in numerous materials (e.g., vinyl flooring, shower curtains, etc.) that are important to our economy.

The primary phthalate pathway to sediments is through off-gassing from phthalate-containing materials and attaching to particulate material in the air. Phthalate-containing products continually off-gas until most of the phthalate is released and the products are brittle. The vapor phase phthalates stick to fine particulates in the air, which are then deposited on soils and surfaces throughout the watershed. From these surfaces, and especially from impervious surfaces like pavements, roofs, and cars, the particulates with phthalates wash into storm drains when it rains. The phthalates primarily stay on the particles, and do not appreciably dissolve into the water. Consequently, watersheds with more impervious surface and urban or metropolitan population contribute a larger mass of phthalates to sediments than watersheds with less impervious surfaces.

There are some other sources of phthalates to sediments, but off-gassing of phthalates from plasticized PVC is the predominant source.

Phthalates Build-up in Sediments

Phthalates accumulate in sediments, most usually where storm drains empty into receiving waters, and particularly where the receiving water body is generally still and/or slow moving. This happens because phthalates chemically prefer particles, not water, and settle out in the stormwater. They don’t tend to move very far in certain receiving environments. When phthalates accumulate in sediments to a level of regulatory concern, the area affected is typically a relatively small area because they are unlike chemicals that stay dissolved in water
and tend to travel further away from outfalls. In the colder aquatic environments, the phthalates on sediments do not readily break down, they are persistent.

**Phthalates Do Not Trigger Regulatory Response When Diffused in the Air and Water**

When these phthalates are in the air and water (before reaching the sediments), they are not at concentrations that trigger a regulatory response due to human or environmental health. However, within a few years, phthalates can accumulate in sediments to levels that can be toxic to benthic organisms (such as worms, clams, oysters, etc.). These organisms exist at the bottom of the food chain and live in and on the sediments.

**Build-up in Sediments is Toxic to Benthic Organisms—but is a Minimal Concern up the Food Chain**

Phthalates in sediments do not readily bioaccumulate, instead, organisms metabolize phthalates and excrete them. Ecology set numeric and biological criteria for sediment quality in the Sediment Management Standards (SMS) under the authority of the state Water Pollution Control Act and Model Toxics Control Act (MTCA). The purpose of the SMS is to reduce and ultimately eliminate adverse effects on biological resources and significant health threats to humans from surface sediment contamination. Washington is the only state with promulgated sediment standards that includes phthalates criteria. Although phthalates are toxic to benthic organisms, sediment concentrations pose a minimal risk to larger animals and human health. ¹

**Phthalates Don’t Drive Sediment Cleanups— but Build-Up Again Quickly at Cleaned-Up Sites**

Sediment cleanups are typically performed to address historical contamination and multiple contaminant types. At sediment cleanup sites that receive runoff from large urban watersheds and have quiescent receiving waters, phthalates reaccumulate to levels that exceed the Washington SMS criteria after the original cleanup (e.g., Thea Foss, Diagonal/Duwamish). Because sediment phthalates pose a low human health risk compared to other contaminants, and because it is important to remove those other sediment contaminants, it is important that initial sediment cleanups not be delayed due to concerns about potential phthalate recontamination.

¹ There is limited information about ecological risk and impacts of phthalates. The Lower Duwamish Waterway human health risk assessment indicates that phthalates pose a risk for a small percentage of the subsistence seafood consumers eating seafood only from the Lower Duwamish. That risk was slightly above regulatory levels and much less than the risk from other chemicals in the same seafood.
Phthalate Sources are throughout Cities and Dust in the Air Attracts Phthalates

Billions of pounds of plasticized PVC products are currently in the urban environment (vinyl flooring and siding, electrical cable covering, carpet, shower curtains, etc.) These plastics will continue to off-gas phthalates until the products are brittle and no longer contain phthalates, which takes many years. As long as dust is in the air, phthalates will stick to the particles and will be deposited from the air to the ground surface. Air containing higher concentrations of fine particulates increases the loading of airborne phthalates deposited on the impervious surfaces and the ground. Altogether this increases the amount of phthalates deposited in sediments.

Banning Phthalate Sources would be Difficult and Not Have a Near-Term Effect

A potential ban on use of phthalates in plasticized PVC products would be very difficult to implement because so many common products contain phthalates and are manufactured throughout the world. A ban on the use of phthalates in product manufacture would likely not have a significant effect on sediment deposition within the next 20 to 30 years because the reservoir of phthalates already present in urban environments is enormous and because imported phthalate-containing products predominate the economy and would be difficult to control.

Air Quality Improvements and Low-Impact Stormwater Development Would Really Help

Phthalate loading to storm drains could be reduced by effective reduction of fine particulates from the air or by increasing pervious surfaces within a watershed to reduce stormwater runoff quantities. These actions also have many additional environmental benefits and have good synergy with many other environmental sustainability initiatives.

It is very difficult to treat stormwater to remove fine particulates effectively because flow rates are highly variable even in areas that are not urbanized. In urban areas it is even more difficult to treat stormwater because flow rates vary more dramatically as the amount of impervious surface (e.g., roofs, roads, parking lots) increases while the amount of space available to install treatment decreases. Even if there were technologies or locations where it was practicable, it might lengthen the timeframe, but not likely prevent sediment reaccumulation.

Our Regulatory Programs Do Not Work Well for Pervasive Pollutants that Move along this Air to Sediment Pathway

Existing regulatory tools and programs are not well designed to address this type of pervasive pollutant with a multimedia pathway. Current regulations effectively break up the phthalate pathway to sediments into separate segments because they are based on site-specific, source-based pollution. End-of-pipe regulations do not regulate the products or media at the beginning of the pathway, and solutions at the end of pipe are not feasible to comprehensively address the problem.
There are Other Pollutants that Behave Like Phthalates and Pose Greater Risks

Phthalates are among several ubiquitous urban contaminants (PAH’s, Zinc, Copper, etc.) that become a greater problem as population increases and urban areas are more heavily developed. Phthalates get to sediments primarily along an air deposition to stormwater pathway that may also be an important pathway for these other urban contaminants, many of which pose greater overall risks in sediments than phthalates do.

In general, phthalates pose a lower environmental and human health risk relative to other issues and ubiquitous pollutants affecting Puget Sound.

Phthalate Recommendations Should Also Address Other Air—Sediment Pathway Concerns

Recommendations to address phthalate recontamination should be considered in a broader context of pollutants that behave similarly. Where appropriate, such recommendations should be implemented in a manner that addresses a broader set of ubiquitous urban contaminants that are transported similarly to phthalates along an air to water to sediment pathway.

This includes the studies that are put forward for consideration, and the potential work that could be done to consider a more comprehensive, integrated regulatory approach to the air-stormwater-surface water-sediment pathway.

This approach to consider phthalates in a broader context could more efficiently utilize available funding to focus on multiple problems that are meaningful to the health of Puget Sound.
Draft Recommendations

This is a comprehensive list of potential recommendations developed by the Policy Group for further consideration. These draft recommendations will be considered further by the organizations involved with the Sediment Phthalates Work Group. Decisions have not yet been made as to how to move forward. Many of these draft recommendations would have an associated public involvement process if they were to move forward.

1. Educate Agency and Community “Stakeholders” Regarding the Comprehensive Problem Statement

Provide education within member organizations and to community stakeholders regarding phthalate sediment re-accumulation—including information regarding phthalate sources, risks and regulatory drivers, air to sediment pathway and control alternatives.

Start to shift thinking regarding source control, to acknowledge that there are sources of phthalates that will continue following cleanup, at least in the near term.

Raise awareness about the air to stormwater to sediment pathway, which may be very relevant to other Puget Sound cleanup efforts.

Raise awareness about actions and solutions that can help the sediment phthalates issue and also meet other environmental goals.

2. Manage Phthalate Reaccumulation at Cleanup Sites Using Site-specific O&M Plans

Develop considerations related to phthalate re-accumulation to be taken into account in development of site-specific O&M plans for CERCLA and MTCA sediment cleanup sites. This can likely be performed by the Technical Committee of the Sediment Phthalates Work Group, and would serve as a starting point for consistent criteria to be considered on a site-specific basis.

- Considerations could include items such as: localized area and size of impact, outfall engineering, co-location with other concerns, triggers for action, options for O&M actions (such as continued monitoring, thin layer capping or removal).

Consider relationship to National Pollutant Discharge Elimination System (NPDES) requirements that are tied to SMS.

3. Define Other Pollutants Transported via an Air-Stormwater-Sediment Pathway

Define the other pollutants that are pervasive in the Puget Sound area and are transported to sediments along the same transport mechanism (air-stormwater-sediments) as phthalates.

Study their characteristics, sources and risks, to identify those compounds that could also be addressed through solutions related to the air to sediment pathway.
Characterize identified compounds relative to particle size range in air, stormwater, catch basins and sediments. Develop a better defined model of this transport pathway, and evaluate the mass balance links from air to sediments.

- Confirm assumptions about the pathway. Document drainage basin and airshed characteristics of outfalls of concern.
- As part of this, develop an air toxics high-volume sampling technique for phthalates and other compounds as appropriate.

Study the breakdown of phthalates (and potentially other constituents). Determine how quickly they degrade in the various environments along the pathway—in air, fresh water, marine water, marine sediments, freshwater sediments, and soils.

Evaluate percentage of identified phthalate (and potentially other constituents) in sediments that are coming via the air pathway. Acknowledge other sources of phthalates (marinas, tires, etc.) and study those other sources. Consider source sampling at marinas and update of sediment trap source identification work.

4. Coordinate with Puget Sound Partnership and Air Agencies Regarding The Air–Stormwater-Sediment Pathway and Related Contaminants

Coordinate and communicate to Puget Sound Partnership and Air Agencies regarding sediment contamination air pathway sources. Coordinate with air agencies to increase awareness and work jointly on recommendations.

Feed information to lobby organizations looking at regulatory change and Puget Sound wide issues regarding this multi-media/source perspective for identified contaminants.

Use existing legislative and regulatory frameworks to define how the air to sediment pathway could be more effectively addressed/controlled, or develop a better multi-media regulatory/statutory approach.

Based on acknowledgement that there are sources of pervasive pollution following an air to sediment pathway which will continue following cleanup, develop and/or modify the current regulatory framework to address unavoidable impacts that can not be controlled or mitigated.

5. With Puget Sound Partnership and Air Agencies, Jointly Evaluate Effective Solutions for the Air–Stormwater-Sediment Pathway

Recognize that many solutions could address multiple contaminants and provide additional environmental benefits.

Evaluate effectiveness of air quality initiatives (such as the reduction of diesel or other fine particle emissions) to reduce sediment impacts.

Develop programs for encouraging reduction in effective impervious surfaces within watersheds (through reduction in pavement or increase in infiltration) to decrease runoff and increase permeability. Evaluate effectiveness to reduce sediment impacts.
Consider public incentives or funding for voluntary actions that implement phthalate control priorities.

Model likely mature characteristics (expected area of impact and concentrations) of areas off outfalls for air to sediment pathway compounds, assuming initial sediment cleanup and site-specific source control.

Consider solutions to offset unavoidable sediment impacts within limited areas with environmental mitigation.

Study bioremediation or other in-situ remedies for compounds of interest in sediments.

6. Evaluate Stormwater Source Control and Treatment Options and Implement Where Justified

Evaluate source control and treatment options for phthalates and potentially other identified air to sediment pathway compounds. Consider implementation where studies predict actions to be relevant and effective. Consider potential multiple benefits of selected technologies and cost justification.

Perform studies on street sweeping, catch basin cleaning and other O&M. Implement where relevant/effective.

Perform systematic evaluation of stormwater treatment alternatives with selected pilots. Implement those treatment methods that are feasible.

Evaluate costs and benefits of source control and treatment options for identified compounds versus repeated cleanup in area of impact. Evaluate cleanup options relevant to areas of outfall impacts for utilizing in site-specific decision making.

Recommend directing research on “green chemicals” to compounds like phthalates — not just for more toxic compounds.

7. Consider SMS Rule Amendment to Address Phthalates and Other Pervasive Pollutants

Explore potential for an SMS rule amendment, to add consideration to SMS that would be factored into decisions regarding the cleanup trigger for phthalates and similar pervasive pollutants. Consider narrative criteria that could be added to SMS based on additional information collected in the Work Group. In doing so, think through MTCA/SMS relationships. Consider parallel actions under Superfund.

8. Coordinate with Other Phthalate Risk Initiatives

Work with initiatives that are addressing phthalate risks from other exposure pathways (cosmetics, toys, medical, etc) to develop solutions that could also benefit sediments.
If studies or multiple pathway focus supports one of these, then implement bans, product substitution, or coatings to reduce phthalate sources. Negotiate with foreign producers to institute product substitution or reduction.

Support studies on product/plasticizer alternatives and coatings (and product substitutions for other pervasive contaminants) and their potential concerns, benefits, and costs.

9. Develop recommendations regarding plasticized PVC (which could also be potentially extended to other products that are sources of air-sediment pathway contaminants).

Evaluate and develop environmentally sustainable alternatives to phthalates as a plasticizer.

Adjust LEED (Leadership in Energy & Environmental Design) building standards to address plasticized PVC. Evaluate and develop substitutions for plastics in construction materials.

Engage U.S. industry so the problem, including all pathways of exposure, is not ignored. Get on the industry’s radar at the national level to help evaluate solutions. Consider implementation of a “Cradle to Grave” law — in which those responsible for putting phthalate into products would be responsible for addressing environmental consequences.

Consider building code modifications regarding plasticized PVC product use in construction materials.

Consider tax or incentive mechanisms regarding product use and emissions, and to assist to fund source control priorities. Educate public to make associated lifestyle changes.