

# Sediment Workgroup January 28, 2010 Meeting Summary

## **Location**

Tacoma Wastewater Treatment Plant, Tacoma, WA

## **Sediment Workgroup Members Present**

Joanne Snarski, Paul Fuglevand, Lon Kissinger, Glen St. Amant, Teresa Michelsen, Pete Rude, Clay Patmont, Jack Word

## **Ecology Participants**

Chance Asher, Laura Inouye, Dave Sternberg, Pete Adolphson, Russ McMillan, Donna Podger

## **Audience**

Jessi Belstom, Port of Vancouver; Todd Thornburg, Anchor QEA; Jacob Letts, Environmental Resolutions

## **Agenda**

1. Report from the January 11, 2010 MTCA/SMS Advisory Group Meeting
2. Review of the January 7, 2010 Sediment Workgroup Meeting
3. Freshwater Standards: Biological Endpoints Updates
4. Ecological Risk From Bioaccumulatives Issue
5. Effects Based Body Burden Data

Meeting notes are organized by the agenda number and include a short summary of material presented with a brief summary of the main discussion points. Detailed notes on the discussion are included in an appendix.

## **Acronyms**

AET – Apparent Effects Threshold

AKART – All Known Available and Reasonable Technology

ASTM – American Society for Testing and Materials

BAF – Bioaccumulation Factor

BPJ – Best Professional Judgment

BSAF – Biota-Sediment Accumulation Factor

CERCLA – Comprehensive Environmental Recovery, Compensation and Liability Act

CSL – Cleanup Screening Level

COC – Chemical of Concern

CSO – Combined Sewer Outfall

EAP – Environmental Assessment Program (within Ecology)

ERED – Environmental Residue Effects Database

ESA – Endangered Species Act

FW – Freshwater

LD50 – Lethal Dose at 50% Population  
LOEL – Lowest Observed Effects Level  
MCL – Minimum Cleanup Level  
MTCA – Model Toxics Control Act  
NPDES – National Pollutant Discharge Elimination System  
NOAA – National Oceanic and Atmospheric Agency  
NOEL – No Observed Effects Level  
ODEQ – Oregon Department of Environmental Quality  
PAH – Polycyclic Aromatic Hydrocarbons  
PCB – Polychlorinated Biphenyls  
PLP – Potentially Liable Party  
PRP – Potentially Responsible Party  
QA – Quality Assurance  
RI/FS – Remedial Investigation and Feasibility Study  
RSET – Regional Sediment Evaluation Team  
SAPA – Sampling Analysis Plan Appendix  
SMS – Sediment Management Standards  
SQS – Sediment Quality Standards  
SQV – Sediment Quality Value  
SSD – Species Sensitive Distribution  
SWAC – Spatially Weighted Average Concentration  
SWG – Sediment Workgroup  
TBT – Tributyltin  
TEE – Terrestrial Ecological Evaluation  
TEL – Threshold Effects Level  
TMDL – Total Maximum Daily Load  
TPH – Total Petroleum Hydrocarbons  
TOC – Total Organic Carbon  
TRV – Tissue Risk Value  
USEPA – United States Environmental Protection Agency  
USGS – United States Geological Survey  
WPCA – Water Pollution Control Act  
WQ – Water Quality

## Meeting Summary

### 1. Report from the January 11, 2010 MTCA/SMS Advisory Group Meeting

- The MTCA/SMS Advisory Group tends to have similar issues as the Sediment Workgroup. They were also not understanding the Area Background versus Regional Background issue. Ecology is working through these definitions. They strongly suggested that Ecology develop background numbers, not the PLPs.
- For the background numbers, Ecology needs to look at how to implement and attain them, as well as maintain them.
- The Colville Tribe is concerned about the regional background concept and how it would apply to a site like Lake Roosevelt. Specifically the phrase in the definition of “hydro dynamically defined” and its use for freshwater sites. Ecology should view their work from a freshwater standpoint, not just marine.
- Both groups want to see source control addressed in this rule revision and asked if Ecology has a strategy for moving forward on source control.

### 2. Recap of the January 7, 2010 Sediment Workgroup Meeting

- There was agreement with the Sediment Workgroup to:
  - Continue to discuss Options 1 & 2.
  - Discuss Option 1 and consider the use of cost and feasibility during remedy selection.
  - Consider how to set cleanup standards that are technically achievable while working towards a long-term more conservative cleanup goal.
  - How to resolve PLP liability.
  - How to get to final cleanup when recontamination is not from the PLP.
- No Sediment Workgroup meeting in February. The group was given homework for the next March meeting that focuses on the human health and background issues, Options 1 and 2. The focus of the homework will be the implementation and PLP liability resolution aspects of the cleanup process regardless of what Option is decided upon for rule revision:
  - 1) What areas in the SMS have or do not have flexibility for making cleanups feasible and final regardless of the background standard (regional or natural) used?
  - 2) How can we use the following to reach a natural or regional background cleanup standard: remedial alternatives analysis, cost and feasibility, partial settlements, institutional controls, remediation levels,

recovery time frames, sediment recovery zones, points of compliance, site definition.

3) If the rules provide some flexibility, what conceptual changes are necessary for clarification?

4) If the rules do not provide the necessary flexibility, what conceptual changes are needed to do so?

#### **a. Workgroup Member Discussion**

- Recontamination issues. If a site's recontamination is not from the PLP, how do we get to final cleanup? Need to resolve PLP liability issues. Do we have flexibility within the SMS for final cleanup and PLP liability?
- Sediment Recovery Zones. This has been used informally at several sites. How much flexibility is there in the rule language? This an area identified for the Workgroup to provide advice about.
- Discussed compliance in relationship to contaminant exposure: watershed approach versus point by point, depending on the size and location for the cleanup site. Issues Parking Lot for 'spatially weighted average concentrations' or SWAC. The sediment recovery time frame should depend on the site and not be an arbitrary timeframe.
- Source Control Issues within cleanup and the rule revision. Workgroup members are concerned that sediment cleanups can never reach natural or regional background levels without source control. Discussion of source control at cleanup sites versus with NPDES dischargers. The point was made that some cleanup sites are linked to NPDES discharges such as CSO's.
- Discussion of the definition of 'site.'
- How is Ecology addressing 'joint and several' liability?
- Add 'sediment impact zone' to list of homework considerations.

### **3. Freshwater Standards: Biological Endpoints Updates (Teresa Michelsen)**

- Freshwater biological endpoints for the acute mortality test using *Hyalella* and *Chironomus* were discussed for comparing the controls with test samples. The alternative endpoints that people seem most comfortable are between 15% and 30%. Teresa is graphing the hit/no-hit data to look at the changes as we move through the options. If there is a big difference between the hit/no-hit distributions, the chemical is probably involved in toxicity. If low to no differences, then the hits are more correlated with chemistry.
- Teresa will also look at setting a "bright line" as well as doing a project by project control comparison. The general consensus about percent difference between control and test sample seems to be about 15%.

- If anyone has additional comments on this topic, please send them to Russ McMillan.

#### **4. Ecological Risk from Bioaccumulatives Issue (Laura Inouye)**

##### **Ecology Presentation**

[http://www.ecy.wa.gov/programs/tcp/regs/2009MTCA/SedMtgGroupInfo/SGMtgInfo/s\\_g\\_mtg\\_100128/Jan\\_28\\_2009\\_Sediment%20Workgroup.pdf](http://www.ecy.wa.gov/programs/tcp/regs/2009MTCA/SedMtgGroupInfo/SGMtgInfo/s_g_mtg_100128/Jan_28_2009_Sediment%20Workgroup.pdf)

- Laura presented and led a discussion about addressing the adverse effects to biota from bioaccumulative chemicals when setting the sediment cleanup standards. The discussion emphasized bioaccumulative risks and how Ecology could provide a process to determine clear and predictable cleanup standards to protect biological resources from bioaccumulative risks.
- SMS is not clear about bioaccumulation. The definition of chronic does include words such as bioaccumulation and biomagnification that impact mortality, growth, reproduction, birth, etc. Also, Ecology needs to address guidance for addressing bioaccumulatives. To protect benthic organisms, Ecology is looking at developing a process for developing cleanup standards.
- It was suggested to call this ‘ecological risk to higher trophic levels.’ Important to include NOAA’s work in the decision framework. The narrative section of the rule should include 3 components: risk to fish, risk to mammals, and risk to birds. Include 3 receptors: human health risks, ecological risks, and benthic risks.
- The rule is vague on risk from sediment to fish. The framework should include this. Need to clarify tying together sediment to fish to histopathological abnormalities. NOAA is doing some similar work. RSET worked on the Sediment Evaluation Framework that did address sediment assessment endpoints for many species, but the framework was only for dredging projects and not sediment cleanup.
- We need to address the impacts of bioaccumulatives to ecological receptors, which will aid looking at health based concentrations based on a variety of consumption rates. Data analysis methods discussed included species sensitive distribution (SSD) and tissue risk value (TRV).
- Discussion ensued regarding target tissue levels and what the drivers are for determining these levels. For some compounds, the driver is human health, particularly for carcinogens. However, for some compounds aquatic life has lower target tissue levels; the human health values would be too high to protect some benthic species from some compounds. For metals such as selenium and lead, PAHs, and TBT, target tissue levels tend to be driven by

wildlife values. However, if values fall below analytical detection limits, they will be driven to background.

## **5. Effects Based Body Burden Data (Jack Word)**

### **Workgroup Member Presentation**

[http://www.ecy.wa.gov/programs/tcp/regs/2009MTCA/SedMtgGroupInfo/SedMtgInfo/sg\\_mtg\\_100128/Jack%20Word%20Presentation.pdf](http://www.ecy.wa.gov/programs/tcp/regs/2009MTCA/SedMtgGroupInfo/SedMtgInfo/sg_mtg_100128/Jack%20Word%20Presentation.pdf)

- Jack presented an overview of the Environmental Residue Effects Database or ERED. It's a collection of environmental data pairs for residue tissue data and their biological effects. It provides measurement of the relationship between effects and concentrations in tissues. It was started by the Corps of Engineers with EPA sponsorship. Currently, it contains nearly 14,800 pairs of data, going back to the 1960's. It is continually being updated. It contains single contaminant responses as well as field responses.
- Jack also gave an example of body burden uptake rates measured through time from a study in Nacoma at the Hamilton Army Air Force Base in the San Francisco Bay area. A lab kinetic uptakes experiment looked at the uptake and depuration of mercury in two clam species. In San Francisco Bay, tissue burdens and area wide average concentrations, in relationship to trophic levels, are being studied. A big question is how much contaminant is coming from the sediment to the animal versus how much contaminant is coming from the water to the animal. We need to be working on the drivers for the uptake into tissues.
- The workgroup then discussed trying to get to target tissue levels and development of these numbers using BSAF for non polar organics and BAFs for polar organics and metals. Site specific assessment of bioaccumulation and/or field evaluation will give a better understanding of chemical behavior associated with sediments.

## **6. Member Feedback and Discussion**

- When setting values, whether for dredging, cleanup, or source control, the target tissue levels should be the true driver. Using target tissue levels, we should be able to say what the concerns are for each watershed. What do we need to do with a watershed to get contaminant X down to a certain level?
- Discussion ensued of how to get smaller projects through the system by developing a comprehensive strategy. Simpler systems (e.g., simple thresholds, simple interactive spreadsheets) for smaller projects, off-ramps at certain stages, and working from the top down were all discussed for smaller projects.

- Other ideas included examples of what has been done in the past at bay wide sites like Bellingham Bay and Fidalgo Bay. These bay wide initiatives included some early off ramps for some sites which also reduced the area of concern to make it more manageable. Look at these past approaches and put them in guidance to make a workable process. Add a tool box of simpler tools that small sites and dredging projects can use. Maybe use a flowchart system.
- Look at moving away from MTCA for sediment cleanup. SMS was originally intended as an integrated source control and cleanup program. Cleanups should be multimedia, incorporating not just MTCA but also other authorities such as the Clean Water Act and the Water Pollution Control Act. This could help us address the nature of the contaminants: Is it the water? Is it the sediment? Would like to see more emphasis on the water when evaluating a site so we have a better understanding of where the bioaccumulatives are coming from. Remember there are multiple authorities for carrying out actions, which would give us more flexibility to many different things.
- Workgroup members expressed concern about writing a rule too far ahead of the current science. They also expressed additional concern about making cleanup to complex and expensive for smaller sites. Ecology should look at potential unintended consequences of any potential rule changes.
- As far as modifying the narrative standard, it's pretty good right now but need to maintain flexibility. The cleanup part of the rule, is, however, excessively vague and has caused problems for site managers and with litigation. It needs to be clear about what needs to be done to get to a final cleanup.
- Clarity, guidance, and flexibility were key concepts in the discussion. Predictability was also brought up as a key concern. Cleanup standards should be attainable; you don't want to draw the lines too stringent. The rule needs to maintain flexibility. Can guidance help the consistency without the legal challenge?
- A top 5 and a tiered approach were brought up. The Top 5 would address the top 5 PLPs at a site and they would be primarily responsible for the site, under the assumption they could pay for the majority of the cleanup. A tiered approach would look at different sources; a tier 1 site would be treated differently than a tier 3 site. The Corps of Engineers tiered approach was also discussed.
- Site definition and background definition were discussed. Also the potential of a sediment site ranking system based on the size of the site and its contaminants. Smaller sites should have a limited cleanup so they can focus on their targeted items and not the bigger regional bioaccumulation problems.

## 7. Audience Comments

- The audience agreed with the discussion of the top down approach. Shouldn't we be looking broadly at receiving waters and not on a piecemeal basis? This is a more regional issue. Maybe approach this similar to the strategy for TMDLs.
- The audience also agreed that they support flexibility as well as predictability. How the guidance is used is important as is liability for the PLPs.

## 8. Other General Comments

- How to approach group discussions outside of the meeting structure was discussed. Ecology will not be hosting a blog or similar tool. If group discussions do occur, please write them up and send the summaries to Chance Asher so she can distribute to the entire group.
- Members would like to see more discussion of topics as well as present information to the MTCA/SMS Advisory Group. Their reactions and comments would give this group a better understanding of how stakeholders would respond.
- The workgroup members, while pleased with meeting summaries, would like (1) to see something that, overall, addresses where we are with the overall concepts, where the trends of our discussions are going, and what the collective themes are emerging from these discussions. This would be a broader document than the individual meeting summaries and would show what the group has covered, where it is going, and what the arising major themes are. A living document with these items would be good, that also addresses dissenting opinions.
- The workgroup members would also like (2) a breakdown of the policy issues versus the technical issues that have been addressed and discussed. This would make it easier to take the information back to their coworkers and constituents, to explain what is being discussed and how it could possibly affect them.
- The workgroup members would like (3) to develop a framework, based on their comments, of what they would like to see developed and give it to Ecology. They understand the constraints Ecology is under and would like to convey to Ecology how they think Ecology should move forward with this rule revision and understand potential outcomes of this process. Ecology would be under no obligations to take this suggestions and it may be a helpful tool for Ecology. Doing this would also help the group create an overarching structure and help the group see what pieces need further clarification.

- Need to determine what goes into guidance versus regulation. That has not been clear from these discussions.

## **Appendix A: Detailed Meeting Notes as Taken During the Meeting**

### **1. Report from the January 11, 2010 MTCA/SMS Advisory Group Meeting**

At the last MTCA/SMS Advisory Group meeting, we focused on human health and background. The MTCA/SMS Advisory Group tends to have similar issues to this Sediment Work Group (SWG). However, these are issues for the SWG to solve. The MTCA/SMS Advisory group needed clarification on Area versus Regional Background. Area Background is the definition found in the MTCA rule. Regional Background is similar to natural background. People seem to have a hard time understanding the differences between them. We are working through the definitions of both. It was strongly worded from the MTCA/SMS group that Ecology should have and establish numbers for area/regional background. They were resistant to having the PLPs establish these numbers as it would be expensive. It would also be difficult to establish protocols on how to do this. Ecology heard this and will keep this in mind.

Some preferred site/area specific natural background the difference between this and natural background would need to be clarified. Maybe we should think about this and talk about it. We polled Ecology staff about natural background, which is often calculated on more of a regional basis. Some numbers are based as state wide numbers.

Doesn't the USGS study have different numbers for different regions of the state? It has been done regionally for metals. Eastside versus Westside will be different. We need to figure out real differences between regional and natural background. When this group gets to a definition, we need to have a joint meeting with MTCA/SMS group to discuss this. Good idea.

Chance - Ecology is getting a lot of value on a different scale from the SWG versus the MTCA/SMS group; we are getting something out of both. They are a larger group with wider viewpoints.

Clay - Bigger view of background ideas. This is the big issue. Make sure you have consistency in your thoughts.

Chance - Definitions are really important as well as the definition of a site. They (MTCA/SMS group) came to some same conclusions with background. Whatever Ecology decides, we need to take a look at how to implement background numbers, attain them, and how to maintain them. Also need to address how to resolve PLP liability and the importance of statistics and need for consistency. We will discuss with this group further. Ecology has Greg Glass under contract for help with statistics. We want to settle our thinking and questions before we bring the statistics questions up to this group. Good to have the basics for statistics in rule but will likely put the specifics in guidance, especially human health risk assessment.

The Colville Confederated Tribes brought up a concern for fresh water sites, especially Lake Roosevelt and the idea of regional background. Lake Roosevelt, as a whole, is a site. The definition of "hydro dynamically defined" may not work for a lake situation. Cannot use this to attain regional background.

This is a real concern from them. There are also issues of looking at urban versus rural areas and cannot look at this from just a marine viewpoint.

Source control shouldn't be ignored. Would like to see this in the rule revision. If it's not in the rule revision, then is it a regulatory issue, for example NPDES permits or cleanup issue? What does it mean for PLP liability? Does Ecology have a strategy for moving forward on source control if it's not in the rule revisions? This is very important to that group and this one.

## **2. Review of the January 7, 2010 Sediment Workgroup Meeting**

Chance – There will be no meeting in February. I'll be giving homework for February for the next March meeting. Homework will be the larger concepts to work on.

Continue to look at option 1 and 2. Neither is off the table. Look at addressing the cost and feasibility piece in the remedy selection process rather than the way SMS is currently written (can incorporate cost & technical feasibility). When setting cleanup standards look at how it could work for the alternatives analysis similar to MTCA process. More flexibility for implementing & attaining cleanup standards. For the third bullet decide on technically attainable background number (whether area/regional/natural), keeping in mind the longer term conservative goals of reaching natural background or lower. Looking at the practicality of meeting that right away. It would be similar to an interim action but with a long term goal of a lower standard.

Need to resolve PLP liability. This is an umbrella issue for everyone when working through the rule revision.

The issue of recontamination: if recontamination is not from the PLP, how do we get to final cleanup? MTCA has some wording on it. Legally, does it apply to SMS? Some people think it does. Do we revise and/or clarify the SMS to resolve this within SMS?

Slide from last meeting. Originally focused on setting cleanup standards. Start focusing on the issue of implementation and then resolving liability for the PLP. Does the SMS already have this flexibility in these two areas? Do we need to clarify or revise the SMS for this? MTCA has some of it. What should we do? How do we implement a potentially conservative cleanup standard? What we want you all to focus on, just to think about, is: Do we have or not have areas of flexibility within the SMS for making cleanup final and resolving PLP liability, no matter what the cleanup standard?

Please start thinking about what can be clarified or added, tweaked, what MTCA has, etc. Email your thoughts and questions to Chance, who will compile and send them out for full discussion at the March meeting. Get stakeholder thoughts to Chance as well for consideration and distribution to group for further discussion.

Clay – Sediment recovery zones, is this a viable concept? It was discussed years ago. Never formally used.

Chance – It's used in practice but not using the term 'sediment recovery zone.' Anytime you leave a cleanup site above SQS, theoretically under the rule, it is a sediment recovery zone.

Teresa – Superfund sort of used it in the Hylebos. Sort of been used but not as formally designated.

Clay – It's a worthwhile tool.

Chance - Don't know why it hasn't been used formally.

Pete A– At Bellingham Bay, this is essentially what we are doing, we just haven't called it 'sediment recovery zone.' The area was very big, too large.

Chance – can it be used? Can it be easier? Is there some flexibility in the rule language? Can we change it? On a larger, baywide scale? This is the thinking we need from you.

Clay – on points of compliance, human health based criteria, the area average/SWAC concentration within an accepted home range for a species you are targeting – is this on the table or off the table?

Chance – well, we haven't talked about this, one way or another, so right now it should be on the table.

Teresa – if we took a watershed approach and we knew the current levels were too high from an area weighted point of view, that the sites could go down to the point where their contribution to cleanup would get the area-weighted average down to a certain level, but not that the point of compliance would still be the whole watershed, but you would be looking at your site within that context. Is that what you are talking about?

Lon – talked about compliance in relationship to exposure. For benthic invertebrates, it is point by point. For direct contact sediment exposure, it would be intertidal areas for clamming, or exposure to bioaccumulatives, more of a waterway. A little bit of that in the Duwamish.

Clay – yes, thinking of approaching it something like the Duwamish, getting beyond a point by point approach.

Chance – don't make any more complex.

Clay – it's a balance. Just getting a sense of what's in the mix or not.

Chance – the internal group hasn't said yes or no to that yet. So at this point, let's put it on the table but don't spend too much time on it.

Lon – We need a parking lot for SWAC versus spatially weighted upper confidence limits. Sites with biased sampling need to be corrected.

Jack – remediation to me means concentration-based chemical driven values. Sediment recovery to me means biology and how long is needed to recover the biology of the site to restoration. I see these as two different decision points, recovery time frames we don't have a strong handle on anywhere – marshes make take many years, redwood forests may take thousands of years. Remediate to a level at which recovery is able occur. The time frame should be driven by the community you are working with more than some arbitrary time limit.

Chance – makes it complex, simplify the concepts right now. Bioassay rather than benthic community analysis. Simplify if possible.

Pete R – struggling with the second bullet. I don't see source control on the list. Why is it not? Trying to reach background? What do you mean by "reach"? Sources would be a big one. I don't see sources listed.

Chance – we are focusing on the cleanup standard part of the rule. Not the rest of the rule. We don't want to spend too much time on source control because Ecology is not authorized to do source control revisions at this time. We could talk about it conceptually but we cannot move forward on rule revisions for source control.

Clay – a number of us have the belief that there is no way you will reach natural or regional background in the majority of the systems we are concerned about without some pretty major source control. How do we put this in context?

Chance – Let's look at this two ways: 1) the areas within the rule that we can look at for revising and clarifying are where you can technically or physically meet that standard at a certain point or 2) what do you do after that. At your site, meet the cleanup standard initially then source control for the future. Unless you have a CSO discharging right next to the site, which is totally different. Looking at different sites, that is another issue in terms of upland dischargers.

Teresa – from a rule stand point, there are still are ways to handle source control within cleanup. There is a portion of the cleanup standards part of the rule that talks about the RI/FS which does require source control. Are there places to discuss source control within the rule and build a framework for ourselves that incorporates source control?

Chance – the source control definition can be very broad. Right now we are not looking at the source control section for NPDES permitted dischargers. We're talking about source control from a site, upland sources need to get that under control.

Teresa – but often the sites are NPDES permitted dischargers. When talking about waterways many remaining problems are NPDES dischargers. We have the authority to require reductions in NPDES dischargers. This has been used. We need to not make the cleanup section so parallel to MTCA, but include more source control discussion in that part of the rule. It is how we will cleanup our waterways. Have a slightly different framework when cleaning up a site, if we recognize that regional background is X and is caused by larger sources that are not related to a site, then this site will go to a certain point then we'll get a buy off on liability. We need something different from what MTCA needs as part of a watershed approach. Particularly if using a regional background concept.

Chance – Look at the concept of source control as smaller rather than a larger watershed approach (for example, the Duwamish), look at it as site specific. If that site has upland contamination, then an NPDES discharge could be incorporated as source control. Look at the local area in terms of source control. I am not authorized to allow this conversation to be dominated by the source control issue from a watershed perspective. We can't go there now.

Teresa – I don't believe we will go there later, with my history with Ecology. That's not how it works. We'll just keep sending you these comments. I don't believe it can be done any other way.

Chance – I'm not saying not to send these comments, we want to hear from you. But it cannot dominate our conversations at these meetings. Also, MTCA language on recontamination not from your site.

Teresa – We can't ask as much of sites. We are trying to solve a big problem with only one tool.

Pete A – I bring up the definition of 'site.' The liability is only the definition of that site for the PLP beyond that, those are the issues we are discussing. Try to limit to the definition of site when talking about these other issues.

Teresa – Can we bring up at another meeting to discuss how Ecology is addressing “joint and several.” Because both MTCA/CERCLA have “joint and several” so it's not just the PLP and their own particular liability. They have concerns about the broader liability that can pertain to them if they own tidelands. Maybe an overview of how Ecology deals with that when managing a site. Does it really just resolve that person's liability? Do we need other tools?

Chance – A question to follow up, the owner/operator phrase in terms of liability. Will Ecology do that? Need to talk about it internally too.

Jack – First 5 bullets relate to site remediation levels, recovery, and the larger picture.

Lon – the nature of comparison of statistics is to come, right? It's key. How much time depends on how stringent.

Can we add site definition to that list? Yes.

Are you saying if we go into the rule as now addresses the bulleted items, how do we use that language in the rule to bring in natural/regional background?

Chance - How do we implement natural/regional background and attain it as a cleanup standard? And resolve PLP liability?

How can I bring in natural/regional background to achieve it? Yes

Do we need to revise/clarify this? How can we implement background?

Chance - Do we have this ability in MTCA or SMS the way it is currently written or do we have that flexibility on how we can implement that cleanup standard and resolve PLP liability?

Will try to put cleanup sections of rule online for group to look at.

Joanne – 'Sediment impact zone' is not up on the list. Not sure how it would fit into the list.

Chance – You can bring it up if you'd like.

Teresa – Sediment impact zones and sediment recovery zones are almost identical. They were designed that way.

Chance – familiarize yourself with the rule language

### **3. Freshwater Standards: Biological Endpoints Updates (Teresa Michelsen)**

Teresa – Briefly we presented a table of endpoints for freshwater biology and people commenting on the numbers for the acute mortality test thought they looked a little tight, especially for comparing to control and not reference. We had only a 10% difference between the control and test sample. People would be more comfortable with a difference of 15-20%.

We have worked on the issue. Interpretive guidelines came out for freshwater standards. Ecology came up with money for additional analyses and we came up with alternative endpoints: 15-30% for both lower and higher. I am doing a full range to graph the range of hits and no hits for the various levels. Look at how the changes as we move through options for these two bioassays.

We looked at two bioassays: the acute mortality *Hyalella* sp. 10 day test and the *Chironomus* sp. 10 day mortality test. The 10 day growth was fine and the chronic tests were fine. We looked at alternative endpoints. Question about how we choose an endpoint. We talked to local laboratories and experts about what control values should be and what is a meaningful difference from control. Looks like closer to 15% is probably a better difference. Also confirmed the 2<sup>nd</sup> step after looking at hits/no hits to see if there were big jumps at certain points. We are running through ANOVA analyses to compare the hit/no hit distributions of each chemical by taking all stations and looking at hit and no hit concentrations for lead or other chemicals and comparing them. If there is no difference between them, then that chemical has little correlation to toxicity in the overall data set.

If there is a big difference between the hit/no hit distributions, then that chemical is probably involved in toxicity in that dataset. I will run all the data through the correlation analyses with all these different endpoints to see if going from 10% to 15% makes the correlation stronger. If yes then fewer hits, the hits are better correlated with chemistry and suggest it is above lab noise.

Another way we will be looking at what levels we should be using...Even though we heard last time that 15-20% might be better, we didn't get any actual scientific basis for those numbers. We are looking for some scientific basis for them, anything you can think of. We talked with Chris Ingersoll, who is also doing some round robin testing for the ASTM standards, is giving us good information. His suggestion is to bump the control down 5% and difference from control up 5%. This ends up being the same level of mortality but greater difference from control.

The labs these days are doing very well with those two tests. It used to be that the controls were set loosely, but now the labs easily meet the new recommended values. The ASTM control standards may be tightening up, but Chris and Jack agree that we may need to loosen up our comparative guidelines. The second half of study they haven't published yet, but Jack got the information for us. If you have any information, published papers, data, please send it to Russ McMillan. Ecology will make the decision on which endpoints to go forward with. In March Teresa will be doing the final modeling runs to see if reliability improves.

Clay – I've previously seen a reference envelope analysis, kind of looking at the body of information from all your reference tests, using that to help inform what is a significant difference. I know there is some talk, some work that Ecology has done with freshwater and clean, pristine areas, looking at that in terms of the confidence we have in these tests.

Teresa – We haven't done that. Portland Harbor just did some work on that. We can take the new criteria we are looking at and reapply to study to see if that improves the results. That would be helpful. ODEQ and EPA Region 10 and Portland have done that analysis for Portland Harbor. Knowing the dataset, the idea that we could make that approach work for all of Washington and Oregon with all the various reference samples we have, I doubt it. They are not coherent enough, it's not like the Portland Harbor reference data set.

Clay – Thought it could inform us with the evaluation of 10-20%.

Russ - We can look at reference samples, we may have in the analyses already. We can look at setting that criterion at 15% to see if that would make all the reference samples look like clean samples. Not sure all were in clean areas, though. That's the thing with freshwater, the difficulty of finding good reference areas for freshwater. Teresa will have suggestions later. She looked at this with the Walla Walla District, trying to find good reference areas on the East side. They have some suggestions and ideas I can pass on.

Teresa - It's a tough problem, not sure if all reference samples in our data base are really clean/should be clean. Treated them just as test samples...some are clean and some aren't.

Clay – it gets to that point when you wonder if you have a true reference plot relationship. Teresa – but we aren't talking about using references as comparison and when Jack talked to Dave and Chris, they were saying the same thing, that freshwater, that it's not a good idea to try to do that.

Jack – a little bit more noise in the system to represent other factors that could contribute to change. Very close to what we did with the amphipods years ago. It comes up about the same answer.

Teresa – We have always been looking at a difference from control. For example: test minus control equals X. The question is what should the X be? What Ingersoll is proposing is 85% survival in the control and 70% or better survival or better for the test sample, but no comparison to the control. That would remove some variability, depending on what the control is. Interesting idea. Haven't talked about it yet.

Jack -. Has to be statistically significant greater than 20% reference. The reference had to be really close to the control.

Teresa - Still 20% less than control?

Jack - They had 90% or better.

Teresa – so you're saying control + 15% mortality is allowed but still setting a bright line instead of doing a project by project control comparison. That's actually pretty easy to look at. We could look at that, too, when I get back as another alternative. We seem to be honing in on 15%. We can decide whether

subtraction or bright line. That's where we are at. Send comments to Russ. Ecology will be making a decision before Teresa gets back.

#### **4. Ecological Risk From Bioaccumulatives Issue (Laura Inouye)**

Laura – talking about addressing the bioaccumulative adverse effects to biota when setting the cleanup standards. I'm emphasizing this is for bioaccumulative risks. Still not addressing acute fish toxicity for the change in the rule. Focusing on how to provide clear and predictable cleanup standards to protect biological resources from bioaccumulative risks.

Currently the SMS does have criteria that protect the benthic community from acute and chronic effects but numeric criteria do not specifically include bioaccumulation exposure pathways. The existing numeric criteria are for protection of benthic only. MTCA does have terrestrial ecological evaluations (TEE) that do address bioaccumulative and acute risks to organisms. SMS does address risk from bioaccumulation but some sections address human bioaccumulative risk but not ecological bioaccumulative risk.

SMS is not clear about bioaccumulation. WAC 173-204-100 addresses adverse effects such as acute and chronic. The chronic definition involves bioaccumulation and biomagnification that impact mortality, growth, reproduction, birth, etc. It's not that we don't have anything that addresses bioaccumulative risks, but it's not clear. Some options put forth in the issue papers would continue the site specific approach to developing cleanup levels for bioaccumulative chemicals. Or, we could revise the SMS narrative standards to provide a clear decision process for bioaccumulatives without guidance.

Also provide guidance on how to deal with the bioaccumulatives. We also had discussed adopting numeric criteria and biological criteria, but there are many difficulties getting there. So the option here is this favored option to go forward.

Teresa - Can you clarify biological criteria in this context? Do you mean sediment versus tissue? Those are both numeric chemical criteria but one could override the other (like bioassay versus chemistry) or sediment versus tissue, but still they'd still be chemistry values, not biological.

Chance – we haven't gone into that detail. Those are off the table.

Laura – trying to get to actual numeric criteria for sediments and tissues because we didn't feel we could get to that point, biological endpoints. There was much discussion on how to develop target levels but we weren't ready to go there. If we deal with this, but can't work on background issues. Can revise the narrative standards to make it more clear in the rule that we need to address the bioaccumulative risks to the ecological receptors. Also develop guidance on how to do that versus putting all effort into developing criteria.

Dave – look at the previous definition of chronic. We could do a lifecycle test, a mesocosm approach, measuring different endpoints.

Teresa - Did you mean true biological endpoints or tissue levels?

Dave - Anything on the table.

Laura - Even determining what we mean by biological would take forever.

Glenn – I am still really confused about why the interpretation is solely concerned about bioaccumulatives on fish or wildlife. I don't see other chronic effects from sediments on fish or wildlife species and they are not addressed in the current rule. I am confused about why Ecology is concerned about one potential exposure of one category of chemicals and not the endpoints of the contaminants in the sediments on those same receptors. I'm thinking of PAHs and of contaminants whose mode of toxicity is through metabolism. Just don't understand. For example: regulate for heart attacks but strokes are ok. Confused about this.

Chance – Valid question.

Russ – one clarification, we want to ensure we are capturing what isn't captured in current regulations as far as protecting benthos. We are not, at this point, looking at developing numeric criteria but rather a process for considering chronic effects (or whatever other endpoints may be effected by bioaccumulatives) into a process for developing cleanup standards at a site. We are addressing narrative component of the rule to consider these as we are developing this issue.

Laura – this was based on what was done with RSET. NOAA was part of that group and hoped to have values protective of fish. They haven't been able to come up with protective numbers. We did have something to help address the bioaccumulatives now. Trying to get something moving. The other problem is what we are allowed to address in the rule revision.

Teresa – I would suggest calling it ecological risk to higher trophic levels. Like what we did in RSET. Although NOAA didn't get their task done, it is still important to include in the decision framework. When writing the narrative section of rule, there were 3 components of it: 1) risk to fish, 2) risk to mammals, and 3) risk to birds. Risk to fish includes direct contact with PAHs. Another issue are chemicals that bioaccumulate into fish as the first step up the food chain and which could also harm the fish itself. Has three categories of receptors. Call it ecological risk to higher trophic levels. That way it will be clear: human health risks, ecological risks, and benthic risks (direct toxicity). If NOAA ever does come out with it in the future, they seemed very close to finishing, so it's frustrating. Narrative structure would be there.

Chance – This does expand the scope of this issue that we are authorized to move forward on. We will make note of risk to higher trophic levels.

Teresa – It's an ESA issue, so it must be dealt with. Ecology will run into this with ESA consultations.

Pete A - That's a good point. We've had to address that before. It isn't clear currently in the rule.

Teresa – Between the ESA consultations and the treaty issues, we just felt that the fish had to be addressed that way.

Laura - Same bucket as bioaccumulatives. It's covered but it's not clear. Correct. We are trying to make it more clear for the bioaccumulative aspects. We were getting closer to dealing with it. We aren't quite there yet. Still covered and still there.

Clay – that’s where I was going. From an order of community point of view, our knowledge of taking histopathological correlations and applying to sediment cleanup, what that truly represents, we aren’t that far along. Interesting stuff. Capture the thought but not ready to deal with.

Chance – We are trying not to bite off more than chew. Would be easy to add more issues. Trying not to exclude anything.

Glenn – I think the rule is particularly vague on risk from sediment to fish. I am supportive of developing guidance, but not numeric criteria. Pull topic aside and develop guidance. If not ready for primetime now, that’s fine. Pull aside what’s particularly unclear in the rule and have a way to address that. Revise later without massive rule revision.

Teresa – The framework needs to include it, but I’m not committing Ecology to additional work.

Dave – It would be consistent with MTCA, goes through ecological risk procedures, and could be easily addressed in guidance. All food web models take into account bioaccumulation, ingestion of soil, etc.

Teresa – Need to clarify about tying the facts of sediment to fish to histopathological abnormalities. We met with NOAA last year and they are way beyond that. We’ve got data for impaired reproduction, reduced growth, mortality, and all the key endpoints. Not just histopathology. They are as far along with fish endpoints as we are with bioaccumulation. We are just down to tissue level, not yet to sediments. Almost at exactly the same point with fish as with other organisms. Roughly similar in their level of development. Less far along with bioaccumulation than people assume.

Laura – An example from RSET can be found in the appendices for the Sediment Evaluation Framework released in 2009. Website for the document is provided in the slides. Key point: it was developed for the assessment of sediments for dredging projects, not cleanups - not complete enough to apply to cleanup. The receptors considered for cleanup were not necessarily considered for dredging, because they are not often found at dredging sites.

Teresa – We expanded on it. The RSET policy decision was to limit to dredging. It did include all the bioaccumulative endpoints that apply to both types of sites. It does have shorebirds, terrestrial mammals that use land and water. But amphibians are a gap. We took the ODEQ’s four or five species and expanded to 12 species. The large marine mammals and amphibians are gaps. It includes a wide range of species that do apply to cleanup sites as well.

Laura –I agree with you. But it still needs to be addressed again. And peer reviewed by wide variety of agencies.

Joanne – I’m a little confused about terms. Dredging sites versus cleanup sites: are we talking about sites removing the sediment or sediment disposal sites?

Teresa – It is designed for both.

Laura – Both, for multiple levels. ESA type issues, populations, and non-ESA endpoints. The tables shown later are only the most sensitive species, often near shore. Trying to keep it simple.

A large group was working together on this. If you protect human health, the vast majority of compounds are falling to background definitions. We really need to address the impacts of bioaccumulatives to ecological receptors to conclude looking at health based concentrations based on variety of consumption rates.

Ecological risk values are based on aquatic life including fish such as juvenile and adult salmonids, gastropods, and benthic invertebrates. Vertebrates included birds such as eagles and kingfisher, and a range of mammals. Both species sensitive distribution (SSD) and tissue risk value (TRV) approaches were used.

Teresa – We relied on Oregon. They did some species sensitive distribution but only 6 chemicals had enough data to do species sensitive distribution. Most of the other analyses were tissue risk values or TRV for the other chemicals. The work group felt that SSD were way to go with enough data. The guidance said species sensitive distribution if enough data. TRV used for the rest.

Lon – So it's like the LD50?

Teresa - Our goal was a LOEL, didn't want to use NOELs and didn't want to be up at LC50s.

Laura –For a wide variety of compounds such as metals, organics, PCBs, dioxins, these are the target tissue levels in the tissues, below which we think we are ok. What is the driver? For quite a few compounds, it's humans. But some compounds where aquatic life has lower target tissue levels to protect them than for humans. Moving up the consumption grid level, the metals and PAHs tend to be driven more by the wildlife, not the humans. Even with higher consumption rates for humans, risk is still driven by aquatic wildlife such as TBT, selenium, and lead. Lead risk assessment is driven by blood levels, not consumption.

Lon – We could look at that. One lead model for human health risk has been modified to look at lead exposure via fish consumption. We could look at this if wanted to.

Laura – If values fall below analytical detection limits, they will be driven to background.

Teresa – The chemicals lower for human health are the carcinogenic compounds, the lower ones for wildlife are non carcinogenic. If one always drives and the other doesn't, it is still helpful to have all the information. Nice to know where wildlife/benthic are being impacted. Good to have the numbers out there, even if in guidance for making good hot spot cleanup decisions.

Clay – You had said mercury...struck me the comparison to natural background...the mercury levels we have naturally in most seafood in Puget Sound would exceed all these values. It is common to see a 0.1 or 0.2, depending on the fish and fish age. Have you compared against background levels?

Laura - No not yet. We stated that this has the same problems as human based risk assessment and whole background issues. Same types of issues, but didn't want to go over this all again for ecological receptors.

Laura – Same concepts of these are naturally out there and how to deal with it?

Clay – How many more chemicals are getting put into this background? This has the potential to expand this list well beyond PCBs and dioxin and what we had been focusing and develop quite a few highlighted chemicals.

Teresa – Actually, there are only a few from aquatic that can go all the way down to background, most are achievable. The human health ones will expand beyond dioxins. If you look at human health, from more than just dioxins, there are many chemicals.

Tribal consumption rates most of the chlorinated..

Clay – Just keying in on mercury.

Teresa – Probably just mercury, not selenium like California. Maybe on the east side of the state.

But we haven't done a formal comparison and we need to do that.

Laura – Concluded from the RSET study that large numbers of compounds, including chlorinated compounds, are driven by human risk. When you go into higher consumption rates, it's also driven by human risk. Many of those are below detection limits. Lead, TBT, and selenium are still driven by ecological based concentration. Protecting for human health does not automatically protect ecological receptors. Yes for carcinogens, but for others, no. Need to have something in the rule to address this more clearly.

Laura – We are trying to get your input. Is the preferred option also the best choice, given staff and financial resources? It would be nice to get further along. But with all these other things on the table, is what we are discussing a reasonable option? Human Risk is the main driver for most bioaccumulatives, but not all. What could go into guidance for deriving sediment standards (not target tissue levels). It is difficult to create a standard based on target tissue level.

## **5. Effects Based Body Burden Data (Jack Word)**

Jack – Database timing is good. A parallel effort (going on for the last 15 years) is going on with a different objective. It's a collection of environmental data pairs for residue tissue data and the biological effects of the same. Provides actual measurement of the relationship between effects versus concentration in tissues. The Corps of Engineers database started with EPA sponsorship. Right now, it has 130 different analytes in the database, 2300 references as of yesterday. In terms of pairs, 14800 pairs of data in the database, dating back to the 1960's.

Most data are more recent, within 20 years. They put in about 300-400 more data pairs a year. It's online. You can sort by species name, common name, analyte name, CAS number, etc. Look for effects information, EC50s, and LC50s within the database. Gives a suite of information that you can manipulate. Jack gave example information on mercury and DDT data from database. Information available includes endocrine disruption, induction of certain enzymes, etc. You can look at what type of effect found in the lower concentrations.

RSET data are pretty close to the values found in this database. These data could have been used in the RSET study. Depends on when the data was accessed. Several hundred different chemicals are within the system. The type of information included in ERED are single contaminant responses as well as field responses. If multiple effects from those chemicals, any individual values are conservative. Relationship to lab studies, a few where uptake kinetics were looked at. Trying to see if the guidance will give us similar steady state concentrations seen in the field. If the lab assessment gives higher concentrations than in the field, then it's on the conservative safe side of the evaluation. If organisms are in trophic step 2, then a direct sediment application factor into the tissues of that organism, so do a site specific BASF, then do modeling afterward.

Another example: Uptake rates in Nacoma at Hamilton Army Air Force Base.

Lon – Mercury, organic carbon, how reproducible are these curves?

Jack – What I'm getting at, the body burden uptake rates measured through time demonstrate that they got past that point after 8-12 days. In that case, the prediction is similar to what is seen in the field with that organism. Similar but not the same. Probably pretty good but depends on types.

We did an experiment recently with mercury where acclimated sediments to equilibrium of aeration, so bacteria community before adding organisms. Sediments that were not acclimated had a lower bioaccumulation of mercury. Sediments that were acclimated had a higher bioaccumulation of mercury. The values were still less than the predicted based on standard BSAF, but this was a site specific test. The idea of acclimation to allow benthic microbial community to develop is a good strategy. It takes care of ammonia that might be present in the sediment sample, sulfides and could create more mercury bioavailability of methylation (methylated mercury). Hasn't been done at many sites.

A lab kinetic uptakes experiment involved the uptake of mercury in sediments then depuration after having gotten to a point at 60 days. I don't know why there was a change in the rate. At depurated values from 2-3 days post exposure to 30 days after, it gave about same value as at 28 days. Also, similar to timeframe saw with mercury uptake in Hamilton AAFB study. Twenty-eight day timeframe is good for that. The standard 28 day test is doing pretty well in predicting availability.

ERED provides a lot of information that we should take advantage of. By adding several hundred more data points, observations probably won't change. Could be expanded for certain chemicals of interest. Contact ERDC for adding more chemicals to the database. This helps target the search for data. ERED is for aquatic systems. Edmed for uplands data and Redland for terrestrial data. UDMEED does not have as many data pairs (about 8000 data pairs).

Standard bioaccumulation tests work pretty well as estimator of first trophic step from sediments into tissues. From that point, you can work with models for trophic steps 3 and 4. Can use trophic trace or Gobas models for that. Have good site specific BSAF. This really tells you what the uptakes may be.

Lon – The two clam species you showed, are they deposit eaters or filter feeders?

Jack – *Mecoma* sp. - if there is enough food on the surface, it will take that up but if not enough surface. We found higher uptake in *Mecoma* than in *modeolis*. Vic also has some *Mecoma* data, but very little of it. We didn't use it for comparing. *Mecoma* is fairly similar to *modeolis* at that site.

Site specific uptake is a very important issue. Reference background and different geology components like metals, depend on the upstream source of sediments. If part of the mineral matrix of sediment is from there, it's often not very available. Not as available as if coming out of a different system like sewage discharge system where it would be more biologically available.

The rigorous metals extraction procedure will get every bit of metals with this extraction. The method breaks up the sediment matrix much more than other extractions. Very little to do with bioavailable fraction, which is a completely different way of analyzing data. Not just using a standard measurement system. Biology extracts differently than chemistry. Can provide a better estimate of the availability out of the sediment, which is very important.

One thing they are doing in San Francisco Bay is looking at tissue burdens and area wide average concentration. Area wide concentrations are different for different species such as fish and clams. If looking at uptake from sediment, where the highest concentrations into the tissue of organisms at trophic level 2, then you can do a good modeling effort. This can tell you what the amount of uptake you'd expect in a fish which would be feeding only on that particular organism at that site. If that number is much lower than in the harbor, then they might be getting their dose in another area. This is the first step and making predictions of what's in the upper trophic levels by using these two models and avoid some of the weaknesses of San Francisco's evaluation.

Use ERED, look at 95% protection limit and individual protection limits below that and their significant effects to consider. Use bioaccumulation testing to get trophic step two linkages and then model from there. Then estimate the amount of uptake (that would be coming from the sediment) you see in the tissues of fish or vertebrates swimming in an area. We don't know how much is coming from the sediment versus what is coming from the water. We need to be working on the drivers for the uptake into tissues.

Chance – I would like to go back to the discussion questions and tie into what Jack was talking about and then open up for discussion. We are looking for important concepts and points related to the science or logistics we need to write a good standard. We've got, and want, good ideas of what to put into guidance.

Laura – To get target tissue levels, we just heard one way of getting there. RSET also went through a way to get there, but based on what's present at your site. Wouldn't need to use species that are not at your site. To get to "how do you get to target tissue from sediments" Jack was showing information from studies running bioaccumulation testing. You could also collect organisms from your site and compare to target tissue level or clay mentioned background comparisons. Could do comparison to tissue levels found at reference or clean areas, depending on how we develop background. Some sort of tissue value to be developed for your area.

Speaks to a lot of how uncertain this is.

How would we get to a target tissue level? For a non polar organic compound, the ones driven from BSAF, you can use models such as the Gobas to develop with site specific data to determine safe sediment levels. But BSAFs don't necessarily work. Not developed for polar organics and metals. Those are BAFs (bioaccumulation factors) not BSAFs, sediment accumulation factors. More complications in site specificity couldn't necessary use BSAFs for non polar organic compounds but may be able to work with BAFs and site specific data to get to sediment levels. Trying to develop guidance on this will be difficult, so much site specific information, especially with metals. This is just a really fuzzy outline.

Jack – In terms of all that, are your second two bullets trying to address overall general concepts? Yes. So site specific assessment bioaccumulation testing and/or field evaluation or a combination of those two give you a much stronger understanding of how those first steps behave in terms of association with the sediments. In the cases where looked at closely, there is concern they are not seeing as much bioaccumulation as you would expect in sediments with a higher level of contaminant. Probably a good reason for that. Probably an assumption of what we expect to see.

That's why the Corps went to the site specific benthic bioaccumulation tests. Richland Harbor is in San Francisco Bay and the site of an original ecological risk assessments for a superfund site to get rid of DDT contamination. Certain levels of bioaccumulatives were comparable to tissue levels. They removed a lot of sediment but never changed the TOC normalized concentration of DDT. Essentially the monitoring is now seeing the same levels of contamination in tissues as 12 years ago when they did removal. In the non polar organic compounds, not only are residuals part of it, if you haven't changed the organic carbon normalized values, dredging isn't going to solve your problem for non polar compounds.

## **MEMBER FEEDBACK and DISCUSSION**

Teresa – I agree with a lot of this. In the workgroup, we tried to start with TTLs because that's where the exposure is. Those values can be well defined. Those should be the regulatory values and that any sediment values would be site specific or project specific watershed specific. The target tissue levels should be the true driver and that's what you are trying to meet, whether you are doing it with dredging or cleanup or source control.

What we really need, you can see all the complicated stuff that comes after that. How do you get from your TTL to your sediment? We were dealing with Willamette River where they couldn't do the bioaccumulation test fast enough to prevent the berms from filling up before the dredging had to occur. It's non-trivial to do this in a vast moving freshwater system, so there are issues with requiring all of this complicated testing and modeling at each site that don't even have to do with cost and small businesses, etc.

I apologize in advance but it's important for the agency to...(we have tons of fish monitoring data for the Duwamish, tons of tissue monitoring data for Bellingham bay, tons of fish monitoring data for Eagle Harbor). We've got agencies monitoring constantly. We know what's out there, if not, we can deal with that. Most places we know what's out there. We should be able to say, based on target tissue levels, what are our concerns in this watershed, what are the problems. This is the only way to simplify it for people.

These are our problems...proactively go after them. What do we need to do in this watershed to get mercury down to a level that's appropriate? Should it be source control, cleanup, dredging, what? Then go target those people and get that project started. Don't burden every other project with that complicated bioaccumulation process. That's the only way I can think of (and I've been thinking about it for a long time) to make this simpler is to do it on a larger scale and develop a plan.

Say a little site or project comes through because of a property transaction or dredging project that ecology has to deal with. I think we could have some super simple deals. Do bioaccumulative test, compare to target tissue level, and if you are twice the target tissue level, then give that person the option of reducing their sediment concentrations by two. It's really complicated. Don't make them do the Gobas model. That's the most conservative model. It says that everything is coming from that site, only sediments, not water or anything from other sites. Then say "You're Done!" if it gets recontaminated from upstream then ok. But give them a simple out that doesn't involve months and months of bioaccumulative testing and calculations just something simple. Simple threshold.

If you are the Duwamish river superfund site, then you can do area weighted averaging and so forth, the best actions to reduce target tissue levels for a site that wants to and big enough to warrant it. But have simple outs for small projects that just need to move through the system which are reasonably conservative and quick. I feel like a combination of these things and the agency starting from the top down instead of the agency expecting these sites to come through the agency from the bottom up. As well as some simple ways to get thru smaller sites that are going to come thru the system.

Chance – So that was really helpful, Teresa, the need for us to have more comprehensive strategy and providing something more simple we can do on a site specific basis.

Teresa – I would also like to see little spreadsheets, not just language, but a simple spreadsheet where you can click on the species you have on the site, click on the chemicals at the site, nearshore to deep water, endangered species, and out pops the number. A disk you could hand out to people. Something interactive instead of having people try to figure out all the equations, tables, etc. Let's do more of that. That's my suggestion for these more complicated processes.

Clay – I think this is a good approach. I had the same reaction that Teresa did. Include some off ramps on the second bullet. Repeat a lot of what we've done like at Bellingham Bay. For those not involved with it, the issue was mercury, human health based but applied to ecological quite well. Developed a correlation between an area weighted average in the sediments and concentrations in the tissue. The tissue concentrations varied in the bay and developed a rough correlation based on that information.

Chance - Can I clarify, when you say area weighted average is that from the cleanup site or the area?

Clay – The data we have, Ecology collected a bunch of data from the crab population from Whatcom waterway, where the concentration were the highest in the outer part of the bay. They were able to correlate that to what was going on in the sediments, both were following the same gradient. Took that relationship between sediments and tissue and applied it and came up with bioaccumulation screening levels for mercury. A lot of information on crabs, the thought was what about a species that had a smaller home range? Crab harvested more.

What about on the smaller scale? We took that information and came up with a concentration in the sediments on a point by point basis. As long as everything was below about 1.5 ppm on the dry basis, basically we used it to say any area that's less than 1.5 ppm, we don't have to worry about it. Even in an area like Bellingham Bay, it reduced the area of concern to a smaller area. Even with an option of going into more detailed steps, we opted to we can live with this number. There were other things happening in that area. We have since applied that approach to the Fidalgo Bay area and used the same approach to off ramp early. See all the areas with elevated Hg coincided with other issues at the site. Maybe there is away to use the successful approaches Ecology used at past sites and fold it into the guidance and make this a workable process.

Teresa – I was thinking this. There is a simpler approach. If you using bioaccumulation tests instead of field collected organisms, use spot bioaccumulation tests, then take sediment concentration and paired with tissue concentration and do a simple regression analysis. It's a lot simpler than Gobas model or calculate biotic ligand model or BAF. Less expensive for PLPs, anyone can do with simple statistics program. Add to the tool box some simpler tools, that small sites and dredging projects can use. And also some off ramps based on suggested. Sometimes on a watershed basis. Need to know what's going on in your watersheds to understand what's going on at your smaller sites.

Chance – I think the issue would be that we don't have the data.

Clay – I was thinking of a flow chart.

Teresa - Yes, if you have the data go here, if not go there.

Clay – It seems like the only way to convey the various ways, don't get into the detailed risk assessments when you really don't have to.

Chance – Need to clarify. If you don't have the data, what's your off ramp, if the area wide data isn't there, what's the simple off ramp?

Clay – some of these other...go get data or..

Teresa - Or do regression instead of a model.

Chance – Need to think about fairness.

Follow the approach talked about earlier, the off ramp for mercury instead of 1.5 would be .11, which is a problem...

Teresa – That's a tissue level, not a sediment levels.

Jack - Looking at what is the contribution of the sediment to body burden, what are you most interested in? The human health level or the contribution to the body burden or the trophic level whether protecting whales or whatever. But the weak link is the connection between what's in sediment versus tissue or in water versus tissue. Need to segregate those, because if we are cleaning up the non problem with cleaning up sites with a little problem, then we are spending millions of dollars on the wrong issue, which is source control (I'm sorry – it's back to that).

Lon – Just one thing, for example, the Duwamish system (and I think this is generally a problem for regulators). Looking at correlation between arsenic in the environment and arsenic in the organisms is problematic. Haven't been able to work out a relationship. The question is you have a problem that's indicated by target tissue levels and what do you do? Where do you stop? The other thing is Jack, was curious, we had data matching bivalve TPH concentrations to sediment TPH concentration. So I'm assuming you would spike sediments to get the desired concentration range to get a regression.

Jack – Spiking sediment has a lot of quality issues.

Lon – Yes, I figured it would. You get a lot of interaction between chemicals and the matrix, bioavailability and that was the problem... a lot of field data of TPH but not a good spread of concentrations to get a really good regression relationship. So that was just an observation of an issue.

Jack – That's why I like to do it in the laboratory, because I can control it.

Lon - So you would go out and assay sediments for the contaminant and some for the lab.

Jack – Yes, generally do a clam and a worm for testing scenarios. It's been fairly robust as far as comparing against reference sites and seeing about going to ERED data base to see if statistically differ from references, and look at body burden to see if at effects level. Pretty useful.

Pete A – I've always viewed cleanup of contaminated sediments as source control.

It is a source. It can be a source to contaminated over the line water. Just looking at what's the source of that bioaccumulation. That's the only comment I had.

Jack – I agree. Sediment does have a contribution. I don't know the percentage.

Teresa – I think we can get back to source control in a MTCA context which would make things easier for Chance.

One thing, that throughout the history of the sediment program hasn't been done well enough, and should be part of MTCA, is that cleanup should be multi-media. But we only look at the sediments. We don't look at the water enough. Regarding the comment about arsenic, we know in Elliot Bay that natural arsenic concentrations in water are high and exceed risk based levels. It's from the geology and the Cascade Mountains and is a natural problem. If we were to, we could address that in the context of a cleanup sites by having contaminated sediments and clean water in an assay and run a clean sediments test with site water. We never do that.

I think it would be great if we did more work on water at our sediment sites to address the issue of: Is it the sediments? Is it the water? If it is the water, is it natural or is it a source control problem? Because when we have a cleanup site and find out it's a source control problem, you get to go cleanup that source. It's part of the process, generally. Unless totally unrelated to the site, but you can still often use as context for going to the discharger: We are having this problem throughout the waterway and we need to work on this. We need to do more work on water along with sediments, especially when getting to bioaccumulation, it's really low levels, and we'd be asking for really huge sediment cleanups.

Jack - I'd reiterate that and add in that San Francisco Bay, if you look at relative PCB congener mixes in the tissues of fish or invertebrates, they do not match what's in the sediment. They match what's in the effluents coming out of East Bay mud (a sewage treatment plant). Cleaning up sediment, based on that, isn't going to help with sediment and the tissues of fish. You're talking about millions of dollars going into moving mud around; East Bay mud ought to be the issue.

Teresa – Maybe this is a retraining issue or a guidance manual issue. Just to put more emphasis on the water when evaluating a site and when do regional Ecology's Environmental Assessment Program (EAP) studies, so that we have a better handle on where the bioaccumulatives are coming from.

Chance – Well, we already have an idea of that, for PCBs.

Teresa – No, but for other things, too. Arsenic, mercury is soluble, TBT is very soluble.

Laura – Does MTCA already address that to a certain extent? If it's not sediments then not in SMS?

Pete A – SMS does cover that. It's part of ...talk to any PLP, they don't want to cleanup a site if it's going to be recontaminated so generally ask them to look at ongoing sources and control those ongoing sources. That would be a perfect example. That doesn't mean they wouldn't have to cleanup the sediments that are contaminated but don't want to clean them up to become recontaminated from a known source, so then go do source control requirements thru the NPDES process, which we've done before.

Teresa – But also talking about fish becoming recontaminated. I think that's a key point. We are trying to reduce concentrations in fish and they won't reduce to the extent expected if we're not addressing the right source. We'll cleanup up sediments and monitor and concentrations won't go down... "you didn't do it right" or "you didn't do enough" and that may not be the actual answer. It may be something else.

Donna – A point about looking in the water column...one of the struggles with that is the mismatch between how the water quality standards are established and sediment standards are established, without consideration of how those two interact.

Teresa – No, you are absolutely right. MTCA has historically had the surface water piece and SMS has historically had the sediment piece and that has never made sense. MTCA should have the surface water on soil, like a stream. Surface waters should go with the sediments. Always has been this really weird interaction.

Paul – listening to this discussion and the uncertainties and complications, it almost feels to me like you are trying to get the rule way ahead of science. That we don't have sediment science we don't have now. We have information pointing one way and it seems like it's too soon to try to jump to changes in the rule. It may be very appropriate to have guidance that comes out that collects the current knowledge that says look this way or that way.

I think you have enough language in the rule. Like in Bellingham Bay, you can push that way with the rule. The second concern is that the rule treats all sites the same. Portland Harbor spent \$70 million on an RI/FS addressing these issues. And still with a lot of uncertainty. So what about the little guy, with this framework you are setting up? They can't afford \$70 million or \$7million or even \$700,000. It's like you

are going to force things to stop. If you leave it, if the end point is this very complex process and don't know the rules, you are going to collapse the process.

I could see that SQS and the CSL are gone as soon you pass this rule, because now we are pointing to human health and bioaccumulatives and those don't apply. So the caution is, really think about the unintended consequences. It is so complex, so a path forward might be – I liked Teresa's idea of on an estuary-wide basis what are the five main compounds that are the problems? Who are the five major sources of those? Focus on them, anybody else, give them a back door process with just SQS and CSL, and a screening level, a benthic based number that's easy to apply and don't give every person a job having to worry about this complex conversation. I've already seen lots of property transactions collapse because the buyer wants to be assured there won't be any liability.

Where we're going now. There won't be a piece of property they can sell. Background on PCBs or dioxins, we as consultants won't be able to say the property is clean. So the unintended consequences are huge, trying to get more refined in the science before the science is settled. I think you could have a significant impact. I know that's not our focus here, but I have lots of small sites that all of a sudden we shed light on the bioaccumulatives and there's no straight forward answer. This will make it collapse. It's hard, you're trying improve and take a step ahead. We may just be too far ahead of the science. Things that are great like Portland Harbor and Duwamish that are investing all of this money in the science. Maybe in another five years it will be easy to distill out a rule change, but I think right now you're best bet would be a guidance change and adding off ramps. Off ramps that are... focus on estuary rights, major compounds of concern, and major sources. If you are not a source of a major compound, you get a simpler path.

Chance – Very interesting. Thank you, some excellent points for us to consider. Any comments?

Teresa – That's where NOT tying our process to MTCA would be helpful. I really think we need to move away from MTCA and go back to what SMS was originally supposed to be, which was an integrated source control and cleanup program that was not completely tied to MTCA. It used to be you could do cleanups under the Clean Water Act. We could do cleanups under a whole bunch of different authorities. We had five authorities we could use, only one of which was MTCA.

When Ecology moved the sediment program into TCP, there was a lot of worry that what's happening now would happen. That sediment cleanups would all have to follow the strict MTCA approach and we would find ourselves in these corners and I do see that happening. I worry that we are losing a lot of the tools that we need to do the more complex and problematic issues. If we weren't so tied to MTCA, we could develop our own framework for how to move forward that doesn't give us the big issues and help the smaller issues live within their contaminated environments and not get totally broadsided.

Chance - Does that apply to all the issues we are addressing?

Teresa - Mostly bioaccumulation. The other things can go along pretty well.

Clay – I was trying to get back to this issue. I think there are two questions. Do you really need to modify the narrative standard? The stuff Laura put up there, you have a pretty good narrative standard. I think

you need to maintain your flexibility, for all the reasons that have been mentioned. I think site managers understand when to apply a ball ping hammer and a sledge hammer. I mean we could tell a difference between big and little sites. The guidance seems like still some differences, highlighting differences between where the Corps of Engineers and EPA are at within a tissue based criteria and RSET. Maybe they are the same number, but to the extent there are differences of opinion, be really flexible in the actual guidance, pick one or the other.

Teresa – I'm going to disagree with that. The stuff Laura put up but was from the beginning of the rule comes before source control cleanup. The stuff written in the cleanup part of the rule is excessively vague. It has caused multiple problems with litigation and for site managers in many contexts. It's in the Introduction and Purpose but not in cleanup standard section or any standard sections. Those are totally vague and don't say anything about ecological risk. Human health is not clear, not even what risk standard to use. It's completely vague and needs to be clear about what we care about. Include fish and wildlife, some of the basics that we care about. Why are you are doing the cleanup?

Clay – I guess I haven't seen the problem Teresa. It has come up at several sites, been applied as long as applied reasonably, it has...

Joanne – I hear everything pretty clearly. This is the struggle: we put it in guidance and keep the flexibility, but what is the predictability? If you get a site manger that thinks one way versus another site manager, you are doing the billion dollar tests or the simple route. This is the thing that we want to see how we overcome. Assurance. I don't know that I've heard the solutions here. This is a very complicated issue.

Chance – The way it's written is very general and doesn't necessarily give guidance on how to assess these different pieces.

Joanne - What's more important?

Teresa – You can also include a sentence which is present in many of the other cleanup sections that says: Ecology will have guidance document, rely on that.

Teresa – but in other places in the rule. It allows you to modify the guidance document over time. But you don't know how many sites we've had arguments about exactly the things that are listed there, what are the endpoints that Ecology needs to look at.

Chance – So can we need to through on that. That was one of the questions to answer. Specifically, are there some endpoints (3<sup>rd</sup> bullet) that we should have written into the rule? Do we start with the narrative that is cobbled together, clarify it more, be specific on endpoints? Are there specific suggestions about that?

Teresa – Well, we chose some from RSET, close to those. For an actual cleanup, those sort of administrative principles, what do we care about overall? We actually took out histopathology, because we didn't know what it meant. We took out biomarkers, we retained mortality, growth, reproduction, behaviors affecting mortality, growth, or reproduction, clearly scientifically linked to the other endpoints. We didn't include things that we didn't know the relationship. You could slightly narrow that narrative

standard a little for cleanup projects where it has a lot of activity or money on the line and everyone was pretty happy with it. Everyone was pretty comfortable with those more specific endpoints.

Lon – It seems the rub is putting small projects through the ringer and so specific quantitative values like Method A would be useful. You don't want to draw the lines too stringent. People should be able to attain cleanup standards. I still think we should be considering the relationship between background and bioaccumulatives. Again, I think the rub is in the compliance test.

Russ – I think there are a couple of venues we should consider when we are looking at how we might modify what we do now and where it's captured in rule or guidance. A couple of those would be specific language that addresses how we would address these other ecological endpoints in a generic fashion in a paragraph in the cleanup section. Or it could be captured in the description of how we might address the range of issues under a cleanup study. It isn't just the benthic endpoints we are looking at, we are looking at a variety of other things. Also, outside of the rule we have the SAPA that can be updated, easier basis that might go into more specific as to which of the endpoints we might toss into the mix.

Chance – So adding the endpoints into the SAPA guidance that we already have. Sampling analysis plan...

Russ – Just wanted to toss those out.

Chance – What do people think of that?

Clay – The majority of what we are talking about is not rule related. I think the rule needs to maintain flexibility.

Joanne – It moves into the guidance part. If the guidance has all sorts of opportunities versus a clear path...

Chance – If the guidance is specific, it may actually have a flow chart.

Teresa - But don't you run into the whole legal issue of following guidance too closely?

Chance – Well, guidance is guidance. At least, if it helps site managers, I meant it is only as good as it's written and as good as enforced by the agency. So it's our problem to make sure it's specific.

Glenn – Some of the legal challenges you face, and I'm all for the flexibility. But also recognize the logic of having two small sites in the same area that may have similar contaminant issues. Coming up with similar cleanup numbers, some regional consistency, either on small site basis, or Lower Duwamish versus Harbor Island. So I don't know where you ensure you get some of that consistency.

I really don't want to be on the boundary of Lower Duwamish, where there is a cleanup standard that's an order of magnitude different than on the other side of the boat. That's where I don't want to be. If guidance can help get the consistency without the legal challenge, I do not know where the strengths and weaknesses are. You identified in some of the original slides goals to obtain more regional consistency in cleanup decisions and that's what I don't want to lose, but at the same time like to balance with the flexibility.

Chance – So either the guidance is specific, so don't have neighbors with different numbers, or the program looks at a bay wide type of approach to set numbers.

Teresa – Or go after the top 5 PLPs and they are big enough to just spending the money to develop the relationship, then you can use that relationship with all the small parties. We've already figured out the standard for the bay should be X, you don't have to worry about figuring that out. I think that's another advantage to starting with this approach.

If there was guidance for the site managers that identified tier 1, tier 2, and tier 3 sites and tier 1 = superfund and maybe would look at sources. Viewed as a major source of the focus chemicals and would allow a site manager to treat a tier 3 site differently than a tier 1 site. Right now you are talking about once the guidance is written, the site manager will say: Well, I need you to go to the nth to figure out bioaccumulatives on a compound that is maybe coming from upstream. But the guidance doesn't give the site manager an out because you find it on your site.

A divergence from your philosophy now, but it might allow for a combination of the bioaccumulative concerns now without crashing the system. Again, I think that if the guidance became focused on human health and bioaccumulatives, the SQS, and CSL, those numbers go out the window. The numbers used on medium and smaller projects as a basis to get done and resolve the liability. If it's a little dredging project, a guy just needs his berth, all of a sudden dumped on and it may be 5 years before he can dredge and it shuts down his business. That's not the intent of the rule, but might be the unintended consequence, so maybe using a multi-tiered site would be beneficial.

Chance - Are you thinking multi-tiered actual rule language or guidance?

Could be easily be guidance, doesn't have to be rule. But some way to allow the development of a more sophisticated approach without having a small site have to be able to do it on day one, just like on the Duwamish.

Jack – When talking tiers, I was thinking tiers more like the Corps tier approach. There are four tiers and you can opt out at any one. The simplest one, you have no reason to believe there's any contamination or have been any spills. You validate that with sediment chemistry and it doesn't exceed a certain guidance value and you're done. You can be done as a cleanup or a dredge material removal option.

Tier two is to model the theoretical uptake kinetics associated with it and whether or not you expect to have an effect. Tier three would be to test it to see if you have an effect. If you get a negation anywhere along that line, you are done. Anything else, it's the option of the group that's doing the evaluation to determine if they are willing to put in more money to get a potential answer that's ok or not.

Those 4 tiers in the Corps/EPA guidance manual for dredge material can probably be applied very easily toward the sediment issues, contaminated sites, whether it's Superfund or not. You can make the decision: Do we accept the outcome of the data that's there or do we want to go to the next step? How you set what that guidance is for the TTL or whatever you decide that number should be, in tissue it is really the driver and needs to be looked at. It tells the Ports or Corps what the risk they have of taking on the next tier. You can get out really easily at the front end of it.

You would have to have at the front end, though, the five criteria...

Jack – Yeah, and we've got some of that already with the...we could set that up...

If we look at the numbers from the earlier table, a lot of the numbers are below detection limits.

Jack – Yeah, that's why I said the bioaccumulation/TTL thing needs to be...

Dave – I was just going to comment...the tiered approach is we have in regulations...but...we have regulations...somewhat of what you're describing, in terms of small sites being excluded, and you have...well, you've got some habitat there, so you are tier 1, well...hey you have a lot of habitat and it's nearshore, you have to name a lot of species you need to do the full throttle site specific evaluation so that wouldn't be something too far from what we already do in regulations. Depending on what the group...would indicate, that would be something that would be potentially considered for guidance.

Chance – So that's a suggestion, that's not an official Ecology statement.

Lon – I think it's the background thing, really. Once the risk is established, the levels for bioaccumulatives are all lower than background, it's really a matter of defining background. And determining some cleanup standard based on background for a small site, just kind of a cut and dry number.

Glen – I guess that and for smaller sites, that in conjunction with, how do you delineate your site boundaries. I think you suggested as adding that as a bullet (homework). Background issues are important but also important for us to think about the different circumstances and what you use to delineate your site. You know, when does that site stop?

Teresa – I want to go back to what Paul said because I think Paul was talking about a different tiering approach than the one we are all used to using in cleanup and habitat assessment. This is what the Corps of Engineers uses at the very initial outset to decide how much attention to give your dredging project and it's based on how contaminated the environment is and how big a site you are and that combination says how much work do we make this person do? How much work we do as an agency want to spend on this site? It's a workload issue on both ends.

Let's say we even do know what background is, we know a particular bioaccumulative is below background, we have our number. We want to make every single individual site for whom that isn't one of their COCs, cleanup to background. Let's say tier 1 is the little tiny site that never had PCBs and that's probably not going to happen but let's say its mercury and that wasn't one of their COCs. Do we really make them cleanup every inch of sediment that they own to background? When that wasn't one of their COCs and they are a pretty small site? Yeah, they weren't a source. I'm saying there could be different responses.

Chance – I think we've got some of that flexibility in MTCA at this point, that's somewhat of a policy call.

Teresa – There may not be much flexibility, depending on how we write our cleanup standards section. And that’s where I think getting away from MTCA is good. This is sort of a dredging approach but the dredging authorities, if you look in the authorities of the cleanup section of the rule are one of the authorities for the cleanup section of the rule that we wrote in to give ourselves that option of using that to cleanup the site instead of MTCA. I just want to say I think we have that flexibility if we choose to use it and if we make it explicit that we aren’t going to necessarily use MTCA at every site.

Joanne – To be clear, what are you saying?

Teresa - I am saying we have some kind of an initial ranking system, based on the size of the site and how contaminated the area is, and whether the COC is of concern in that area or was even at that site ever. That’s one of their COCs and if it’s not really one of their COCs and it’s a small site, we give them some passes on some of the hardest stuff. We just make it easier for them to transfer their property or get them through the system or do a limited cleanup for what was their COC. If it was sandblast grit, it didn’t have anything to do with bioaccumulatives. I am just reasoning they could have a limited cleanup so they could focus only on their targeted items and not the big regional bioaccumulation problem.

Pete A – I would like to go back to the definition of a site. In response to that, generally how the process I’ve been thru occurs is: If you have a small site and say they have mercury but not PCBs, they were never a source for PCBs but they have it on their site. Generally what ends up happening is that they are responsible for the mercury. Where the plume of mercury is, that’s their site. Then they end up bringing in their request to us to bring another PLP to be responsible for the PCBs on their site for those known sources upstream. Obviously, that would be an example that they would do on the Duwamish, so that’s small entity is not responsible for those PCBs, we bring in someone else for that cleanup. That’s how it’s generally done.

Teresa – Do we need that second part? Or can that second part happen when we get around to that PRP? To get thru the process, not only does the small entity do their part but they have to find the person who did the other part and bring them in. Make sure the cleanup gets done at the same time.

Pete A – Actually, if they point at someone and bring us some evidence, then we do the rest of the research to find out if we agree with them. For the most part...that’s Lake Union.. Because you can’t tell the difference between one party next door to the next party, so it’s not inconceivable and we do it quite a bit. So I don’t want to say that the current rule doesn’t handle that. We might refine it somehow to make it clearer.

Pete Rude – ...this is the one, maybe next time around...is there a definition of the site we could all look at together at some point? Is it in SMS or in MTCA? [Pete A – it’s in MTCA, I believe]

Teresa – In SMS, there is a definition of the cluster of potential concern. That’s essentially the initial site as an issue and that’s only based on the CSL to identify a site. It’s not a definition of the boundaries. Just says there is a site.

Clay – A real good one to give feed back to you, Chance, so you can pull them together, right. I think there's some flexibility in here. Remember the Spokane River site, when we were doing that site, I remember you were thinking that was not such a good way to carve out the PCB site and the metals site.

Pete A - At the beginning yes, but I recognized that the PCBs were under the authority of MTCA and there was already an agreement that the metals were under EPA authority. We knew it would get recontaminated, even if we cleaned it up for PCBs it would get recontaminated with metals. That was EPA's deal. We carved that out separately.

Clay - I think that approach was essentially the same thing, though. It allowed the PRP, so the PLP is associated with the PCBs, it's a little easier, to actually proceed with the cleanup and not wait for this much more complicated situation [Pete A – you have to move forward] called the Coeur d'Alene sort of basin to get to some point of comfort.

Chance – So they are responsible for whatever contaminant they've actually contaminated sediments with, what they are responsible for...we've settled that liability?

Clay - So that site, we called them Spokane River, was called it the PCB site to make that really clear and distance those parties from all the other issues...I just remember Pete, I remember you were uncomfortable when that first got going.

Glen - I guess I was also wondering, this is a site Pete's worked on in the past, Gas Works Park. I'm not just thinking where you have a PLP responsible for one COC and you have a broader COC with a regional concern. Gas Works is a primarily a PAH site and, guess what, PAHs can continue throughout that region. If you have PRPs interested in doing cleanup, where does the site stop? Because you are not going to drop below your numbers for a long time, a long linear distance from the site. That's were some of these issues about how do you delineate a site when does the site stop...

Chance – And we've identified that as a big issue. I think that's all tied around the issue of background. What number we use? Then once you have defined that site, which could be an entire embayment, what do you do?

Teresa - It could also pivot around: How far do you use cleanup authorities and when do you start using water quality authorities? That could be the line that you draw. Where you do active cleanup for a certain extent of it and then you...you know we did this with the dioxin.

Russ worked on this at Cascade Pole when we had the dioxin issue. That was one of the first test cases for bioaccumulation and it was quickly realized they could never go all the way out to infinity or the dioxins would drop below our cleanup levels, so there was a given action that was taken and the whole agency...it was written up as a case study and people said this is what we can do under the cleanup program, the rest is up to source control, dredging, and natural recovery.

Joanne – It should be renowned as a really positive test case. Something got done. It's not sitting there today. I have to commend you for that. I think it's fantastic.

### **Audience comments**

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Chance – Any audience comments? You can send me comments, too. You have all of February to send me comments.

Todd - I guess I would just voice some agreement with the top down approach. It seems to me we should be looking at receiving waters and we can't piece meal it site by site. Each of these issues is more of a regional issue. What are the bioaccumulative chemicals of concern? We can't be asking individual sites, as a matter course, to go down thru the bioaccumulatives list just because we have detections of certain chemicals that go through exhaustive field studies or lab bioaccumulation testing studies to try to make some sense out of it. I really think it's got to be done on a larger scale.

And some of that might therefore fall on the agency's shoulders to...it's almost like a TMDL kind of approach (audience agreement). You've got to understand: What's the contribution of the sediments? What's the contribution of the water? What's the background? How far can you reasonably cleanup to without starting to get into recontamination issues? Some of which maybe be outside of our control for a decade or more into the future. So I guess that's my first reaction.

This really needs to be looked at from a top down/receiving water type of scale to define what are the problems. It may be a short list of chemicals that we really need to focus on. And I think a lot of those decisions have to eventually propagate down to individual sites, which sites we need to focus on and what we can realistically accomplish. I do think it needs to come from a broader combination.

Jessi - I wanted to go back to something Joanne said earlier, talking about predictability. We're all about flexibility but definitely very interested in predictability and liability resolution. The guidance idea sounds great but how we marry that guidance with our narrative is really important because we are using guidance to drive whatever the project is, cleanup or dredging, and we need to make sure we are covered liability-wise on how we are actually doing the project.

Teresa – I have a question for you. I really do think it's important to remember that we have multiple authorities for carrying out these activities. We actually used to start writing our cleanup decisions with which authority we were choosing to cleanup that site, whether it was Clean Water Act or MTCA or a dredging authority, we would start our decisions off with that regulatory authority discussion. And that would give us more flexibility to do a lot of these different kinds of things.

It brings in our NPDES authorities, it brings in our dredging authorities, it brings in all kinds of authorities that help us attain these goals. I guess what I'm asking that given that sediments is now in the TCP program, is there any receptivity on the part of management to not use MTCA at every single sediment site? Is there a way to use these other flexible approaches so that we don't get locked into that? Where we can't give a MTCA buyoff if they don't do X, because that's what we will be talking about. How can we provide sites with a buyoff at some point when we feel like they've done enough? If we get locked into the MTCA framework, there will be times when we can't do that, but we need to. If we use our water quality authorities, we have more flexibility to do that.

Chance – Yeah, I would have to say that it's not off the table to use other authorities, but there is definitely a hesitancy to do that because of the ease of MTCA, even though we are doing rule revisions to try to make it easier. Then there's a process that's understandable in MTCA and there's some legal issues.

And when we talk about using a different authority like the Water Pollution Control Act that set's us up for being in front of the hearings board, so we're talking about probably a higher workload if we used another authority.

Teresa – It was actually my experience that it was a lower work load than under MTCA. We didn't have to use the orders and the ...it was a much simpler process and we never got called before the hearing board. I think a lot of that are fears that don't actually happen.

Pete A – I think things have changed since then. Yeah.

Teresa – Ok, I'll accept that. I just wanted to ask the question.

Chance - It's definitely not off the table, but there is a strong preference and a bias to using MTCA for valid reasons but doesn't mean we couldn't explore other authorities.

Lon – Looking at cross-media issues, you've got sediment which can become like a beach area or something like that, or you've got material on sediment then you've got MTCA and surface water quality standards, so there certainly has to be some communication. You can't do a cleanup at a sediment site that results in problems for other media.

Teresa – it's more of an administrative issue with what flexibility you have and how you handle a site administratively. You want your numbers to actually be the same under any process that you would use. But a way of getting around that would be doing your watershed approach. And then where you decide you need to do cleanup, using MTCA, you decide you need source control using your water quality authorities. That could work, too. The initial overarching thing would have to be cross-program.

Pete A - I don't know how administratively how you handled it. In the past, in terms of a sediment site, but generally we don't have sediment sites. We have our sites based upon the definition of the site, which is where the contaminants have come to rest. Usually they start off upland and they end up in the water. So there's still some upland and still some in the water, so it falls under MTCA generally and use the SMS for the cleanup requirements, you have groundwater, surface water, all that stuff is integrated in the RI/FS, so I don't know how it was done in the past, but that's how it's done now.

Teresa – It's sort of bittersweet. We started out with sediment sites really separated from upland sites and we fought hard to be respected in the MTCA program and to be part of the MTCA program and now we've swung the other way.

Chance – No, there aren't a lot of sites out there that are just sediment sites. That comes back to what Pete Rude was talking about, the definition of the site. I did add that on the bullet and will update it and sent to you guys. That's a concept to think about. Do we need to talk about that some more? That would mean a change in MTCA in terms of definition. Maybe we can leave it for everyone to think about more.

Pete R – About a year or two ago, I was on the Sediment Phthalate Workgroup. It was different in a lot of ways. At the end of it, we had thought long and hard about some of these issues, and there's some crossover, so I'm... I want to commit to looking at that and see if there are any nuggets that might add to

these discussions. I just can't pull it up right now. Might be some things there that might help us...or confuse us.

Chance – Confusion isn't bad as long as we can eventually have some clarity. We discussed doing some thinking for February and will send out reminders in February. You may want to talk to each other, brought up before. It's fine to talk with each other. Most important for you to capture substantive discussion/conclusions in some format and send to me for part of public record. All of this is publicly disclosable. But it is important to talk to each other.

Teresa will be out for a month and may have occasional internet access. The first week of March, she will be able to send things out. Our goal is transparency with the public and transparency among the group members, so no one feels left out. You are representing more than just yourselves. That's really critical. So if you are having discussions, again, I need you to record the substantive information and let me know about it, so I can compile all that information and send it out to people. That way everyone is on the same page in terms of information and everyone else has an opportunity to think about issues.

Teresa – Can I suggest a different approach? There are plenty of free hosting sites for discussion forums.

Chance – We have legal issues with that. We aren't doing sharepoint or blog sites for the rule at this time.

We'll just have to do it the best we can. You don't have to record every conversation, just discussions and conclusions, that information needs to be distributed to the rest of the group and be publicly accessible and disclosable.

Glen – The tribe considers any emails I send out to be formal correspondence with letterhead, so I do not off the same level of candor in emails that I can in person when discussing issues. A policy issue.

Chance – Is a phone conversation different?

Glen – Yeah, unless phone conversations lead to email which is happening more and more.

Chance – You need to send information to me, if you have important conversations and come up with ideas. Just let me know who was involved in those conversations and send the information to me, again, summary format and then I make sure that information gets out to everybody else.

Clay – Is it okay to coordinate with the folks from the other group as well? Some of these background based issues...

Chance – We haven't brought some of these issues to that group yet, so I think it might be premature. I can't tell you that you can't have conversations with people, but there is a reason we have this group versus that group. Just try and keep that in mind.

Clay - So the agenda for next meeting. Are we going to do freshwater standards?

Chance – We're going to have to wait and see. I'm not sure we are going to be ready, but we may have updates. Most of it will be focused heavily on human health and background issues. We may be able to

talk about other deleterious substances phrase in the SMS, but I need to have a discussion with my management team first.

Teresa – I think we should count on freshwater later and dive into these site definitions.

Chance – I do realize at the last meeting we talked about updating the definition of regional background, we just haven't time to talk about it and wanted to provide it to you a while ago. It just didn't happen. Still working on that as well.

Any suggestions for how these meetings are being handled? Anything to make more productive? Or think about it. We want you to feel these are productive. Trying to have specific goals for specific questions we need to answer. Any other ideas to improve the process?

Teresa – I'd like to see more discussion. That's why I thought the discussion forum/blog would be good, it give us a place to go. I think these are great meetings and getting good things done. Need a way to present information to the other group that is coherent. If we present it to them, we will get some ideas of how stakeholders might respond to ideas we have. We need to figure out how to coalesce that. That's my only concern is, do we have enough meetings left to have enough forums of communication to make that happen?

Chance – Yes, valid concern. Likely not enough meetings, but we have what we have, so we have to try to figure out the best way to...

Teresa – But what about other side discussions?

Chance – I think side discussions are fine but again, you just need to capture so that not a single person in this group.

Teresa – Every person needs to be include on the list and we always 'reply all.'

Chance - That's a new ground rule we haven't discussed. And I am aware of how much email traffic might be going back and forth and the amount of work I promised you wouldn't have to do. 'Reply all' – I'm hesitant about that. That might not be the best way to go.

Laura – What about sending to all member initially, but if you don't respond, we won't bother you.

Joanne – As far as improvement, I struggle with how I convey what's discussed here to my colleagues at other ports. My assessment is that we ping off of very high policy issues down to very minute technical issues. This is hard to track back and I know when we are doing both. To convey, what are the issues that we want to respond to? It is very difficult for me to pare down and I just have to put this out there. Just my frustration. Conveys to what Teresa is saying: Are we going to be able to capture this discussion and thought process? I am not clear on that process.

Chance – We are capturing the meetings with summaries, but not out immediately. Hopefully that helps summarize. We are also trying to summarize the information and bring that to the larger group. You don't see that discussion because you all aren't there. Do you have any suggestions on how I can make that better? Do we need a high level recap?

Teresa – What you are preparing now is a summary of the meetings, it's a faithful reproduction of the meetings of what is said and concepts we convey and it's been very very good but there isn't any coalescing summary, the majority were trending this direction. Maybe it's too early, but some themes are emerging, even if not themes that TCP management agrees with. There are collective themes emerging, can these be put on paper? We could feed back from the back from the group – is this what you meant? Is this the overall concept you wanted us to hear?

Joanne - Where are we at with what you want from us? Do you want consensus from us? Comments on specifics? What are those topics?

Chance – Maybe we need to revisit goals and what we need from you all. We do not need consensus from this group, just good honest feedback and specific suggestions and advice on what may work. What about keeping a running document that has the larger concepts/conclusions, keep a living document and update it with where we are?

Teresa - Yeah, that's a good idea. Even with dissenting opinions on a topic. Key ideas.

Joanne – What are the topics? We've been all over human health, ecology, tissue levels, all kinds of different things today. I need help wrapping up and what relates into points for recommendations.

Teresa – Strict meeting summaries aren't as good for that they just follow our conversation.

Chance – I think what we need is a combination of what's we've been trying to do. Summary and detail and keep a living document on those topics.

Joanne - Coming to agreement about what we discussed and saw as issues.

Chance – We want you to know we are capturing everything, that you can see it, and combining everything and checking accuracy with detailed notes and then do a larger concept meeting summary. We need to make that more obvious.

Joanne – Or call out: What are the policy issues? What are the technical issues? What areas are we seeing suggestions on, recommendations on, and areas of disagreement?

Teresa – That's why not tying it to an individual meeting. Do this topic by topic summary to show where we are in each topic. And see where we need more work.

Chance – More organization by topic about where we are at, some conclusions and recommendations. We are not looking for consensus from the group.

Pete R – We do a lot of brainstorming and ideas, questions. If you try toward agreement, something would clarify it, you don't go past the brainstorming, if there are two competing issues.

Chance – We're still processing everything we've heard, forming our conclusions, and starting to draft rule language. You'll need to look at that language and tell us what you think. I'm hearing what you are saying. Identify differing opinions.

Teresa – You don't have to force consensus. The step you are skipping is helping us coalesce our brainstorming into our ideas so we can check it and what we are trying to convey to you.

Laura – Topic by topic list by policy, technical, etc. is that it?

Teresa - More than just a list. Make it as coherent as possible. There are themes emerging and need to see them.

Chance – We've been trying to but obviously need to be clearer.

Joanne – Explain what was talked about and the outcomes.

Russ – Would it help...whatever gets written down is consensus without spending too much time on it, recognizing there could be 20 different subjects. At least succinct statement of main points with just a couple of bullets under each one. That way we walk out with agreement

Clay – There are many issues, that's good, but the big elephant in the room is the background and human health issue. Take a step back. When you came to us, you tackled a very difficult problem and whittled it down to 2 options, presented them, and we gave you a ton of comments. What's the best way to go? Different thoughts. Distill the issues down. All these things are all connected. One approach is to categorize, to put the pieces together. Personally, that's where I'm at. Give the general concept of how you define a site, short term and longer term issues. And many other things. Get to actually facilitating cleanups and liability closure for projects.

Laura – Talking general concepts. We have over a month. Ecology takes a stab and does what we are talking about and ready for next meeting to get comments on it.

Clay – That would be fantastic. Thought that's what we would do today. Like definitions of regional background, but we shifted gears today. Might help – its complicated – but if you want us to think how we'd put it together, some might be willing to do that and if you could do the same thing. That would really help. We are trying to solve a tough nut. No simple solutions.

We ended the last meeting with how Ecology would define...thought it would be presented today.

Chance – We got overwhelmed and it's still on the table.

Clay – Provide that or a supplement, maybe get a week before the meeting so we could think about it. That would do a lot for me.

Chance – So you are looking for revamped definition of regional background to chew on and think about.

Clay - That's a good place to start.

Teresa – I'm with Laura

Dave – In the beginning at ecological risk, where we are leaning toward, high level recap, go back to that spot, quantify it right there, doesn't have to be consensus. This is what people were thinking. Brings it full circle.

Chance – Hearing that what we were trying to do, we need to do better. We will work on getting that out.

Paul – I think the meetings have been very good. It wouldn't have worked to draw conclusions earlier. Things are starting to distill now. Dave's idea, toward the end, commit to the process and distill and learn from it, get to Clay's point, specific language, as part of group. We see the outcome of the meetings. What's the collective position? What is drawn from this? Details matter. Seeing if we could maybe the second to the last meeting we identify 5 issues that we really want to bring to fruition. That floats to the top. Last meeting identify some language that shows where we're at.

Teresa – I have a slightly different idea. Had you had a facilitator, this would have been what they did. To help the group convey it's concept of how Ecology should move forward, a distillation of what workgroup is recommending. I understand the constraints that what we recommend couldn't necessarily be easily integrated into something you could come back to us with. You are under enough constraints. Suggest a framework we develop, that you and your management understand we're trying to capture our framework that we are recommending so you don't have to feel schismatic. We can't go there so we can't recommend that. Helping Ecology understand outcome of this process.

Chance – Just to make sure there's an understanding, we do the best we can to capture concepts in the summaries, no matter if within boundaries.

Teresa – No, Paul is suggesting that you come back to us with how you would do it based on what we said. I am saying maybe the alternative is for us to pull together what we would recommend, recognizing that you may not be able to incorporate that.

Laura - We are trying to capture everything.

Chance – I'm seeing an important distinction between what Ecology could put together versus what this group would put together if you could.

Laura – But this is notes, summarizing what we are hearing from the group, not saying this is what we are going to do.

Teresa – We are trying to create into an overarching structure so we can see what pieces we need to further clarify.

Chance – You guys are not independent of Ecology in terms of this as a workgroup. This is Ecology. And you need to keep that in mind. We are trying to think of how we can capture what you or others would recommend versus what we would do with that. That's what I'm hearing.

Joanne – My concern is the issue about what goes into guidance versus the rule. Or some derivative of that. I don't feel like we've moved that part to hear recommendations. What do we want to put into guidance? But we haven't balanced with where are we at with the rule? Formulating the concepts, then taking the next step so how would these ideas be integrated with the existing rules or through guidance? We've jumped on that a little.

Chance – We've gotten some good feedback on what should be in rule.

Joanne – More formally teasing that out.

Chance – I'll try and synthesize what we heard and try to make some kind of a document that you can look at with the larger themes and keep it updated. We'll work on that for February.

Jack – It is really hard to capture everything here. I think by your trying to summarize what you heard it's going to be very interesting to see how it relates to what I heard. Not so much the details, but the overall general conclusions. Everyone hears something different.

Laura – It's important to review the notes to make sure we caught everything

Teresa – That's not the point, Laura, I read every line of those notes. The point is figuring out what you synthesize from that.

Laura – But I'm hearing something different from Jack, is that he's also concerned about how we interpret what we heard. The meeting notes should summarize the issues.

Jack – There's the details and there's the general ideas.

Chance – We'll do the best we can. Thanks for the feedback.

## **Appendix B: Flipchart Notes Taken During the Meeting**

- Parking Lot ideas to return to
  - Spatially weighted upper confidence levels (SWUC)
- Remediate to a level at which recovery can occur
- Why isn't source control on the Homework list? Because Ecology is not authorized to do revisions to Source Control right now
- Source control is needed to reach area/natural background levels
- Are there places to discuss source control within certain sections of the rule?
- Don't make the Cleanup portion too parallel to MTCA
- Address source control within sediments, especially with regional background concept
- How is Ecology addressing "Joint and Several"?
- Add "Site Definition" to the homework list
- How do we bring area/natural background into the current language? How do we implement this?
- What about adding Sediment Impact Zones?
- Ecological risk to increased trophic levels (two levels)
  - Within fish bioaccumulation
  - Sediments to benthic to fish bioaccumulation
  - More than just bioaccumulation pathway
- Rule is vague on sediment/benthic pathways to higher trophic levels
- Want guidance for framework
- Puget Sound animals would exceed these values. Have these numbers been compared to background yet? No.
- Combination of lab & field derived BAF/BSAF much stronger concept
  - Example: Richmond Harbor ERA

- Tissue concentration did not decrease after sediment removal. Didn't change organic carbon-normalized concentrations
- Tissue levels should be the regulatory value. How do you get from target tissue levels (TTL) to sediment? Complex issue, especially difficult in fast moving environment.
- Lots of tissue monitoring available; agency should determine what problems are in watersheds then determine a proactive approach to reduce those contaminants, including sources and cleanup.
- Don't burden PLPs with site specific bioaccumulation
- Some simple approaches
  - Bioaccumulation tests, tissue
  - Don't make PLP do Gobas model, extensive testing
  - More complex approach for large sites is okay
- Agency needs to start from the top down strategy
- Would like 'click-on' spreadsheet with chemicals and species that will give the cleanup level for smaller, simpler sites
- Include some off-ramps between 1<sup>st</sup> and 2<sup>nd</sup> bullets
  - Area-weighted sediment concentrations and tissue concentrations relationship
  - Bellingham Bay – developed bioaccumulation screening level of 1.5 ppm Hg dry weight
  - Used same approach in Fidalgo Bay
- If use bioaccumulation tests and field and field organisms and do adjustments, simple tool
- Have to understand what is happening on a watershed basis
- Flowchart –
  - Do you have data?
  - Is there a way to have simpler approach off-ramps?
- Weak link is what is between sediments (tissue or water to tissue)
- Lower Duwamish – arsenic in sediments and tissue have no obvious relationship. The problem with the tissue is how to decrease the concentrations in the tissue
- Spiking sediments is a problem. Often don't have field range of concentrations to do regression
- Do clam and worm bioassays then look at ERED values
- Cleanup of sediments is source control and does have a contribution
- Ecology doesn't look at the water column enough. Elliot Bay arsenic concentrations in water are naturally high.
- Bioassay
  - Clean sediments and site water
  - Sediments and clean water
  - Is it the sediment or the water?
  - Is it natural or discharges?
- In San Francisco Bay, congener mixes in tissue match the discharge values, not the sediment values
- May be guidance issue – put more emphasis on water
- MTCA has surface water piece and SMS has sediment piece
- Too soon to jump to rule revisions; don't get ahead of science; guidance more appropriate
- Rule treats all sites the same: \$70 million sites are treated the same as small sites
  - Could collapse cleanups with complex process (watershed approach)
  - What are 5 main compounds?
  - What are 5 main sources?
  - Don't involve every small site in these complicated issues.
  - Huge unintended consequences of making it too complex. May be too far ahead for the science.

- Best bet now is guidance change and off-ramps
- Helpful to move away from MTCA; keep SMS intent of integrated cleanup and source control
- Problem moving sediment; TCP is not so tied to MTCA; develop framework that makes sense, especially for bioaccumulation issues
- Don't need to change narrative; it's better to keep flexibility and have guidance
- Disagree – Rule is too vague – only in purpose definition sections need to be clarified in other sections
- Vague language has been used reasonably
- Predictability is important not just different interpretation of site managers
- Could put in rule – refer to Ecology guidance
- Lots of disagreement about endpoints with current approach
- RSE – took out histopathology, biomarkers; keep mortality, growth, reproduction, behavior affecting
- Problem is putting small projects through wringer – something like Method A, not too stringent. Also consider background, compliance.
- SAPA – easier to update, put more information in there
- Most of what we're discussing is not rule related
- Problem if guidance has lots of opportunity instead of clear path.
- Some regional consistency in Cleanup Levels across small sites
  - How to achieve that – can guidance help without legal challenge
  - Goal was to attain consistency but don't want to lose flexibility.
- Go after top 5 – develop that relationship for region.
- Different types of sites & sources; tier 1,2,3 – different approaches
- Flexibility – be aware of unintended consequences (little guys); allow development of sophisticated approach without starting at square one for the little guy
- Four tiers in ACOE guidance. Ecology needs flexibility to make decisions
- Clients know risks of each tier
- Upland tiered approach – already a precedence for tier approach in MTCA
- Background – defining background and base numbers on this for smaller sites
- Site boundaries
- Think about different circumstances for individual sites
- ACOE – look at contamination and size of site; look at the workload for each side
- Do we make every site, even if a chemical is not a COC, make every inch Cleaned up to background, especially small sites, who are not a source?
- Have initial ranking system based on size, COC. Give them some out – limited cleanup on COC
- Definition of site – site boundary based on COC, bring in other PLP for COC that are not theirs; current rule can handle that
- Would like to look more at definition of site in MTCA
- Spokane River example – allowed PLP to cleanup without waiting for bigger intractable cleanup
- Gas Works Park primarily PAH site, but PAH throughout region. Where does the site stop?
- How far do you use cleanup authorities and go to WQ authority
- Cascade Pole – something got done.

Audience Notes

- Agree have to look at regionally, not site-by-site. What are bioaccumulative COCs? Has to be done on a larger scale. Agency may need more like TMDL – sediment contributions, water contributions, how can you reduce? Top down approach for receiving water – focus on smaller set of COCs.
- Flexibility is good but predictability is very important. Narrative and guidance need to be linked.
- Need to remember we have multiple authorities, CWA or MTCA. Use authorities to help achieve goals? Can we use CWA more than MTCA? More flexibility.
- Chance – hesitancy to use CWA
  - Process and clarity of MTCA
  - May have to go to PCHB; workload
- Cross media issues with MTCA
- More of administrative issue if take watershed approach and then use which authority is relevant
- Not many sites, just sediment sites
- Sediment phthalate work group; look at that again, many similar issues.