SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING

FINAL

MEETING MINUTES

JULY 2011

Prepared for DMMP Agencies:

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Appendices

List of Acronyms and Abbreviations

ADCP	Acoustic Doppler Current Profiler
AFDW	ash free dry weight
BERA	Biological Eco-Risk Assessment
BMP	best management practice
BO	Biological Opinion
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
COC	Chemical of Concern
CSL	Cleanup Screening Level
CSMP	Cooperative Sediment Management Program (Washington State)
DDT	dichlorodiphenyltrichloroethane
DEQ	Department of Environmental Quality
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Program
DNR	Washington State Department of Natural Resources
DOD	Department of Defense
DY11	dredge year 2011
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FPM	Floating Percentile Method
IDG	Interim Dioxin Guidelines
IPC	Intergovernmental Policy Council
LDW	Lower Duwamish Waterway
MDL	method detection limit
MTCA	Model Toxics Control Act
NMFS	National Marine Fisheries Service
OSI	Organism Sediment Index
PCB	polychlorinated biphenyl
PLP	Potentially Liable Party
ppm	parts per million
pptr	parts per trillion
PQL	practical quantification limit
PRP	Potentially Responsible Party
PSEP	Puget Sound Estuary Program
PTM	Particle Transport Model
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSET	Regional Sediment Evaluation Team
SEF	Sediment Evaluation Framework
SL	Screening Level
SMARM	Sediment Management Annual Review Meeting
SMS	Sediment Management Standards
SPI	Sediment Profile Imaging
SQB	Sediment Quality Benchmark

SQS	Sediment Quality Standards
SQV	Sediment Quality Value
SRM	Sediment Reference Material
TEQ	toxic equivalence
TMDL	Total Maximum Daily Load
TOC	total organic carbon
TSS	total suspended solids
USACE	United States Army Corps of Engineers
VOC	volatile organic compounds
WAC	Washington Administrative Code
ECOLOGY	Washington State Department of Ecology

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The Cooperative Sediment Management Program (CSMP) held its twenty-third annual review of sediment management issues on May 4, 2011. The Sediment Management Annual Review Meeting (SMARM) was hosted by the U.S. Army Corps of Engineers (USACE) Seattle District, and was held at the Federal Center South, Galaxy Conference Room, in Seattle, Washington. The meeting was open to comments from the public, with prior invitation to submit issues for consideration and discussion. The Dredged Material Management Program (DMMP) is an interagency cooperative program that includes the USACE Seattle District, the Environmental Protection Agency (EPA) Region 10, the Washington Department of Natural Resources (DNR), and the Washington Department of Ecology (ECOLOGY). The DMMP response to public issues raised at the SMARM (Appendix I), meeting agenda (Appendix II), list of attendees (Appendix III), the speakers' presentation slides (Appendix IV), and the 2011 SMARM Clarification Papers (Appendix V) are included as appendices.

WELCOME AND OPENING REMARKS

Stephanie Stirling, USACE (Moderator), introduced Olton Swanson, Deputy District Engineer, Seattle District, to welcome those in attendance and to offer opening remarks.

Olton Swanson, USACE, thanked the audience for joining the meeting and traveling great distances to attend. Olton began with the USACE motto "Essayons," which means "Let us try" or "We will try," because the Corps is often called to action for situations which are all but impossible to solve. He relates this to the seemingly insurmountable hurdles, which were encountered early on by the DMMP partners, and are continually overcome. He listed some of the complex technical issues faced by the DMMP, as well as the challenge of balancing limited resources with fulfilling regulatory objectives. He expressed gratitude for everybody's efforts. Olton concluded by wishing everyone a very successful meeting.

Stephanie Stirling, USACE, welcomed everyone to the 23rd annual SMARM. She pointed out that there was a full agenda for the day and would like to keep the meeting on track to adjourn on time. She advised everyone to please sign in at the back table and addressed a few "housekeeping" issues. Comments or proposed changes are due in to the DMMO by June 4, 2011. Stephanie introduced the panel seated at the front table: Jonathan Freedman, Ocean Disposal Coordinator for the EPA; Wayne Wagner, Chief, Technical Support Branch for the Operations Division, USACE Seattle; Kristin Swenddal, Program Supervisor for the Aquatic Resources Division, DNR; and Jim Pendowski, Toxics Cleanup Program Manager, ECOLOGY.

Stephanie Stirling

PP0.1 Welcome
PP0.2 Meeting Details
PP0.3 Cartoon

AGENCY SUMMARY REPORTS, PART 1

1. EPA, Summary of Regional CERCLA Activities, Sheila Eckman

Sheila Eckman, EPA, presented a summary of ongoing activities of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) program, and began by pointing out that the discussion would be focused on Puget Sound. In general, more sediment cleanup work is progressing this year in comparison to last year. Sheila ran through each of the following sites individually (PP1.3 through PP1.10), discussing challenges, successes, and ongoing work:

- Commencement Bay: Occidental Chemical (Hylebos Waterway), ASARCO
- Duwamish: Harbor Island Five-Year Review
- Elliott Bay: East Waterway; PSR; Lockheed West Seattle
- Lake Washington: Quendall Terminals
- Upper Columbia River
- DOD sites: Puget Sound Naval Shipyard; Jackson Park
- Bremerton Gas Works

Following the site summaries, Sheila focused a greater portion of her presentation on activities at the Lower Duwamish Waterway (LDW) Cleanup Site. Several sites identified for Early Action will be pushing forward with cleanup activities in the near future, including Slip 4, Boeing Plant 2, and T-117.

The RI/FS for the LDW is currently being finalized, and Sheila gave a very tentative deadline of the first half of 2012 for its completion and release of a Proposed Cleanup Plan. The subsequent Record of Decision (ROD) is expected in 2013. Early cleanup actions are expected to remove 50 percent of PCB contamination from the river. A range of alternative cleanup combinations and associated costs exists ($230 million to $650 million, not including the $66 million for early action costs), with the maximum costs tied to dredging. Sheila concluded by summarizing considerations for the LDW cleanup decision, which is to include several factors, in addition to public comments that will be addressed and outlined following the completion of the ROD.

Comments and Questions

Question: Unknown; What about Bellingham Bay?

Response: Bellingham Bay is being managed by ECOLOGY. This will probably be addressed later today.

Sheila Eckman

PP1.1 EPA Region 10 Superfund Sediment Cleanup Update
PP1.2 Update on Sediment Cleanup Projects
PP1.3 Commencement Bay
PP1.4 ASARCO
PP1.5 Harbor Island Five-Year Review (September 2010)
PP1.6 Elliot Bay Projects
PP1.7 Quendall Terminals
PP1.8 Upper Columbia River Remedial Investigation
PP1.9 DOD Sites
PP1.10 Bremerton Gas Works
PP1.11 Duwamish Waterway Cleanup
PP1.12 3 Key Parts of the Duwamish Cleanup
PP1.13 Lower Duwamish Waterway Early Actions
PP1.14 Slip 4 Cleanup begins in Fall!
PP1.15 Boeing Plant 2
PP1.16 T-117
PP1.17 Lower Duwamish – The Rest of the Story…
PP1.18 Where are We Now in the Cleanup Process?
PP1.19 Consider the Cleanup Alternatives
PP1.20 Considerations for the LDW Cleanup Decision
PP1.21 Lower Duwamish Schedule
PP1.22 EPA Contacts – Sediment Projects
PP1.23 Figure
PP1.24 What is Needed to Clean the Duwamish

2. U.S. Army Corps of Engineers, Seattle, Summary of Testing Activities, Lauran Warner

Lauran Warner, USACE, presented an overview of what the DMMP has been working on during the 2011 dredging year (DY11: June 16, 2010 – June 15, 2011). In general, it has been a very active year for the Dredged Material Management Office (DMMO). There were 23 projects in total: 15 completed actions and eight ongoing. Of the 15 completed actions, two were no-test determinations and one was an exclusionary determination, leaving 12 completed actions that required testing.

Three projects/four Dredged Material Management Units (DMMUs) required bioassay testing:

- Grays Harbor
- South Park Bridge
- Crescent Bar

Lauran provided a map summarizing DY 2011 projects and their determinations (PPT2.6), as well as a map of ongoing projects (PPT2.13).

Two percent of the total volume of tested material was determined to be unsuitable for open-water disposal. The unsuitable material determination applied to two projects: the Port of Bellingham Gate 3, and Crescent Bar.

Outside of project-specific tasks, the USACE Seattle District spent considerable time tackling other issues. This included reviewing comments and conferring with lawyers to finalize the new dioxin guidelines. Also, five-year Endangered Species Act (ESA) documentation required updating to include the recently listed rockfish species. The USACE Seattle District has been working with small ports in Willapa Bay to evaluate flow-lane disposal as a viable, economic solution to dealing with their dredged sediments. Lauran also touched on the topics of Sediment Reference Material (SRM) and bioassay endpoint tweaks, which will be addressed later in the meeting by Justine Barton and Dr. Jack Word, respectively.

Lauran Warner

PP2.1 DMMP Testing Summary
PP2.2 Dredging Year 2011
PP2.3 DY11 DMMP Program Changes
PP2.4 DY11 DMMP Projects
PP2.5 DY11 Completed Actions
PP2.6 Map
PP2.7 DY11Testing Summary
PP2.8 Multi-Year Comparison: Suitability Volumes
PP2.9 DY11 Toxicity Testing
PP2.10 DY11 Bioaccumulation
PP2.11 Projects With Unsuitable Material
PP2.12 Projects With SAPs in DY11 That Continue Into DY12
PP2.13 Map
PP2.14 In 2011 DMMP Also Wrestled With…
PP2.15 For More DMMP Information

3. DNR, Summary of Monitoring and Disposal Site Management Information, Kristin Swenddal and David Kendall

Stephanie Stirling, USACE, took a moment to recognize the contributions of Dave Vagt, the DNR representative to the DMMP. Dave retired at the end of April 2011, following his great efforts in "keeping the program running, keeping site use authorizations flowing, and taking on a lot of work in a short period of time."

Kristin Swenddal, DNR, also acknowledged Dave Vagt's contribution to the DMMP, and teased him for not attending SMARM. Dave, in fact, was not in attendance.

Kristin presented an update on dredging activity this year. Fees were collected on ~366,000 cubic yards, compared to ~513,000 cubic yards last year. The reduction in activity is attributed to poor economic conditions as well as site closings due to the ESA listing of rockfish species.

Kristin did not anticipate bringing a fee proposal forward this coming year but will monitor the activity and revisit the decision in the future, if necessary.

Integral Consulting was selected by DNR as the disposal site monitoring contractor this year.

David Kendall, USACE, briefly reviewed the monitoring history for the Port Gardner disposal site and summarized the results of the June 2010 tiered-full monitoring. With few exceptions, the site has performed within management guidelines for all previous monitoring. Some modifications to the original monitoring plan were made for 2010. These included conducting the Sediment Profile Imaging (SPI) survey 3 weeks prior to sampling to better map the footprint of the dredged material, reduced collections of *Molpadia* sea cucumber due to low abundance, dioxin/furan congener analysis at more onsite stations (Onsite stations increased to 10 for dioxin evaluation), and PCB and PBDE congener analysis in support of future background-based guideline development for these compounds.

David presented results from the 2010 monitoring, which demonstrated compliance with the site management objectives for all four testable hypotheses evaluated. The Sediment Profile Images (SPI) survey delineated the extent of the dredged material footprint to be well within the monitoring compliance boundary at the disposal site. Moreover, the benthic community characteristics measured by SPI exhibited healthy characteristics including an Organism Sediment Index (OSI) with onsite stations averaging 7.9 (OSI > 6 = healthy benthic community), and 81 percent of the stations exhibiting an infaunal successional Stage III benthic community (i.e., climax or equilibrium community). Both of these SPI benthic indicators corroborated a healthy benthic community within the boundaries of the disposal site and offsite. Chemistry expressed at onsite stations indicated all metals were undetected below SLs, and

detected/undetected organic compounds were below SLs, except one blank contaminated bis(2-ethylhexyl)phthalate site center station, slightly above the SL. Toxicity testing at the three onsite stations all passed the interpretive guidelines for non-dispersive sites. With the first four of the DMMP's testable hypotheses accepted, the tissue and benthic samples did not require analysis under the tiered-full monitoring program, which had been archived pending review of the data assessing the first four monitoring hypotheses.

Onsite dioxin concentrations were well below the former Port Gardner site specific interim (4.1 pptr-TEQ) and new interim dioxin guideline (4.0 pptr-TEQ), and onsite Dioxin and PCBs congener TEQs were actually lower than offsite locations. This observation was explained during the question and answer period following the presentation.

Comments and Questions

Question: Bruce Rummel, Great Water Associates; In reference to higher offsite vs. onsite concentrations for PCBs and dioxins, were you expecting this result and why?

Response: David Kendall, Yes, the onsite observations are a reflection on the nature of the disposed material; these are relatively clean sediments from a Port of Everett dredging project, and a much larger amount of material from the Federal maintenance dredging of Snohomish Waterway, which was very clean material. So, the pattern observed is more of a reflection of the conditions preceding the monitoring event from these disposal actions.

Comment: John Hicks, USACE; So you're kind of restoring the site, right?

Response: David Kendall, Yes, we are, and the DMMP agencies have been doing our best to manage all our sites over the past 23 years to meet our site management objectives. We have also improved the sediment quality at the Elliott Bay disposal site relative to predisposal sediment quality conditions.

Question: Roger McGinnis, Hart Crowser; As far as modification to the bioassay testing, is that in addition to the standard interpretation, or is the USACE willing to accept an alternative method?

Response: David Kendall, No, the interpretation framework is still the same; we just tweaked the endpoint parameters a little bit. We actually evaluated both endpoints using the existing dry weight endpoint for *Neanthes,* and also evaluated the endpoint using Ash Free Dry Weight (AFDW). Jack Word and Bill Gardiner have demonstrated that the sediment remaining in the gut, particularly in sandy sediments, can bias the test results.

Question: What about the larval test?

Response: David Kendall, We utilized our existing endpoint as we have always done, and then added a resuspension and resettling, and recount to see if some of the larvae become "unstuck" from the sediment surface, to evaluate whether we get a different number. We haven't seen a big change in the endpoint between the initial and resuspension endpoints so far, but we will keep evaluating the process for Federal projects and disposal site monitoring to see if it's worth formally implementing as a future requirement of the program. If we can improve the performance of these test in evaluating dredged material, I think that's something we all care about doing.

Comment: It seems to be an issue more with the fluffy sediment.

Response: David Kendall, Right, it's been an issue over the life of the DMMP, as many of you already know. Some larvae seem to get entrained in the surficial sediment (the "fluff"), and despite being healthy larvae they can't seem to get themselves unstuck and freed and therefore are not included in the final counts of normal larvae (for more details on this issue see Jack Word's talk at the start of the afternoon session).

Kristin Swenddal and David Kendall

PP3.1 2010 Monitoring Results Summary for the Port Gardner Non-Dispersive Site
PP3.2 DMMP's Management of the Site (Overview summary)
PP3.3 2010 Modifications
PP3.4 DMMP Monitoring Framework
PP3.5 Sediment Profile Imagery (SPI) Port Gardner disposal site
PP3.6 Sediment Profile Imagery (SPI) Port Gardner disposal site
PP3.7 2010 Dredged Material Footprint (SPI)
PP3.8 Idealized Development of Infaunal Successional Stages
PP3.9 Infaunal Successional Stage
PP3.10 Calculation parameters for Organism-Sediment Index
PP3.11 Organism-Sediment-Index (OSI) Distribution
PP3.12 2010 Sediment and Tissue Sampling Stations
PP3.13 2010 Sediment Chemistry Results
PP3.14 Bioassays Results Summary
PP3.15 Dioxin Onsite/Offsite Summary
PP3.16 PCB Congener TEQ Summary:
PP3.17 PBDE Congener Summary for Port Gardner disposal site
PP3.18 Evaluation of 2010 Monitoring Data
PP3.19 Questions?

4. RSET Update, Jonathan Freedman, EPA

Jonathan Freedman, EPA, presented a summary of what the Regional Sediment Evaluation Team (RSET) has been involved with in the past year, and began by describing the history and function of the team, which is a multi-agency policy team including partners from Washington, Oregon, and Idaho, in addition to federal agencies. Jonathan urged anyone with questions to consult the website (http://www.nwp.usace.army.mil/environment/sediment.asp), or contact him or Eric Braun, USACE. He also reported on the recent first annual RSET public meeting in Portland, which borrowed from the SMARM in its design. The meeting was successful, well attended, and included public involvement. Jonathan highlighted the effort to engage the public to ensure an ongoing, open dialogue.

Additional items that were addressed included:

- Update on the Portland Project Review Group
- RSET is working to address guidance and policy issues surrounding bioaccumulation
- Snake River Programmatic Sediment Management Plan
- Mouth of the Columbia River Regional Sediment Management Plan
- New EPA-designated ocean disposal sites on the Oregon coast
- Tsunami damage on the southern Oregon coast
- The National Combined Dredged Material Testing Manual is scheduled to be out for public review in the latter half of 2011

Jonathan concluded by speaking about the executive order signed by the president in 2010, entitled, “Stewardship of the Ocean, our Coasts and the Great Lakes.” Although many of the details are too complicated to address during a short presentation, he wanted to point out that over the next few years there will be planning efforts which will include additional support for regional sediment evaluation and management activities in coastal areas

Comments and Questions

Comment: Fred Felleman, Wave Consulting; The west coast governor’s agreement does not include any tribal government, even though in Washington state the governor and the coastal tribes have a joint organization, the IPC. The composition of the west coast governor’s agreement, if this is going to be used as a national model, is insufficient to represent the tribal co-managers on the coast.

Response: Justine Barton, EPA; Everyone is very aware of this issue, and it is being addressed.

Comment: It would be good if the governors could make the case so that the tribes do not have to knock the door down. It’s really for the governors to expand that recognition to represent the tribal co-managers at the coast.

Response: Work has been done, I don't know all the details, but from an EPA standpoint we are very cognizant of this issue. We can talk afterwards and I'll tell you what I know.

Jonathan Freedman

PP4.1 Regional Sediment Evaluation Team (RSET): Update for SMARM 2011
PP4.2 Cartoon
PP4.3 Regional Sediment Evaluation Team (RSET)
PP4.4 RSET Policy Team Background and Responsibilities
PP4.5 RSET Home Page: Located on Portland District Website:
PP4.6 RSET Policy Group
PP4.7 Activities in Past Year
PP4.8 Activities in Past Year (continued)
PP4.9 Activities in Past Year (continued)
PP4.10 Bioaccumulation
PP4.11 Other Regional Sediment Initiatives
PP4.12 Map
PP4.13 Other Regional Sediment Initiatives (continued)
PP4.14 Mouth of the Columbia River Bathymetry and 2006 Dredged Material Placement
PP4.15 Other Sediment Management Initiatives
PP4.16 Oregon Coast Ocean Dredged Material Disposal Sites In Region 10
PP4.17 Map
PP4.18 Other Regional and National Initiatives

Morning Break

AGENCY SUMMARY REPORTS, PART II

5. Ecology, Update on SMS Rule Revision and Decisions Made, Chance Asher, ECOLOGY

Chance Asher, ECOLOGY, summarized the progress Ecology has made since reporting on the rule revision process at the 2010 SMARM. Steps forward have been taken and some decisions have been made, but Chance reiterated that they are still evaluating public comments as part of this process. Since 2010, the governor has halted all non-essential rulemaking. Prioritization of goals and objectives had to take place, and several issues were put on hold. Chance explained that Model Toxics Control Act (MTCA) will not be revised in this round of rulemaking because they can still do the work they need to do for the time being. Several components of the Sediment Management Standard (SMS) rule revision were determined to be critical, and would

affect cleanup if they were not addressed. Ecology continues to move forward tackling these issues, including the recent addition of fish consumption rates to the human health risk determination.

Chance took a moment to thank the members of the advisory groups for all their work. She called attention to the complicated nature of reading, implementing, and interpreting the sediment rule, and recognized the advisory groups for helping Ecology navigate through the tangled web of technical and policy issues.

Currently, Ecology is tackling the issues of understanding the role biaccumulatives play in ecological and human health risk, incorporating background conditions into cleanup standards, and creating freshwater sediment standards. Chance provided more detail on how each issue was being addressed, beginning with freshwater sediment standards.

Freshwater sediment standards will likely share many similarities with the marine standards. These will be numeric standards that aim to preserve the benthic community through a two-level framework with Sediment Quality Standards (SQS) at the lower level and Cleanup Screening Levels (CSL) at the upper bound. The numbers and the methods for their generation were originally developed through RSET and refined by Ecology to meet SMS regulatory standards, with similar goals being set for cleanup and dredging. A report has undergone significant scientific peer review, one more follow up MTCA/SMS Science Panel will be held, and initial comments indicate the science is sound.

Comments and Questions

Question: Brian Ross, EPA Region 9; How will [Ecology's freshwater screening values] compare with RSET's numbers?

Response: Theoretically, RSET's numbers will be the same. We have Ecology's representative for RSET on our workgroup for the rule, so hopefully they will be the same.

Question: Chance Asher; Laura, would you care to comment?

Response: Laura Inouye, Ecology; I believe once we work out the external expert's questions, RSET will probably adopt the values obtained from the floating percentile methodology, so yes they should be the same.

Question: Grant Yang, Ecology; What is the timeframe?

Response: Chance Asher; We're finishing up the scientific peer review, and that's really the next big thing that needs to be done in order to decide on numbers and critters we should use for the biological criteria. That should be finishing up this summer, with a follow up MTCA/SMS

Science Panel meeting. We're hoping to promulgate next year, and this will be encompassed into the other rule revisions we're working on.

The new guidelines for human health and background will retain the two-tier framework which is currently in the SMS. We are still considering cost, net environmental benefit, and technical feasibility to establish the cleanup standard. The Potentially Liable Party (PLP) will have a process that will allow full settlement for a discrete unit within the larger site, or to fully settle liability for their potential contribution to the larger site as a whole. In situations where there is still a source of recontamination, liability of the PLP will be released if the recontamination is not from the PLP or not under the authority of the PLP. Chance followed up this explanation with a conceptual map that can be found on slide PP5.10.

Comments and Questions

Question: Sherry Rone, NAVFAC NW; In the absence of having true Total Maximum Daily Load (TMDL) that the state implements, how can we be expected to clean up to a natural background when my neighbor is discharging permitted stormwater which exceeds the cleanup criteria? I'm really passionate about the issue of TMDLs, because point-source people are always getting stuck with the bill for cleanup. Until you control the flow of water and agricultural runoff, it's like giving a whale a tic-tac.

Response: Chance Asher; To paraphrase the question: "Until there is a TMDL process in place to control contamination coming in, if you are not using a background concentration that is anthropogenic, then why are you making the PLP or whoever do the cleanup when sources are still coming in that are recontaminating?" We're struggling with this issue right now, and I do not have an elegant answer for you. What we're weighing is not allowing this stormwater issue to prevent cleanup from getting done. We think that there will be a benefit to the environment from cleaning up these hotspots of contamination. That's why we came up with the concept of allowing PLPs to settle if their sources are under control. To clarify your comment of anthropogenic vs. non-anthropogenic background, the definition of natural background in MTCA actually takes into account some anthropogenic influence (e.g., there are natural background levels for PCBs when we know that PCBs are not natural). And we are looking at anthropogenic background at two levels – regional and the MTCA "natural." That's the best I can answer for now; we are trying to look at the big picture for some of these issues.

Question: Fred Felleman, Wave Consulting; Have there been formal tribal consultations for these technical workgroups, and can you explain the default fish consumption level that you are using?

Response: Three tribes have been represented on both of the rule advisory groups - sediment technical workgroup and the larger advisory group that's been dealing with MTCA/SMS issues

on a broader policy level scale. We haven't had formal tribal consultation yet; we're looking to do that, but we have had tribal engagement for about two years now.

Question: Sherry Rone; [In reference to the map on PP5.10] What happens to the part that represents "area background"?

Response: That is there to show people the concept of area background under MTCA, where there is influence from localized sources, versus the concept of regional background and natural background.

Question: Joyce Mercuri, Ecology; [In reference to the map on PP5.10] Under the scenario, it is not including what might happen to an area above the regional background, correct? It's still very widespread?

Response: No, it's still very widespread. This still needs to be addressed.

Question: Debra Wiliston, King County; If the cleanup level is below the area background, how can you ever achieve cleanup when you face recontamination for surrounding sediment? How can you call the site cleaned up?

Response: The PLP has to meet the cleanup standard that is set once they're done with their act of cleanup. This requirement is already in place in the current standards. If we've determined that they've contributed significantly to the contamination surrounding their Site Unit, leading to recontamination, then we will not settle. In that case the cleanup activity would be considered an interim cleanup. We would need to figure out whether or not we want to settle for what the PLP may have contributed to the contamination in the larger site, or we would decide not to settle because their wider contamination will likely recontaminate the site.

Chance continued her presentation with a graphic illustrating the criteria that would be used to determine cleanup standards (PP5.13). The revisions to the existing standards would include the incorporation of human health risk as part of the determination of upper and lower bounds, as well as the incorporation of "regional background" in establishing the upper bound. The cleanup standard will still be set as close to the lower bound (sediment cleanup objective) as practically possible, taking into account cost, technical feasibility, and net environmental protection.

Comments and Questions

Question: Unknown; At the upper bound, you have 10^{-5} for the individual chemical?

Response: We haven't completed that determination yet. We are looking at 10^{-5} for individual chemicals, and 10^{-4} for multiple. We are also looking at 10^{-5} for total site risk. We are welcoming input on this right now.

Question: Unknown; Doesn't that imply you are talking about carcinogenic stuff? What about non-carcinogenics?

Response: It is the same as the MTCA paradigm, where you have your carcinogenic risk levels and you have your hazard quotient of 1.

Question: Don Clabaugh, CDM, How do we determine the site boundaries where PCBs, for example, are ubiquitous in the area?

Response: We're not looking to change the paradigm where a site would be defined by concentrations above the upper bound. That will stay the same. We could be creative on how to define the Site Unit. For example, we could look at chemical concentrations, chemical signatures, or if a PLP wanted to conduct a particular activity in an area.

Question: Jeff Stern, King County; In an aquatic site, how can we ever clean up below regional background?

Response: I think what you're asking is, "How do you ever get below regional background whether it's with physical dredging or with capping?" The goal is to try and get there through the current cleanup technologies – capping, dredging, monitored natural recovery. You actually could get to the lower bound with dredging and capping, it's just a matter of whether it's feasible or not to maintain that low cleanup standard. And here's where we get into the issue of recontamination, and settling a PLP's liability.

Question: Unknown; Do we have numbers for regional background?

Response: We have a definition that we're working on. We don't have numbers and we won't have numbers as part of the rule. I'll cover it a bit further in upcoming slides.

Question: Brian Ross, EPA; Do you have, or have you considered a clause in your rule similar to what we have in the EPA for CERCLA, where remediation of naturally occurring chemicals below their natural level cannot be done, by law?

Response: Right, if it's a naturally occurring chemical. This is already in place in the current rule, it's called "non anthropogenic background".

Question: Could you possibly extend that clause to non-naturally occurring substances, like PCBs?

Response: This is the concept we are trying to establish with regional background. It is influenced by sources coming in. This is why we are looking for ways to settle, and not put the PLP on the hook for future recontamination they did not cause.

Question: Tim Timpson, SEE; (Rephrased by Chance) Do you have something like CERCLA's technical and feasibility waiver?

Response: This is not in framework right now, but it is something that we have considered. .

Comment: A discussion ensued between Chance Asher and Doug Hotchkiss, Port of Seattle, regarding the feasibility of cleaning up a site where there is no deposition of clean sediment, and the likelihood of achieving long-term cleanup is near impossible. Doug brought up the issue of residuals from dredging activity preventing initial remediation to the sediment cleanup standard, and likened it to "shoveling against the tide." Chance ended the discussion in the interest of time, and suggested that the current SMS rule allows for technical feasibility to be considered when establishing a cleanup standard which is a way to deal with dredge residuals.

Ms. Asher concluded by speaking about the proposed default fish consumption rate and regional sediment background. Fish consumption rates incorporated into MTCA and the Water Pollution Control Act/National Toxics rule underestimate the amount of fish eaten by subsistence fishermen and high fish consumers in Washington. This has inspired the proposal of a default fish consumption rate for cleanup based on subsistence fishing that can be modified for site-specific considerations. Currently there is no value assigned to the default rate, and further evaluation will follow a technical report scheduled for review in June. At this point it is unsure whether implementation will be on track with the other revisions, or if the default consumption rate will have to be addressed separately.

The purpose of a regional background is to account for urban influence and stormwater discharge in determining the upper bound of the two tier system. Significant identifiable sources will not be included when defining these values. Chance acknowledged that before regional sediment backgrounds can be established, significant data gaps must be filled. Ecology is currently working to address those data gaps. Slides PP5.18-PP5.25 were skipped or briefly skimmed because of time limitation. Please read for more information about settling liability and establishing sediment background conditions.

Chance Asher

PP5.1 WA Sediment Management Standards Rule Revision Update

PP5.2 Goals for Today
PP5.3 Rule Making Path Changed from MTCA and SMS to just SMS
PP5.4 Advisory Groups: Taken Ecology from Wandering in the Policy/Technical Desert to Workable Solutions
PP5.5 SMS Rule Revisions: Issues We Are Tackling
PP5.6 SMS Rule Revisions: Proposed Path Forward
PP5.7 SMS Rule Revisions: Freshwater Standards
PP5.8 Human Health and Background Proposed Framework - More Detail
PP5.9 Specific Issues We're Grappling With
PP5.10 Map
PP5.11 Photo
PP5.12 Figure
PP5.13 Establishing Cleanup Standards
PP5.14 Specific Human Health Revisions to SMS
PP5.15 Fish Consumption Rates What We Know:
PP5.16 Fish Consumption Rates We Still Have Decisions To Make – But Considering:
PP5.17 Map
PP5.18 Why Would We Settle Liability for a Site Unit?
PP5.19 How Would We Settle Liability for a Site Unit Under the Draft Approach?
PP5.20 How Would We Settle Liability for a Baywide Site?
PP5.21 How Would Natural Background be Established?
PP5.22 Regional Background Draft Definition Still a Work in Progress
PP5.23 Cartoon
PP5.24 Timeline and Next Steps
PP5.25 Information About SMS Rule Revisions

STATUS REPORTS

6. Update on Development of a Sediment Reference Material, Justine Barton, EPA

Justine Barton, EPA, gave a status update on the effort to create a Puget Sound Sediment Reference Material (SRM). The SRM was designed to be used as a Quality Assurance (QA) tool, and is composed of Puget Sound sediment specifically targeted for low-level concentrations of regionally important chemicals-of-concern (COCs) such as dioxins and PCBs. The goal is to create a ten-year supply with full chemical analysis, including validation.

The material is not intended to be linked to any particular location, with dioxin concentration in the 4–10 ng/kg-TEQ-dry weight (pptr) range and PCB Aroclors in the 70–130 µg/kg-dry weight (ppb) range. To create the necessary concentration range, sediment was collected from Budd Inlet and LDW T-117, and would be diluted with Carr Inlet reference material if needed. Initial range-finding chemistry revealed that sediment from the T-117 location tested within the ideal concentration range and was ultimately chosen as the SRM.

Funding for the SRM program was provided by the 2010 Puget Sound appropriation. When completed, requests for SRM will go through the EPA, who will organize shipment directly from the Quality Assurance and Technical Support (QATS) contract laboratory in Las Vegas, where the SRM will be stored. Chemical results are expected to be completed in July, with validation to follow. Justine encouraged local labs to participate in this process, and recommended that they get in touch with Gina Grepo-Grove (grepo-grove.gina@epa.gov) if they would like to get involved. Justine thanked many of those involved, and was excited to see the fruits of everyone's efforts.

Justine Barton

PP6.1 Regional Sediment Reference Material (SRM)
PP6.2 What is a Regional SRM?
PP6.3 Why an SRM?
PP6.4 Why is DMMP Doing This?
PP6.5 Process
PP6.6 Field Sampling
PP6.7 SRM Processing
PP6.8 Current Status
PP6.9 Still to be Resolved…
PP6.10 Photo
PP6.11 Photo

PP6.12 Photo
PP6.13 Photo
PP6.14 Photo
PP6.15 Photo
PP6.16 Photo
PP6.17 Photo
PP6.18 Photo
PP6.19 Thank You!

7. Implementation of New Interim Dioxin Guidelines, David Fox, USACE, and Erika Hoffman, EPA

David Fox, USACE, reported on progress that has been made since the revised Interim Dioxin Guidelines (IDGs) were released in April 2010, and compared the performance of some recent projects evaluated under the old and new guidelines. Following a comment period, agencies and directors met through September to deliberate and make any revisions. The new guidelines were ultimately accepted, and on December 6, 2010, they were formally implemented.

The new interim guidelines:

- Site Management Objective = 4 pptr TEQ for both dispersive and non-dispersive sites
- Screening levels
    - 4 pptr TEQ for disposal at dispersive sites
    - 4/10 pptr TEQ for non-dispersive sites
- Expanded reason-to-believe considerations
- Flexibility for non-dispersive disposal using case-by-case and small-business considerations

Changes made to the IDGs include testing dioxin in all materials proposed for dispersive open water disposal sites to address tribal concerns and removing the automatic triggering of bioaccumulation testing for dredged material exceeding 10 pptr for non-dispersive disposal.

David continued with a detailed comparison of six projects that were evaluated under the old guidelines, and two projects that have been evaluated under the new guidelines. In summary, there were minor increases in failed material for a couple of Bellingham projects, the new IDGs were much less restrictive for the Tacoma area projects, and case-by-case determinations under the new IDGs will likely reduce the determination of failed volume. However, case-by-case scenario review is a developing science.

Erika Hoffman, EPA, took the podium to say a few words regarding protocols for bioaccumulation testing, evaluation of guidelines for site-monitoring data, and establishing guidelines for PCBs and other bioaccumulatives. Erika reports that they have not had the resources to set up workshops, and fortunately have not been required by recent projects to solve these issues. The staff feels strongly that these questions should be looked at within the next year, and funding/resources must be obtained to design workshops for addressing these issues.

David Fox and Erika Hoffman

PP7.1 Implementation of New Interim Dioxin Guidelines
PP7.2 Process Recap
PP7.3 New Interim Guidelines
PP7.4 Changes Made Since the April 2010 Proposal
PP7.5 Dioxin Testing Since 2010 SMARM
PP7.6 Dioxin Testing Since 2010 SMARM
PP7.7 South Park Bridge
PP7.8 Nippon Paper Outfall
PP7.9 Bellingham Cold Storage
PP7.10 POB Gate 3
PP7.11 Port of Everett Marina
PP7.12 Port of Tacoma Blair Waterway – Berths 3 & 4
PP7.13 How Would Everett Marina and Berths 3 & 4 Have Fared Under the Former IDGs?
PP7.14 Projects in Commencement Bay Tested Under Former IDGs
PP7.15 Guideline Comparison
PP7.16 Testing Summary
PP7.17 Future Work
PP7.18 Questions?

LUNCH

Stephanie Stirling, USACE, reminded everyone that there were refreshments and beverages on the back table, which were provided by Ecology, and acknowledged Lauran Warner and Laura Inouye for providing the delicious baked goods.

Status Reports (continued)

8. Update on Sediment Larval and Neanthes Test Adjustments, Jack Word, NewFields

Jack Word, NewFields, took the podium to speak about some of the noise and variation inherent in bioassays, and testing method modifications to reduce some of that noise.

Neanthes growth test:

Control and reference sediment is often more coarse than the test treatments and is more difficult to evacuate by the organism. This material can remain in the gut affecting the dry weight of the organism. To address this, the lab has implemented and tested an Ash Free Dry Weight (AFDW) protocol which accounts for any material trapped in the gut. In an experiment, application of the new method resulted in an acceptable outcome for five fine-grained control samples which had previously failed under the standard protocol where comparison was made to organisms with coarse sediment representing a significant part of the 'biomass'.

Larval test:

Larvae are covered in cilia, which can trap sediment and become incorporated into the fine-grained floc layer that settles at the sediment-water interface. This is not necessarily harmful to the larvae, but it prevents them from being counted in the test. The test failures do not show a clear correlation to grain size. Three different methods were tested with to examine their effect on larval test outcomes: the standard PSEP method, a resuspension method, and a screen-tube method. Results showed that the resuspension techniques resulted in significantly lower values for larval mortality, and the screen-tube method even less. Applying the resuspension technique to Port Gardner sediment was less demonstrative, but still showed the refined methods resulted in fewer failures. A key component of these results is that the recovered larvae from the resuspension experiments are normally developed so the evaluations can be based not only on the total number of recovered larvae but also the percent that are abnormally developed.

Jack concluded by recommending that the refined methods be considered for incorporation into standard testing protocols next year, following continued review of the test data.

Jack Word

PP8.1 Refinements of Biological Test Methods
PP8.2 Modifications

PP8.3 Status
PP8.4 *Neanthes* Growth Test
PP8.5 Observations
PP8.6 *Neanthes* Growth Test
PP8.7 *Neanthes* Growth Test
PP8.8 Larval Test
PP8.9 Larval Test
PP8.10 Table
PP8.11 Larval Test
PP8.12 Combined Mortality Port Gardner Larval Test
PP8.13 Path Forward

9. Dispersive Site Fate and Transport Modeling, Dave Michalsen, Corps

Dave Michalsen, USACE, presented preliminary results from a hydrodynamic model and a particle tracking model that were developed to address concerns that sediment released at open-water dispersive sites may potentially reach nearby shellfish harvesting areas.

Dave reiterated that the data presented at SMARM were very preliminary, and refinement of input parameters and validation needs to occur before the results can be interpreted.

Surface transport from a point-source release at the Port Townsend Dispersive site and the Port Angeles Dispersive site were being simulated. The Lower Elwha Klallam Tribe is concerned that material released at these sites may impact shellfish harvesting zones at Freshwater Bay, Sequim Bay/Dungeness Spit area, and Port Townsend.

ADCP data are scheduled to be collected summer/fall 2011 to ground truth the hydrodynamic model. Characteristics of the sediment and dispersion method also need to be refined. Following validation and recalibration, the results can hopefully be used to guide management decisions for future monitoring in these areas, if needed.

Comments and Questions

Question: Brian Ross, EPA; Are we looking at a surface source or resuspension?

Response: Yes, this is just a surface point source released over time. This is just an example of the capabilities.

Question: Unknown; So, you're not trying to say that sediment is moving into any shellfish areas at this time?

Response: No, not yet. This is just a first look at capabilities.

Question: Sherry Rone, NAVFAC NW; Why is the model only 2D and not 3D?

Response: 3D models are very computationally expensive, and require an enormous amount of time and resources to generate results. We wanted to be able to run the model on a desktop computer. If the 2D model is a good enough predictor, then that's great.

David Michalsen

PP9.1 PSDDA Dispersive Site – Fate and Transport Analysis Rosario Strait, Port Townsend, and Port Angeles
PP9.2 Purpose and Scope
PP9.3 Outline
PP9.4 Map
PP9.5 Background Data
PP9.6 Port Townsend Site Source Materials
PP9.7 Rosario Strait Site Source Materials
PP9.8 Areas of Interest
PP9.9 Coastal Modeling System – Flow
PP9.10 Numerical Modeling
PP9.11 CMS Model Domain
PP9.12 Port Townsend Dispersive Site
PP9.13 Tidal Ellipse
PP9.14 Rosario Strait Dispersive Site
PP9.15 Tidal Ellipse
PP9.16 Port Angeles Dispersive Site
PP9.17 Coastal Modeling System – PTM
PP9.18 PTM Model for PT and PA Sites
PP9.19 Planned Field Data Collection

SCIENCE UPDATES

10. Portland ARRA Dredge Prism Sampling Study – Laura Inouye, Ecology; James McMillan, Portland District; Jeremy Buck, USFWS

Laura Inouye, ECOLOGY, reported on results from the recent Portland ARRA dredge prism sampling study, which was conducted to address the concern that not enough samples were being collected to adequately account for homogeneity within the dredge prism and z-layer.

Vibra-cores were collected on the Willamette River at Post Office Bar to characterize a dredged unit equivalent to one high-rank DMMU with a 4,000 cubic yard "A" layer. The investigation set out to answer the question: How many cores are required to correctly evaluate the dredge prism given different mathematical compositing schemes of "A" and "Z" layers within individual cores, and assuming that Incremental Sampling of 30 cores (IS30) represented the "true" conditions of the dredge prism? Following chemical analysis, Zn, PCBs, and DDX were selected as the driving chemicals for the study.

Results of the study revealed that with the proper compositing scheme, 2 to 3 cores consistently reproduced the same screening level (SL) and anti-degradation evaluation results as the IS30 characterization.

Laura pointed out that given the amount of data collected for this project, there is still a great deal of data mining that can be done. Potential areas of research are:

- Analytical variability (IS sample replicate analysis, lab replicates)
- IS sample comparison
- Potential utility of IS sampling for project characterization

**NOTE: For the SMARM presentation, slides 9 and 10 were erroneously labeled "Distribution of the driving chemicals in the Post Office Bar dredge prism". The corrected slides are included in Appendix IV, and read "Distribution of the driving chemicals in the Post Office Bar Z-Layer". Additionally, recalculations indicated that the "A" layer actually represented 10,000 cy, not 4,000 cy.*

Comments and Questions

Question: Jack Word, NewFields; What fraction of the dredge prism volume did the incremental samples represent?

Response: 4,000 cubic yards of material was being represented by 30 incremental samples. We sank 30 cores into the unit and took an incremental sample from each, which is a core-length subsample weighing about 1.5 kg.

Laura Inouye

PP10.1 Portland ARRA Dredge Prism Sampling Study
PP10.2 Introduction: Why Was This Study Conducted?
PP10.3 Incremental Sampling Theory (A Really Brief Overview)
PP10.4 Incremental Sampling Theory (A Really Brief Overview)
PP10.5 Objectives

PP10.6 Objectives
PP10.7 Sampling Design
PP10.8 Data Analysis
PP10.9 Distribution of the Driving Chemicals in the Post Office Bar Z-Layer
PP10.10 Distribution of the Driving Chemicals in the Post Office Bar Z-Layer
PP10.11 Comparisons: How Many Cores Needed to Represent the Material?
PP10.12 Data Summary
PP10.13 Data Summary
PP10.14 Data Summary
PP10.15 Data Summary
PP10.16 Data Summary
PP10.17 Conclusions
PP10.18 Lessons Learned
PP10.19 Questions?

11. Rockfish Biological Opinion and Monitoring, David Kendall, Corps

David Kendall, USACE, spoke about an ongoing larval rockfish study at DMMP dispersive and non-dispersive sites in Puget Sound. The impetus for the study was a recent National Marine Fisheries Service (NMFS) Biological Opinion (BO) released on December 22, 2010. According to the BO, the actions of disposal at DMMP sites do not jeopardize the continued existence of Puget Sound/Georgia basin distinct populations. However, the BO also concluded that there may be a potential impact on endangered larval rockfish.

The ESA conservation recommendation suggested conducting a comprehensive ichthyoplankton survey at the DMMP sites to assess larval rockfish presence and abundance, and the DMMP agencies agreed that a limited assessment of this issue was warranted. Fortunately, a large-scale NMFS (EPA funded) study was already in the planning stage, and invited the DMMP to participate in the $650,000 NMFS study. The amended study would add additional stations at 6 of the 8 DMMP disposal sites to the 90 stations already proposed as part of the comprehensive NMFS study effort.

Monitoring at the 90 designated NMFS stations and 6 DMMP stations will take place at monthly sampling intervals from April to October, and the study would be further expanded to evaluate the six disposal sites monthly from November through February 2012. For the purpose of the study, all rockfish larvae collected within the DMMP disposal sites will be enumerated relative to take estimates for the three listed rockfish species from the NMFS BO. If the numbers enumerated exceed the take estimates, the DMMP may provide additional funding to differentiate the rockfish larvae collected by species, which would require genetic analysis.

Comments and Questions

Comment: Jack Word, NewFields; This seems to make the assumption that all rockfish larvae taken are the endangered species.

Response: David Kendall, Yes. We think the study will find low numbers of total rockfish larvae at our sites given the general locations of the sites relative to rockfish habitats. If the numbers are significant during the disposal window, then the DMMP agencies may need to consider some genetic analyses to elucidate that the rockfish larvae observed are not one of the listed species (canary, yellow-eye, and Boccaccio). The estimated number of take by species in the BO was based in part on a 2004 master's thesis evaluation of rockfish larvae in the San Juan Islands, and demonstrates the paucity of data available from Puget Sound, so the take estimates are admittedly very conservative. Our study was designed to be broad and covers the time period from larvae release for eleven monthly sampling events to assess their distribution and abundance in the vicinity of all our Puget Sound sites, especially during the time intervals (e.g., mid-June – mid-February) when active disposal at DMMP sites is occurring, except the two sites in the Straits of Juan de Fuca (Port Angeles and Port Townsend). As the pelagic rockfish larvae mature they generally move into nearshore recruitment habitats, such as vegetated habitats such as eelgrass, floating kelp, or rocky substrates, away from the impacts from dredged material disposal. We need to conduct the study to evaluate the rockfish larvae temporal distribution and abundances near the DMMP disposal sites.

Question: John Hicks, USACE; How did they come up with a take estimate of seven hundred eighty-*one*?

Response: David Kendall, The numbers in the BO are admittedly overly conservative. The rationale for the take estimates for each of the three species are in the BO, which is posted online.

There was a brief discussion between David and a member of the audience regarding the link between rockfish larvae mortality and dredged material disposal. David indicated that he does not question the outcome of the research project used to generate these numbers, but he believes the survey will confirm their beliefs that the impacts are minimal. The audience member expressed concern that the timing of the surveys bracketing a disposal event may capture spatial heterogeneity in larval distribution due to the advection of the water column over the DMMP sites, rather than disposal-related mortality.

David Kendall

PP11.1 Larval Rockfish Ichthyoplankton Study: DMMP Puget Sound Disposal Site Assessment

PP11.2 2010 ESA Consultation on DMMP Puget Sound and Strait of Juan de Fuca Disposal Sites
PP11.3 December 22, 2010 Biological Opinion, NMFS, Regarding DMMP Disposal Sites
PP11.4 December 22, 2010 Biological Opinion, NMFS, Regarding DMMP Disposal Sites
PP11.5 Endangered Species Act Conservation Recommendation Directing the DMMP Study
PP11.6 NMFS (EPA funded) Study: Evaluate Ecological Health of Puget Sound's Pelagic Foodweb
PP11.7 DMMP Focused Study
PP11.8 Proposed Sampling Stations for Ichthyoplankton Study
PP11.9 DMMP Cooperative Agreement with NMFS to Enable Disposal Site Evaluations
PP11.10 Questions?

Afternoon Break

CLARIFICATION PAPER

12. Update of Marine Screening Levels – Laura Inouye, Ecology

Laura Inouye, ECOLOGY, took the stage a second time that afternoon to update the audience on the 2011 adoption of updated RSET marine screening levels. Laura began with a comprehensive history of proposed screening levels, modifications, and adoption over the last two decades.

A slide summarizing the proposed changes was quickly reviewed, with the proposed SL updates examined in more detail in the following slides. Quick-look changes followed by detailed explanations and project impacts begin at slide PP12.3. Some notable changes include:

- Nickel, VOCs, and Lindane removed from marine SLs. Database of project test results indicates essentially no project or environmental impact. These will continue to be monitored.
- Aldrin, Chlordane (total), Dieldrin, Heptachlor, Hexachlorobutadiene – revised lower SLs are driven by benthic community response, not old detection limit. Little to no project or economic impacts.
- DDT and products – SLs slightly raised. Extremely rare as sole bioassay trigger. Evidence suggests toxicity would not have been missed.

Laura then provided a brief review on detection limits and data qualifiers. She also pointed out that many of the SLs are approaching, or are lower than recommended PQLs, and urged data

users to use best professional judgment when reporting "J" qualified results. Labs should do their best to lower the MDLs to be at or lower than SLs.

**NOTE: The Clarification Paper can be found at (*http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/110426_SL_paper.pdf)

Comments and Questions

Question: Unknown; You're saying that we'd still monitor for the analytes that have been dropped?

Response: We will continue to monitor for them only for our disposal sites, but they will not appear on project-specific screening lists.

Question: Unknown; When will this take place?

Response: We will have a 30-day review and we're expecting to get comments, so we'll go back and address those issues following the review and we'll go from there.

Comment: Susan M'Groddy, Windward; It would be interesting if you went back to your database and pulled out the number of times that values were reported between the MDL and the PQL. In my experience it's very rarely reported. Most MDLs are determined with a clean, spiked sand rather than an actual sample, and you can get much lower limits. I think that best professional judgment can be applied taking these issues into consideration; in any case I think [the revisions] look great.

Laura and members of the audience engaged in a discussion of issues related to reporting limits. Laura highlighted the fact that when you are dealing with reporting limits, you need to be aware that individual labs may have different methods of documenting reporting limits, as well as different acronyms. A member of the audience addressed the ambiguity surrounding the Ecology recommended PQLs, and had questions on the criteria used to arrive at those values, citing the variability that exists between methods. Laura stated that she was not involved in the process of generating the 2008 Ecology recommended PQLs.

Question: Fred Felleman, Wave Consulting. Mr. Felleman wanted a timeframe on when human use/consumption levels would be integrated into this new system as it moves forward.

Response: These are contentious issues, and contentious issues often move slowly. I've been working on this for two-and-a-half years. We thought we would have many more values now, but we don't. I could hatch up a timeframe, but I would have to put an asterisk on it.

Comment: Mr. Felleman pointed out that it is difficult to provide meaningful comments on a piece of a piece of a figurative process if we don't understand the broader context.

Response: Stephanie Stirling, USACE, rephrased Fred's question and concern and responded by saying that each little piece is highly technical, with different stakeholders and different timelines. Where these pieces are expected to come together is at the management level and the agency level, where panels can be formed to review them at the policy level. This is where you would see integration by PSEP; they are not working on the technical details. However, they are trying to merge the policy together. These separate pieces are simply on different timelines, and very difficult to coordinate.

Comment: Meanwhile dredging occurs. Wouldn't it make sense to set some salient, guiding timeline where we can check in periodically to see if we are meeting expectations? The goal of the Puget Sound Partnership is to clean up and restore Puget Sound, and these issues are but one necessary part of that process. I would hope it's before 2020.

Response: Yes, I hear what you are saying. It would be desirable to have that happen, but I don't know how we can get there. I understand the concern, and I appreciate the comment.

Laura Inouye

PP12.1 Update of Marine Screening Levels
PP12.2 Why Do We Need to Revise the Marine SLs?
PP12.3 What Are the Changes?
PP12.4 Evaluation of Potential Economic and Environmental Impacts of the new SLS
PP12.5 SLs Being Dropped Off the C0C list: Nickel
PP12.6 SLs Being Dropped Off the C0C list: Lindane
PP12.7 SLs Being Dropped Off the C0C list: 1,3-Dichlorobenzene, hexachloroethane, trichloroethene and tetrachloroethene
PP12.8 SLs Being Dropped Off the C0C list: Ethylbenzene and total xylenes
PP12.9 Revised SLs: Chromium
PP12.10 Revised SLs: Hexachlorobutadiene
PP12.11 A Short Diversion: Reporting Limits
PP12.12 Revised SLs: Aldrin
PP12.13 Revised SLs: Total Chlordanes
PP12.14 Revised SLs: Dieldrin and heptachlor
PP12.15 Revised SLs: DDT and Products
PP12.16 Summary
PP12.17 Questions?

CLARIFICATION PAPERS

13. Reliability Statistics for Dummies: A Guide to Sediment Benchmark Chemistry for the Rest of Us, Burt Shephard, EPA

Burt Shephard, EPA, was wary of the risk associated with a late-afternoon statistics talk, but forged ahead nonetheless. He discussed some lessons learned evaluating Sediment Quality Benchmark (SQB) determination at a known contaminated site – Portland Harbor. The initial study began as a short comment about SQBs derived specifically for the Portland Harbor Baseline Ecological Risk Assessment (BERA), and evolved into a 50 page white paper as the authors realized the broader application of the issues they faced. The goal of the effort was to establish reliability goals for the SQB to predict the outcomes of toxicity tests. Co-located sediment chemistry and toxicity test results for 293 Portland Harbor stations were used for the study.*Question: Chance Asher, Ecology,* [Referring to reliability goals proposed in the Portland Harbor BERA, slide PP13.6] When did you establish the 20 percent goals for false positives and false negatives?

Response: Those are the PRP's goals proposed in the first draft of the BERA. They were not discussed with us and were established before we began working on the study. They are not EPA or DEQ's goals, but we were reasonably comfortable with those goals as a starting point for discussions.

Question: Jack Word, NewFields, How did you select the 293 samples for bioassay testing out of the ~1,400 total samples from Portland Harbor?

Response: Those were bias-selected following the first round of chemistry to target sites that had higher chemical concentrations. That was done before I began working on the project.

Mr. Shephard continued by clarifying how the term "reliability" is used for the purpose of the study. Essentially, reliability is the level of agreement between the exceedance of a chemical SQB and the toxicity to benthic invertebrates. SQB values are often selected to be protective of ecological health. Risk assessors may be more protective of the benthic community by selecting a lower benchmark that is less likely to trigger false negatives. Risk managers often take the opposite approach to reduce the cost associated with the remediation of locations with false positives. Dieldrin at (21.5 µg/kg) was used as the example SQB for the study. The concentration was calculated from the site-specific Floating Percentile Model (FPM).

Question: Deborah Williston, King County; How do you know that Dieldrin is the appropriate contaminant to use for this study? Why not something else?

Response: We took this approach with a number of different contaminants and we were encountering similar results. This told us that there was something wrong with the statistical approach. I'll probably answer your question in depth in the upcoming slides.

The 293-sample dataset had a 7 to 25 percent prevalence of toxicity depending on which toxicity test one considered; good news for Portland Harbor, but not ideal for SQB reliability statistics, which are best evaluated with data sets containing an equal prevalence of toxic and nontoxic samples. There was also a significant overlap of chemical concentration for samples with negative or positive toxicity results. The combination of those factors really throws the statistic for a loop, according to Burt. As a result, the site-specific logistic regression and FPM method of selecting the SQB produced poor results for reliably predicting toxicity at Portland Harbor when one looked at the predictive ability of the individual chemical benchmarks from each model.

In summary, site-specific SQBs ideally need to be generated from a dataset that has a close to 50 percent prevalence of toxicity, and chemically distinct populations of positive and negative toxicity results. Results at Portland Harbor would not have been different with an alternate sampling approach or more data; there was plenty of good data with poor distribution of toxicity prevalence for commonly used statistical methods such as overall reliability. In these situations where prevalence is an issue, it is advised to use alternate statistical methods that are not affected by prevalence, or can be adjusted to deal with unequal prevalence of toxic and nontoxic samples.

Comments and Questions

Question: Roger McGinnis, Hart Crowser; Have you tried multivariate approaches to evaluate synergistic effects from combined contaminants?

Response: We're getting there, Portland Harbor's logistic regression model for predicting sediment toxicity is a multivariate model, as is the floating percentile model.

Burt Shephard

PP13.1 Reliability Statistics for Dummies: A Guide to Sediment Quality Benchmark Accuracy for the Rest of Us
PP13.2 Cartoon
PP13.3 What Does Reliability Mean?
PP13.4 Portland Harbor BERA Benthic Toxicity Evaluation
PP13.5 How Are Reliability Statistics Calculated? Contingency Tables
PP13.6 Reliability Goals Proposed in the Portland Harbor BERA
PP13.7 Three Factors that Affect Some Reliability Statistics

PP13.8 Toxicity Prevalence in the Feasibility Study
PP13.9 Selection of the SQB What is the Most Reliable SQB?
PP13.10 What if SQB is Lower or Higher than Optimal?
PP13.11 What if There is Extensive Overlap Between Toxic and Nontoxic Sediment Concentrations?
PP13.12 Example of What SQBs Try to Predict: Chironomus Biomass Reduction
PP13.13 Some Reliability Analyses May Not Be Very Reliable When Prevalence is Low: Dieldrin SQB (21.5 µg/kg) from the FPM
PP13.14 Problems with Reliability Statistics if Prevalence Departs Substantially from 50:50
PP13.15 Problems with Reliability Statistics if Prevalence Departs Substantially from 50:50
PP13.16 How Can We Address these Issues?
PP13.17 What Other Reliability Statistics Did We Identify?
PP13.18 Bias Appears to be a Particularly Useful Statistic
PP13.19 PCB Sediment Quality Benchmarks Derived by Three Different Methods
PP13.20 Reliability Statistics for Total PCBs from Various Sediment Benchmarks
PP13.21 Summary
PP13.22 Summary
PP13.23 Questions

14. Roosevelt Landfill, Art Mains, Republic Services

Art Mains, Republic Services, gave the audience a peek into the "black box" of confined, upland dredged material disposal. Mr. Mains is the environmental director of the Roosevelt Landfill, located in Eastern Washington about 5 miles from the Columbia River. The landfill began accepting dredged sediments by rail in 2003, with over 1.5 million cubic yards of material delivered to date. The infrastructure had to be modified to accommodate sediments, which average about 12 percent liquid by weight. As a self-contained facility, liquid draining from the material is beneficially reused to control airborne dust and stabilize underlying waste. From a hydrogeological perspective, the landfill is ideally cited above a shallow, impermeable clay layer, isolating the regional aquifer from an unlikely breach in the robust liner system.

Question: Chance Asher, ECOLOGY; So, you collect the dewater and use it as cover in other areas. Are those other areas lined as well?

Response: Yes, there are no unlined areas at the facility. Whatever arrives here stays here.

Mr. Mains continued with a description of the unique power plant that has been in operation at the facility since 1999. The 10MW plant is currently undergoing expansion, and makes use of methane generated through anaerobic decomposition of onsite waste. At completion, the plant will have a 37MW capacity, making it the largest landfill-gas power plant in the nation, possibly

the world. In his conclusion, Mr. Main cited another benefit of sediment-derived moisture: increased gas production to offset fuel needs and increase energy production.

Comments and Questions

Question: Justine Barton, EPA; Would you please describe the process of receiving dredged material at the facility. Is it handled differently depending on moisture content or presence of contamination?

Response: The train arrives at one of our 12 inter-loading terminals, where it is trans-loaded onto our equipment. It's hauled up to the area of the landfill designated for sediment disposal. For particularly wet sediment we use a remote control of the tipping bucket to place the material.

Question: Jack Word, NewFields; Do you accept saltwater dredged materials?

Response: Yes, we do. We use the same procedures for freshwater or marine sediments.

Question: Brian Ross, EPA; Do you price the disposal to include transportation to the facility?

Response: Yes. I don't know exact numbers for pricing, but the disposal fees include rail transport.

Art Mains

PP14.1 Roosevelt Regional Landfill Dredged Sediment Management
PP14.2 Proven History
PP14.3 Allied Waste Roosevelt Regional Landfill
PP14.4 Environmental Commitment
PP14.5 Constructed Dredge Area
PP14.6 Constructed Dredge Area
PP14.7 Constructed Dredge Area
PP14.8 Sustainability in Action – LFG to Energy
PP14.9 Upland Disposal Benefits
PP14.10 Thank You

SUMMARY AND CLOSING

Stephanie Stirling, USACE, concluded the 23rd annual SMARM by thanking the audience for their attendance, and reminding everyone that the presentations are posted on the website (http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=DMMO&pagename=SMARM_2011)

along with the clarification paper on screening levels. Comments were requested for submission to David Kendall at the DMMO before June 4, 2011.

Stephanie Stirling

PP15.1 Photo of Earth

PP15.2 Photo of Earth

Meeting Adjourned

Appendix I

DMMP Response to Public Issues

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Port of Seattle

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www.portseattle.org

June 3, 2011

Wayne Wagner,
Chief, Technical Support Branch
Seattle District Corps of Engineers
Seattle, WA.

James Pendowski
Program Manager
Toxics Cleanup Program
Washington State Department of Ecology
Olympia, WA.

Thank you for this opportunity to comment on the topics and proposals of the 2011 SMARM meeting. I am providing input on 2 main issues.

Marine Sediment Quality Screening Levels (Adopting RSET Marine SLs for use in DMMP):
The move to adopt the RSET Marine SLs, for use in DMMP removes many of the chemicals on the "chemicals of concern (COC)" list that have been technically problematic, while not enhancing the environmentally sound, scientific, basis of the suitability decisions. I am referring to the COCs in your Group 1. (presently on DMMP list but not adopted by RSET). This is definitely a positive modification. The one area that I am concerned about is in your Group 2 COCs, specifically, total chlordane, dieldrin, and heptachlor, where the RSET Marine SL is significantly lower than the DMMP SL. The issue that I am concerned about is non-detect exceedances which you have mentioned in you discussion of dieldrin, and heptachlor. Although the Ecology SAPA (2008) recommended PQL is 1.7 ppb for total chlordane, we can see from the 51 projects with reporting limits above 2.8 ppb, that meeting this PQL is problematic, even is recent projects. As you are well aware meeting the PQL is largely dependent on the type of sediment matrix and other interfering compounds. I am concerned that we are setting ourselves up for requiring additional testing solely based on not meeting difficult to achieve PQLs. I recommend that DMMP apply "best professional judgment" on decisions of all three of these chemicals when tests show non-detect exceedances.

Update on the SMS rule revision, specifically the melding of SMS and MTCA:
As this is "a work in progress" I will leave a more detailed analysis to future opportunities, but there are a several comments I will make now in response to the presentation.
There are promising elements in your current approach, such as the opportunity for individual liability resolution for discrete site units within a larger site, and retaining the current SMS tiered approach with a range of cleanup and risk levels. The area that concerns me is brought out in the "Baywide Site" example shown in the slides. A mental "mass balance" of the situation illustrated, shows that you will never move your "area background" (of 30 ppt) down to your "regional background" (of 10 ppt) without

a very large source of clean incoming sediments, (well below 10 ppt). Not all of our cleanup locations have the luxury of a large source of very clean sediments. So the ability to reach the regional background will be different and dependent on the inputs clean sources, not just on the efforts of those attempting to clean up the site.

Given that situation, either the maximum allowable level needs to take that site specific information into account at the front end, or at a minimum, you need to have something like CERCLA's Technical Infeasibility (TI) waiver, which will allow the parties involved to resolve their liabilities after a certain reasonable amount of effort.

Thank you again for the opportunity to comment and stay involved in these programs. Open review and communication with all affected parties is one of their strengths.

If you have any questions please feel free to contact me at (206) 7873192, or hotchkiss.d@portseattle.org.

Douglas A. Hotchkiss
Senior Environmental Program Manager
Port of Seattle

DMMP/SMS Comment and Response

6-3-11 Comment letter from Doug Hotchkiss, Port of Seattle:

Comment 1, DMMP clarification paper on SL changes: Comment applies to Group 2 COCs, specifically, total chlordane, dieldrin, and heptachlor, where RSET Marine SLs are significantly lower than the DMMP SL. Doug expressed concern about non-detect exceedances of SL for dieldrin and heptachlor, and chlordane, and failure to achieve the SL detection limits automatically kicking the project into biological testing, and recommends applying "best-professional-judgment" on decisions of these three chemicals when detection limit exceedances occur.

DMMP response: Original language (second to the last paragraph of paper) read, "Best professional judgment will be applied when reporting limits are above the SLs but below the Ecology-recommended PQLs. Laboratories will need to meet the Ecology-recommended PQLs, and attempt to provide sample-specific reporting limits at or below the RSET SLs, thereby providing "J" values that will meet the RSET SLs."

Revised language in finalized clarification paper (**Appendix 5**) now reads, "It is recognized that it will take time for some laboratories to accomplish this. Therefore, best professional judgment (BPJ) will be applied by the DMMP agencies during dredging year 2012 when sample-specific reporting limits are above the SLs for any of these four chemicals. The ability of laboratories to meet the revised SLs will be reviewed prior to the 2012 SMARM. Further need for BPJ beyond the 2012 SMARM will be evaluated at that time."

Comment 2, SMS Rule Revisions, regarding melding of SMS and MTCA: The Baywide Site example depicted in the slides, illustrates the concern, where a mental "mass balance" of the situation illustrated, shows that the "area background" will never move from the "area background" of 30 ppt down to the "regional background" of 10 ppt without a very large source of incoming clean sediments, which are well below 10 ppt. As many cleanup locations do not have the luxury of a very large source of very clean sediments, so the ability to reach the regional background will be different and dependent on the inputs clean sources, not just on the efforts of those attempting to clean up the site. Given that situation, either the maximum allowable level needs to take that site specific information into account at the front end, or at a minimum, something like CERCLA's Technical Infeasibility (TI) waiver, should be considered, to allow parties involved to resolve their liabilities after a certain reasonable amount of effort.

SMS Response: Thank you for your comments. Ecology will consider the site specific feasibility issue regarding potential for natural recovery as well as the technical infeasibility waiver suggestions as we further develop these concepts and draft rule language.

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Appendix II

Meeting Agenda

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2011 SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING
FINAL AGENDA
May 4, 2011
Federal Center South, Seattle
Hosted by the US Army Corps of Engineers, Seattle District

8:30 Registration and Coffee

9:00 Welcome and Opening Remarks – Olton Swanson, Deputy District Engineer, Seattle District

9:15 Meeting Road Map – Stephanie Stirling, Moderator

9:20 Agency Summary Reports, Part I

- EPA, Summary of Regional CERCLA Activities, Sheila Eckman
- Corps, Summary of Testing Activities, Lauran Warner
- DNR, Summary of Monitoring and Disposal Site Management Information, Kristin Swenddal and David Kendall
- RSET Update, Jonathan Freedman, EPA

10:20 BREAK

10:40 Agency Summary Reports, Part II

- Ecology, Update on SMS Rule Revision and Decisions Made, Chance Asher

11:40 Status Reports

- Update on Development of a Sediment Reference Material, Justine Barton, EPA
- Implementation of New Interim Dioxin Guidelines, David Fox, Corps, and Erika Hoffman, EPA

12:10 LUNCH

12:50 Status Reports (continued)

- Update on Sediment Larval and Neanthes Test Adjustments, Jack Word, NewFields
- Dispersive Site Fate and Transport Modeling, Dave Michalsen, Corps

1:30 Science Updates

- Portland ARRA Dredge Prism Sampling Study– Laura Inouye, Ecology; James McMillan, Portland District; Jeremy Buck, USFWS
- Rockfish Biological Opinion and Monitoring, David Kendall, Corps

2:15 BREAK

2:30 Clarification Paper

- Update of Marine Screening Levels - Laura Inouye, Ecology

3:00 Public Issue Papers

- Reliability Statistics for Dummies: A Guide to Sediment Benchmark Chemistry for the Rest of Us, Burt Shephard, EPA
- Roosevelt Landfill, Art Mains, Republic Services
- Other Public Issue Papers

4:00 Adjourn (tentative)

DEADLINE FOR SMARM COMMENTS IS JUNE 4, 2011

Appendix III

List of Attendees

Last Name	First Name	Affiliation	Email
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Appendix IV

PowerPoint Slides for Each Speaker

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WELCOME

23rd Sediment Management
Annual Review Meeting
May 4, 2011

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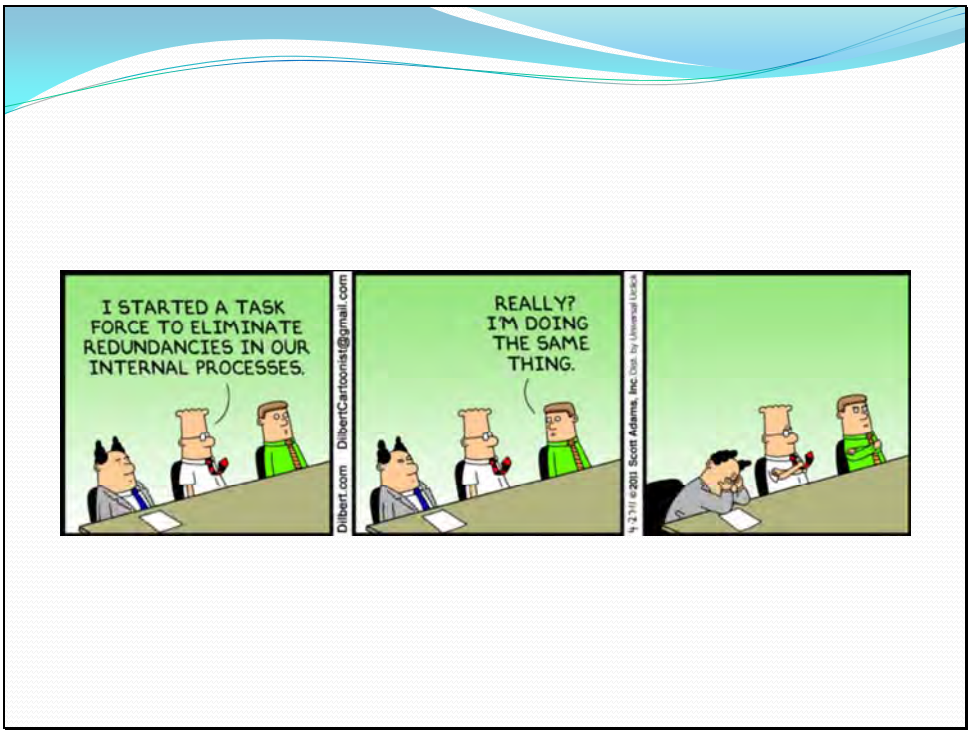
Meeting Details

- Please sign in
- Agendas on back table
- Stay on schedule
- Comments due by June 4, 2011

0.2


I STARTED A TASK FORCE TO ELIMINATE REDUNDANCIES IN OUR INTERNAL PROCESSES.
REALLY? I'M DOING THE SAME THING.
DilbertCartoonist@gmail.com
Dilbert.com
© 2011 Scott Adams, Inc.

0.3

EPA Region 10 Superfund Sediment Cleanup Update

Sediment Management Annual Review Meeting

May 4, 2011

Sheila Eckman, Unit Manager

Office of Environmental Cleanup

EPA Region 10

1.1

Update on Sediment Cleanup Projects

1.2

Commencement Bay

- Occidental Chemical (Hylebos Waterway): Investigation continues.
- Other waterways: cleanup complete and in long-term monitoring.
- Bay-wide fish tissue sampling in planning stage.

1.3

ASARCO

- EPA oversight of DNR piling removal: approximately 2300 piling removed
- Yacht Basin design in progress

1.4

Harbor Island Five Year Review (September 2010)

- Lockheed and Todd sediment remedies (include dredging and capping) are functioning as intended.
- Minimal recontamination of sediment cleanup areas, West Waterway will be revisited after LDW cleanup decision.

1.5

Elliot Bay Projects

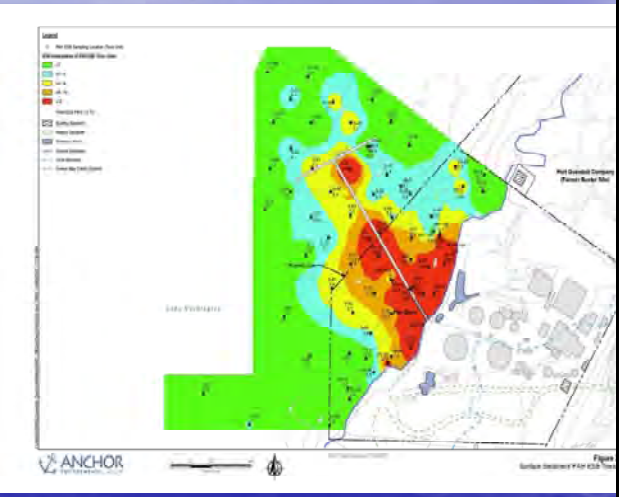
- East Waterway: RI/FS continues.
- PSR: Cap evaluation, including solid phase microextraction. Beach opening to public.
- Lockheed West Seattle: Look for cleanup proposed plan in 2012.

1.6

Quendall Terminals

– RI being finalized

- moving into FS.



1.7

Upper Columbia River Remedial Investigation

- Beach Sampling – April 2011
- Surface Water Sampling - complete
- Fish Tissue Sampling - complete
- Sturgeon Toxicity studies - complete
- Tribal Use Survey underway
- Recreational Use Survey underway
- Next up ---- sediment sampling

1.8

DOD Sites

- Puget Sound Naval Shipyard: investigations related to mercury.
- Jackson Park: RI/FS for munitions in sediment.

1.9

Bremerton Gas Works

- Expect proposal to National Priorities List
- Negotiation with PRP for RI/FS and removal assessment
- November 2010 – removal of pipe discharging contaminants and placement of beach mat.

1.10


Duwamish
Waterway
Cleanup
EPA
United States
Environmental Protection
Agency
Region 10
DEPARTMENT OF
ECOLOGY
State of Washington

1.11


3 key parts of the Duwamish cleanup
Clean up early action areas
Source Control
Clean up Duwamish sediments
12

1.12

Lower Duwamish Waterway Early Actions

We are getting in the water!!

1.13

Slip 4 Cleanup begins in Fall!

1.14

Boeing Plant 2

- Comment on Boeing Plant 2 Sediment Cleanup by May 28
- http://go.usa.gov/449
- Two cleanup options: Dredge and backfill OR dredge and cap
- Expect sediment cleanup to begin in 2012.

1.15

T-117

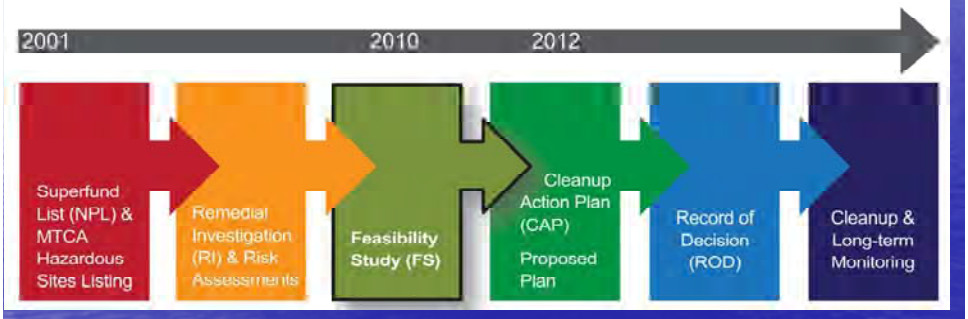
- Expect sediment cleanup to begin in 2012.
- Dredging of approx. 14,000 cubic yards up to 15'.
- Upland cleanup to follow.

1.16

Lower Duwamish – the rest of the story….

1.17

Where are We Now in the Cleanup Process?



1.18

Consider the Cleanup Alternatives

	Removal Alternatives					Combined Alternatives			
*Alternative 1: No Further Action, includes Early Action Areas only at cost of $66 million	2R (with on-site disposal option)	3R	4R	5R (with treatment option)	6R	3C	4C	5C	6C
Cleanup Technologies Applied to Waterway (Acres)									
Site-wide Monitoring and Institutional Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitored Natural Recovery	146 ac.	119 ac.	62 ac.	19 ac.		119 ac.	62 ac.	19 ac.	
Enhanced Natural Recovery						9 ac.	15 ac.	50 ac.	92 ac.
Capping						18 ac.	23 ac.	24 ac.	51 ac.
Dredging or partially dredging, then capping	30 ac.	57 ac.	114 ac.	157 ac.	299 ac.	38 ac.	76 ac.	83 ac.	156 ac.
*Early Action Areas	29 ac.	29 ac.	29 ac.	29 ac.	29 ac.	29 ac.	29 ac.	29 ac.	29 ac.
Years to Construct	4 yrs.	6 yrs.	13 yrs.	19 yrs.	38 yrs.	4 yrs.	7 yrs.	8 yrs.	15 yrs.
Time to Long-term Predicted Concentrations	24 yrs.	26 yrs.	18 yrs.	24 yrs.	43 yrs.	24 yrs.	22 yrs.	18 yrs.	23 yrs.
Cost (without Early Action Area costs; add $66 million to these costs to obtain total costs)	$230 million	$290 million	$440 million	$600 million	$1.3 billion	$220 million	$290 million	$310 million	$650 million

1.19

Considerations for LDW Cleanup Decision

- Superfund Nine Criteria
- MTCA criteria, including Disproportionate Cost Analysis
- Environmental Justice
- Integrated watershed management for source control

1.20

Lower Duwamish Schedule

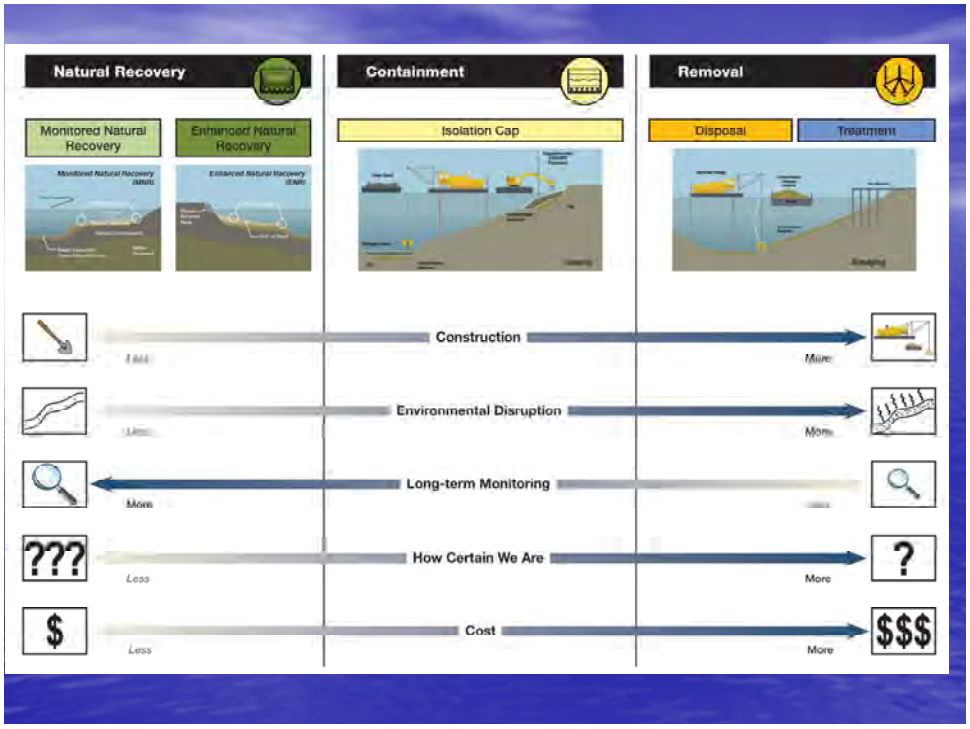
- Fall 2011 – Final FS
- Early 2012 – Proposed Cleanup Plan for public comment
- Summer/Fall 2012 – Consider comments, prepare decision
- Early 2013 – Record of Decision and Responsiveness Summary

1.21

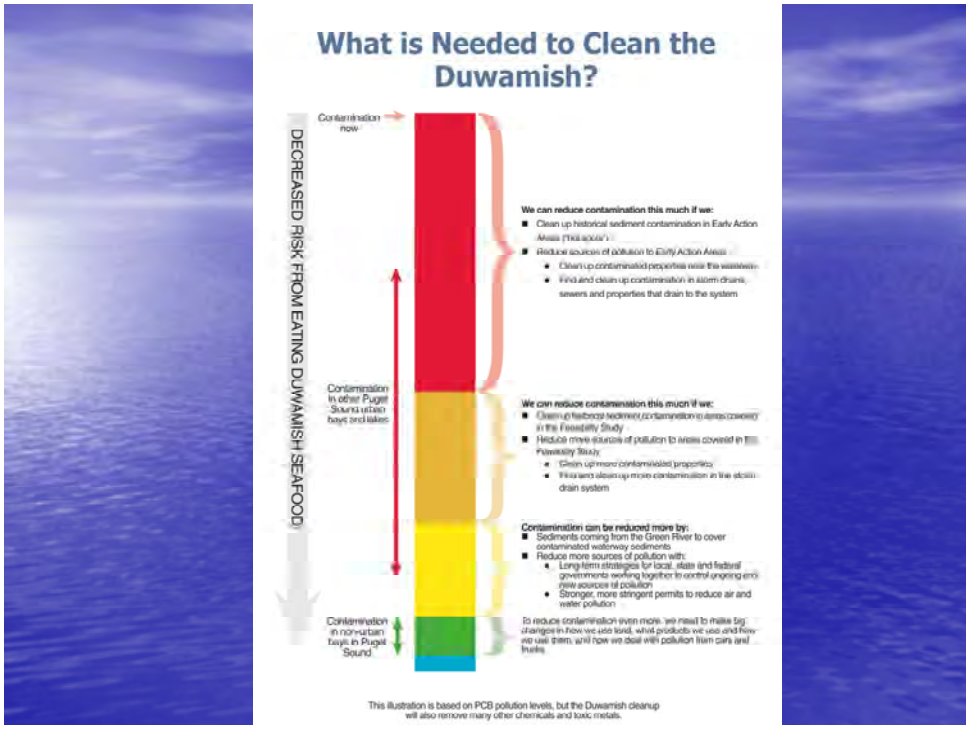
EPA Contacts – Sediment Projects

- Hylebos, Occidental - Jonathan Williams, 206-553-1369
- Lockheed West Seattle, T-117 - Piper Peterson Lee, 206-553-4951
- McCormick and Baxter, PSNS - Nancy Harney, 206-553-6635
- Lockheed, Todd, Quendall Terminals - Lynda Priddy, 206-553-1987
- PSR, Harbor Island, East Waterway – Ravi Sanga, 206-553-4092
- Duwamish RI/FS - Allison Hiltner, 206-553-2140
- Duwamish source control – Kris Flint, 206-553-8155
- Slip 4- Karen Keeley, 206-553-2141
- Portland Harbor RI/FS – Chip Humphrey, 503-326-2678
- Portland Harbor Early Actions – Sean Sheldrake, 206-553-1220
- ASARCO – Kevin Rochlin, 206-553-2106
- Boeing Plant 2/Jorgensen – Shawn Blocker, 206-553-4166
- Eagle Harbor – Howard Orlean, 206-553-2851
- Bremerton Gas Works – Mark Ader, 206-553-1849
- Astoria Marine – Claire Hong, 206-553-1813
- Upper Columbia River – Helen Bottcher, 206-553-6069

1.22


Natural Recovery
Containment
Removal
Monitored Natural Recovery
Enhanced Natural Recovery
Isolation Cap
Disposal
Treatment
Construction
More
Environmental Disruption
More
Long-term Monitoring
More
How Certain We Are
Less
More
Cost
Less
More

1.23


What is Needed to Clean the Duwamish?
Contamination now
DECREASED RISK FROM EATING DUWAMISH SEAFOOD
Contamination in other Puget Sound urban bays and lakes
Contamination in non-urban bays in Puget Sound
We can reduce contamination this much if we:
Clean up historical sediment contamination in Early Action Areas
Reduce sources of pollution to Early Action Areas
Clean up contaminated properties near the waterway
Find and clean up contamination in storm drains, sewers and properties that drain to the system
We can reduce contamination this much if we:
Clean up historical sediment contamination in areas covered in the Feasibility Study
Reduce more sources of pollution to areas covered in the Feasibility Study
Clean up more contaminated properties
Find and clean up more contamination in the storm drain system
Contamination can be reduced more by:
Sediments coming from the Green River to cover contaminated waterway sediments
Reduce more sources of pollution with:
Long-term strategies for local, state and federal governments working together to control ongoing and new sources of pollution
Stronger, more stringent permits to reduce air and water pollution
To reduce contamination even more, we need to make big changes in how we use land, what products we use and how we use them, and how we deal with pollution from cars and trucks
This illustration is based on PCB pollution levels, but the Duwamish cleanup will also remove many other chemicals and toxic metals.

1.24

23rd Annual Sediment Management Annual Review Meeting

May 4, 2011

DMMP Testing Summary

Lauran Cole Warner
US Army Corps of Engineers

2.1

Dredging Year 2011

- June 16, 2010 to June 15, 2011
- Dredging windows vary, *e.g.*
  - Seattle Harbor (Duwamish): 1 Oct– 15 Feb
  - Grays Harbor (Inner): 16 July – 14 Feb
  - Quillayute River: 1 Sept – 1 Mar

2.2

DY11 DMMP Program Changes

- 2 foot Z-layer instead of 1 foot
- Adoption of new dioxin interim guidelines (Dec. 6, 2010)




2.3

DY11 DMMP Projects

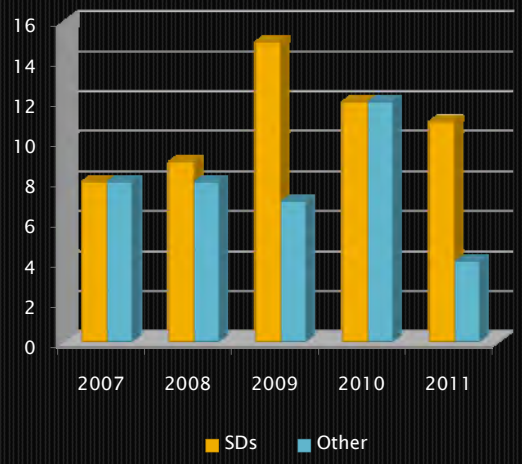
- 23 projects
  - 15 completed actions
  - 8 on-going projects (SAP submitted)



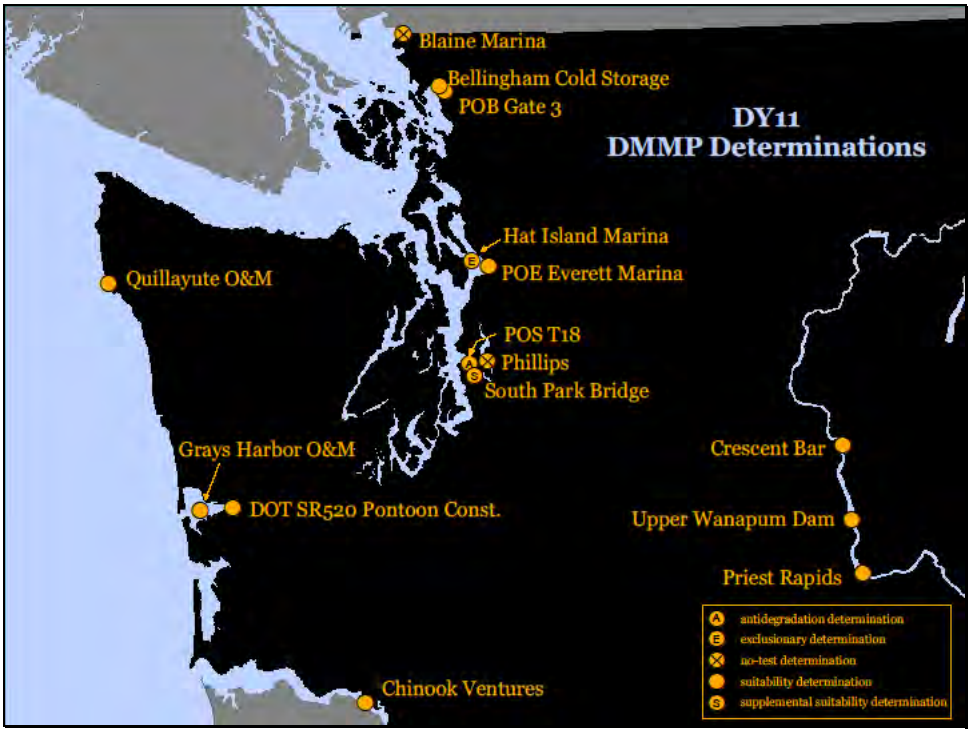

2.4

DY11 Completed Actions

- 11 Suitability Determinations (SD)
- 1 Antidegradation Determination
- 1 Exclusionary Determination
- 2 No-test Determinations



2.5



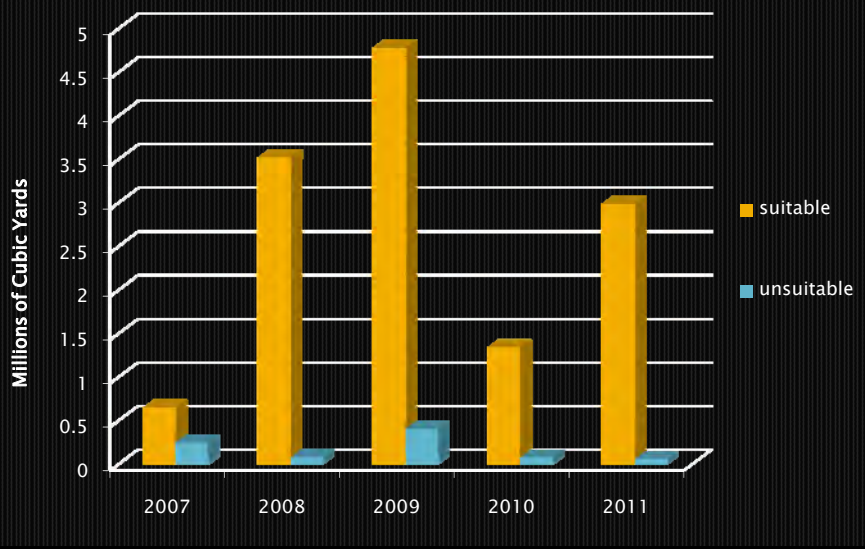
2.6

DY11 Testing Summary

- 12 of 15 completed actions required testing:
  - 7 projects incl. dioxin testing
  - 3 projects incl. bioassay testing
  - 1 project incl. bioaccumulation testing (PCBs)

2.7

Multi-Year Comparison Suitability Volumes



2.8

DY11 Toxicity Testing

- 3 projects/4 DMMUs tested
  - Grays Harbor
    - 2 confirmatory DMMUs tested
    - For 2nd testing cycle in a row, *Neanthes* did not meet ref. sediment performance standard for growth
  - South Park Bridge
    - 1 DMMU tested (PCBs) – passed non-dispersive guidelines
  - Crescent Bar (Columbia River)
    - FW bioassays (Cd, Zn)
    - All sediment *tested* passed bioassays




2.9

DY11 Bioaccumulation

- South Park Bridge – 1 DMMU (PCBs)
- 45-day *Macoma nasuta & Nephtys caecoides*
- Tissue concentrations below DMMP TTL for PCBs; material suitable for OWD




2.10

Projects w/unsuitable material

PROJECT	SUITABLE	UNSUITABLE	REASON	COMMENTS
PoB Gate 3 (Squalicum Harbor)	5,200	44,684	Dioxins	Details in later talk
Crescent Bar (Columbia River)	39,825	7,025	Cd, Zn	FW bioassays*
TOTALS	45,025	51,729	-	-

* not all sediment underwent bioassays due to upland disposal

2.11

Projects with SAPs in DY11 that continue into DY12

MARINE

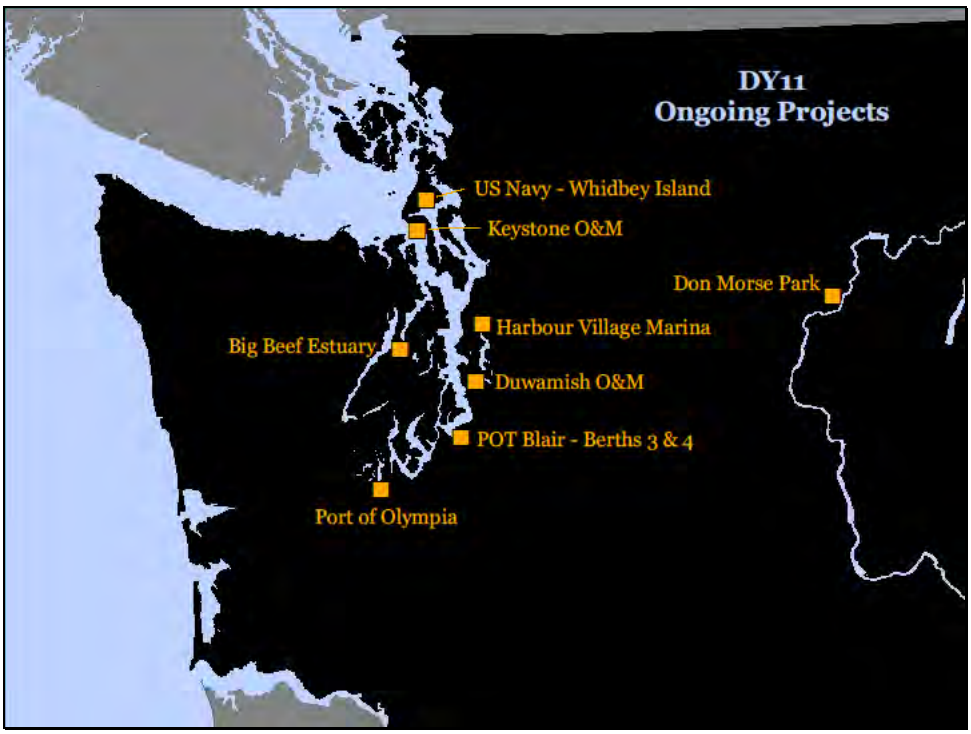
- PoT Berths 3 & 4
- Duwamish O&M
- Whidbey Is. Navy
- Keystone Marina O&M
- PoO Post-dredge
- Big Beef Estuary

FRESHWATER

- Don Morse Park – Lake Chelan
- Harbor Village Marina – Lake Washington

~ 500,000 cy

2.12



2.13

In 2011 DMMP also wrestled with…

- Finalizing dioxin guidelines
- ESA documentation
  - New listings: *Sebastes* species
- Bioassay endpoint tweaks
- Regional Sediment Reference Material (SRM)
- Willapa Bay flowlane disposal

2.14

For more DMMP information

2010 monitoring results summary for the Port Gardner non-dispersive site

David Kendall, Ph.D.

3.1

DMMP's Management of the Site

- Monitored 4 times since 1988 designation and baseline monitoring surveys:
  - 1990 Full Monitoring
  - 1994 Tiered-Full Monitoring
  - 2006 Full, Dioxin Baseline
  - 2010 Tiered Full (addressed 1st 2 monitoring Questions, and 4 testable hypotheses)
- Results evaluated against **testable hypotheses** using updated Monitoring Plan in 2010
- With few exceptions the disposal site has performed within management guidelines during previous monitoring surveys

3.2

2010 Modifications

- SPI survey conducted 3 weeks prior to sampling program
- *Molpadia* sea cucumber abundance
- Dioxin/furan congener analysis at onsite stations
  - 10 Onsite Stations – robust statistical comparison to Puget Sound Bold concentrations
  - Evaluate Compliance with former interim dioxin management objective: 4.1 pptr-TEQ and new interim management objective: 4.0 pptr-TEQ
- PCB congeners and PBDE congeners

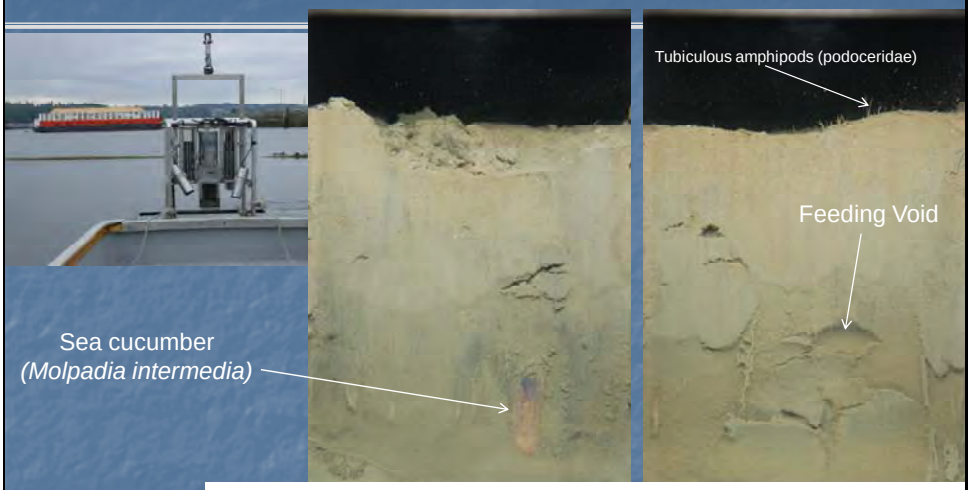
3.3

DMMP Monitoring Framework

1. **Does dredged material remain onsite?**
   - Sediment Vertical Profile System (3 cm)
   - Sediment Chemistry (SQS and CTS)
2. **Have biological effects conditions been exceeded?**
   - Sediment Chemistry (<DMMP MLs)
   - Sediment Bioassays (Site Condition II Guidelines)
3. **Any adverse effects to offsite biological resources?**
   - Tissue Chemistry (metals 3x baseline, organics 5x baseline)
   - Infaunal Community Structure (1/2 baseline of major taxa)

3.4

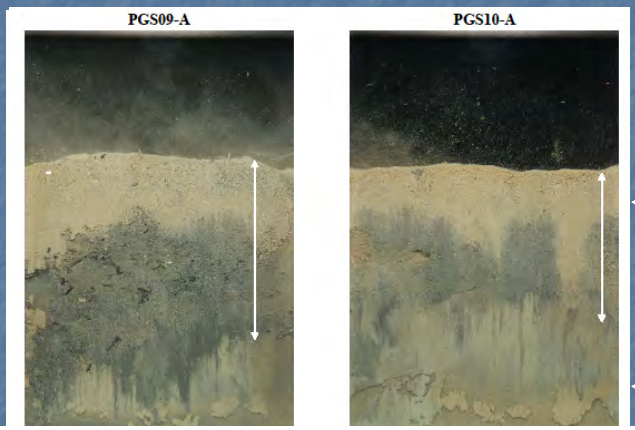
Sediment Profile Imagery (SPI)



SPI images from Port Gardner **Transect** Stations T-24-A and T26-C

3.5

Sediment Profile Imagery (SPI)



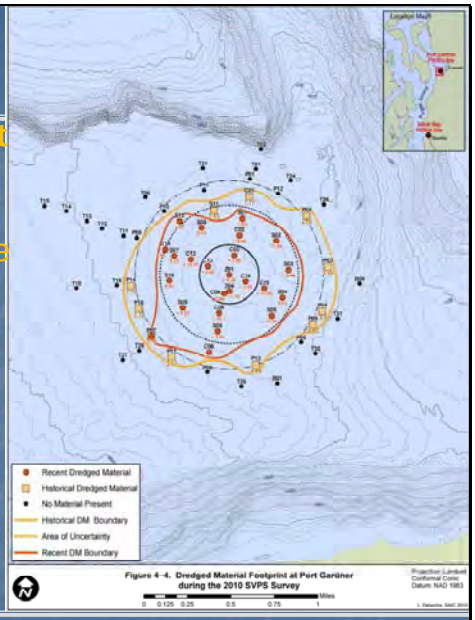
SPI images from Port Gardner **Onsite Stations:** S09 and S10

3.6

2010 Dredged Material Footprint Delineated through SPI Imagery. Recent footprint is well within the disposal site perimeter compliance boundary .

Dredged Material – coarse to medium sands at site center, fine sands along flanks

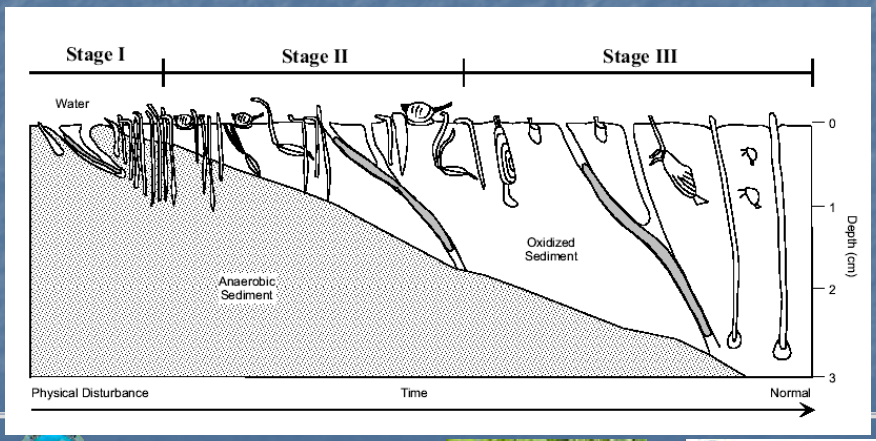
Ambient sediments – water rich, sandy silt and clay (tan colored)



3.7

Idealized Development of Infaunal Successional Stages
(Rhoads & Germano 1986; modified after Pearson and Rosenberg, 1978)

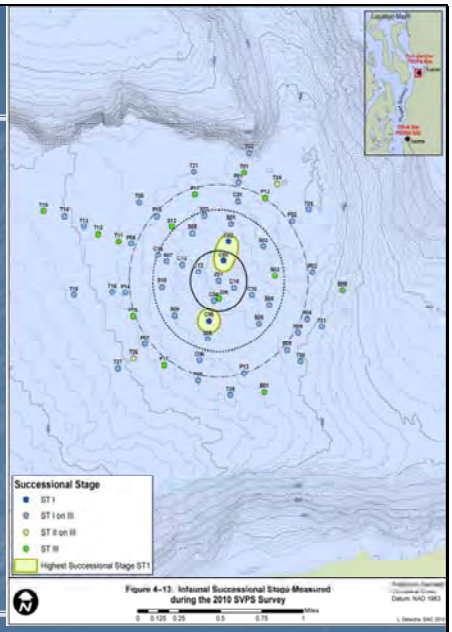
Pioneer Community → Climax Community



3.8

Infaunal Successional Stage

- Stage III succession considered an equilibrium community (Rhoads and Germano, 1982)
- Stage III present at 81% of onsite stations, and 100% of offsite stations



3.9

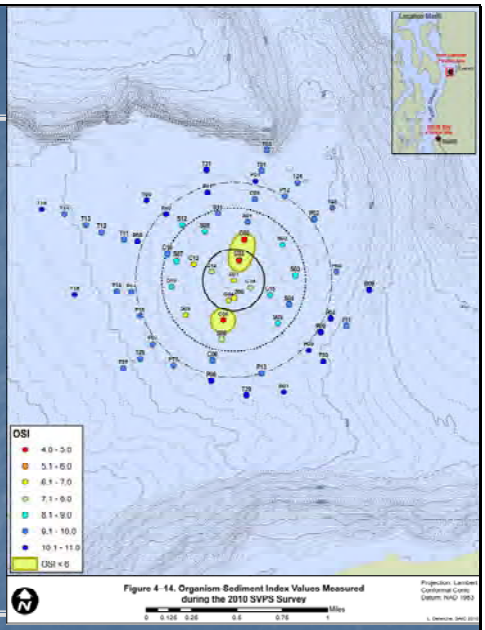
Table 1. Calculation of the Organism-Sediment Index

Choose One Value:	Mean RPD Depth Classes	Index Value
	0.00 cm	0
	> 0 - 0.75 cm	1
	0.76 - 1.50 cm	2
	1.51 - 2.25 cm	3
	2.26 - 3.00 cm	4
	3.01 - 3.75 cm	5
	> 3.75 cm	6
Choose One Value:	**Successional Stage**	**Index Value**
	Azoic	- 4
	Stage I	1
	Stage I – II	2
	Stage II	3
	Stage II – III	4
	Stage III	5
	Stage I on III	5
	Stage II on III	5
Choose One or Both if Appropriate:	**Chemical Parameters**	**Index Value**
	Methane Present	- 2
	No/Low Dissolved Oxygen	- 4
Organism-Sediment Index =		Range: - 10 + 11

3.10

Organism-Sediment-Index (OSI) Distribution

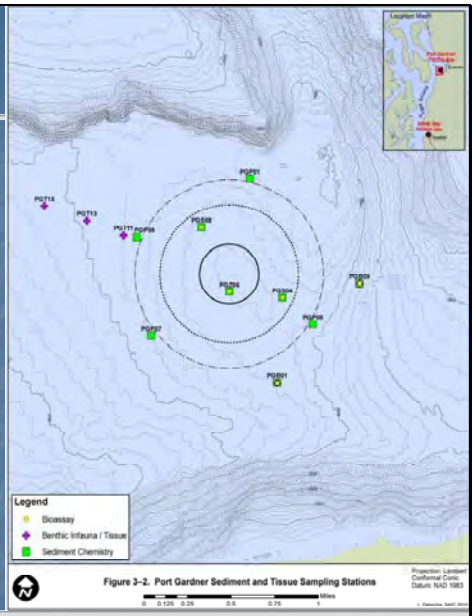
- Mean OSI values
  onsite = +7.9
  offsite = +10.2
- OSI values greater than +6 except a few onsite stations
- OSI > 6 = Healthy benthic conditions & resilient benthic community



3.11

2010 Sediment and Tissue Sampling Stations

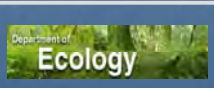
Tissue (*Molpadia*) and benthos samples archived



3.12

2010 Sediment Chemistry Results

- Conventional Parameters:
  - Levels comparable between stations except grain size and TOC
  - Onsite Stations exhibited lower percent fines and TOC (dredged material)
- Metals:
  - Undetected levels, well below SLs
  - Low levels of monobutyltins in porewater
- Organic Compounds:
  - Detected compounds at low or estimated levels below SLs with the excepton of bis(2-ethylhexyl)phthalate slightly exceeding SL (blank contaminated) at site center station
  - VOAs, chlorinated aromatic hydrocarbons, miscellaneous extractables & PCBs undetected

3.13

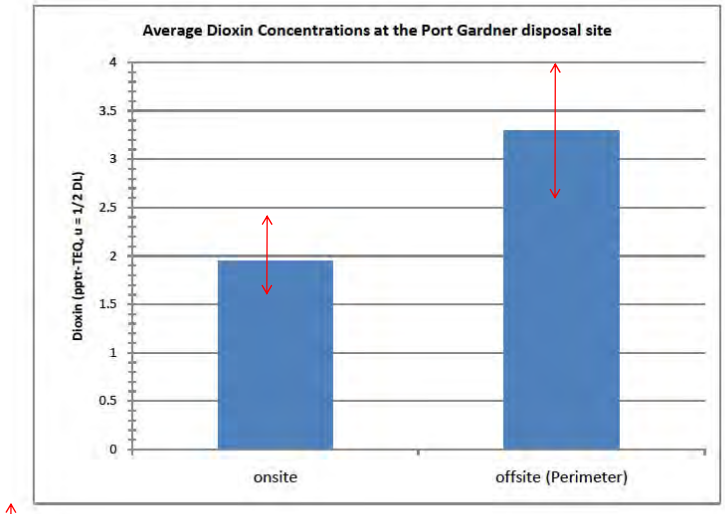
Bioassays

- Bioassays conducted at 3 onsite stations
- All bioassays passed DMMP interpretive guidelines for non-dispersive sites
- Larval Test – utilized resuspension recount endpoint addition
- Neanthes Test – utilized ash-free dry weight endpoint addition


3.14

Dioxin:
Onsite (n = 10)
ranged from
1.3 – 2.4 pptr-TEQ

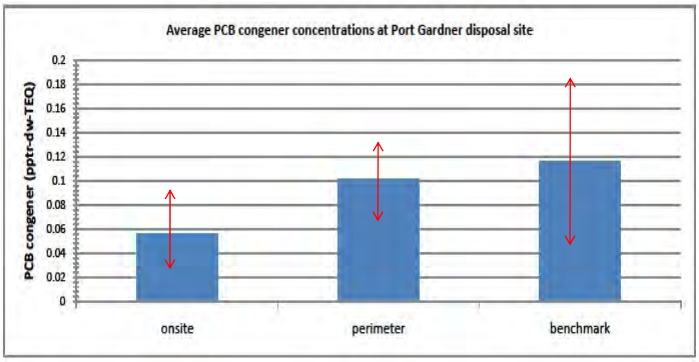
Offsite (n = 4)
Ranged from
3.0 – 4.1 pptr-TEQ



Standard Deviation

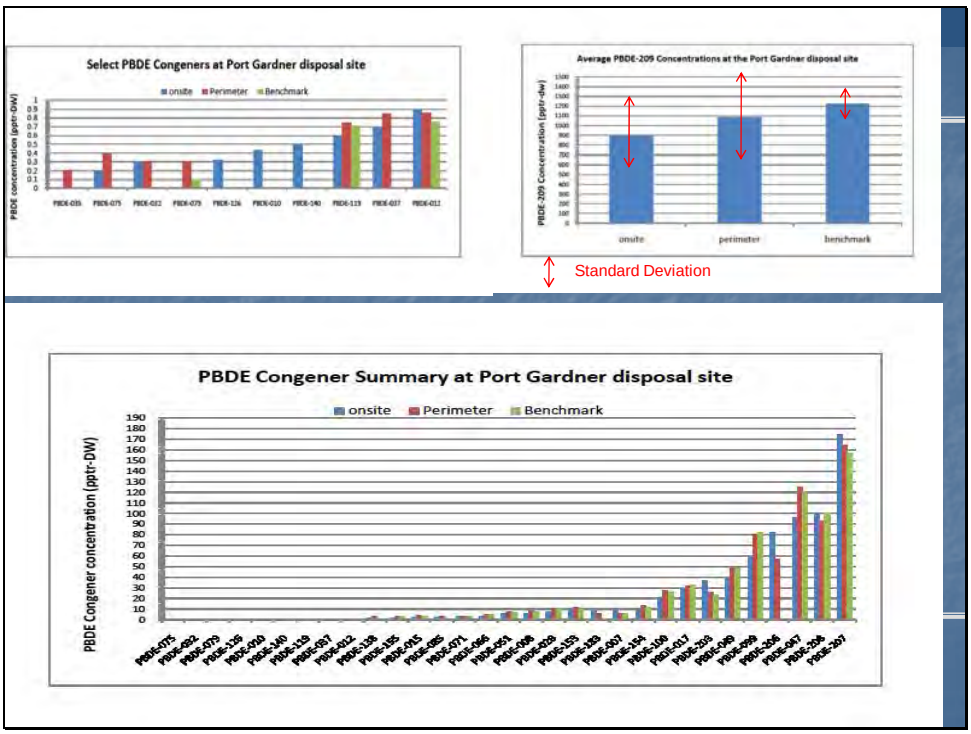
3.15

PCB Congener TEQ Summary:
(Onsite: 0.03 – 0.09 pptr; Perimeter: 0.05 – 0.12 pptr; Benchmark: 0.07 – 0.17 pptr)
Total PCB Congener Summary: Onsite: 2.7-6.4 ppb; Offsite: 4.3-5.6 ppb



Standard Deviation

3.16



3.17

Evaluation of 2010 Monitoring Data

- Question 1: Does dredged material remain onsite?
  - Hypothesis 1 Accepted: Dredged material remains within site boundaries.
  - Hypothesis 2 Accepted: Chemical concentrations offsite do not increase over time due to dredged material disposal (MLs not exceeded; below SQS; Chemical Tracking System (CTS) shows no significant trends)
- Question 2: Are biological effects conditions exceeded?
  - Hypothesis 3 Accepted: Site Condition II for sediment chemistry (MLs not exceeded; below SQS for all detected chemicals).
  - Hypothesis 4 Accepted: Toxicity tests passed Site Condition II interpretation guidelines.
- Question 3: Adverse effects to offsite biological resources?
  - Hypothesis 5 and 6 not evaluated based on acceptance of 1st 4 hypotheses

EPA United States Environmental Protection Agency
Department of Ecology
Washington State Department of Natural Resources

3.18

- Questions?

Regional Sediment Evaluation Team (RSET): Update for SMARM 2011

Applying the Northwest Regional Sediment Evaluation Framework (SEF)

US Army Corps of Engineers

4.1

4.2

Regional Sediment Evaluation Team (RSET)

RSET: multi-agency group, formed under the auspices of the Regional Dredging Team (RDT) to revise the Lower Columbia manual (DMEF) for regional use by all NW Corps Districts, EPA Region 10, NMFS, USFWS, and other federal and state agencies who require sediment quality evaluation procedures.

4.3

RSET Policy Team Background and Responsibilities

- **RSET formed in 2002 to:**
  - update the Lower Columbia Dredged Material Evaluation Framework (DMEF) (1998)
  - RSET mission evolved into: revise / develop regional sediment evaluation procedures
  - Draft Sediment Evaluation Framework (SEF) – Sept. 2006
  - Final Sediment Evaluation Framework - May 2009

- **RSET Policy Team Mission:**
  - maintain and revise SEF
  - Meet monthly to discuss issues of concern
  - Conduct regular program reviews; take public input on SEF - make improvements as needed
  - Develop and support regional sediment database
  - Coordinate with RDT as issues occur

4.4

RSET Home Page: located on Portland district website:

http://www.nwp.usace.army.mil/environment/sediment.asp

("Dredged Material Evaluation" Page: Click on RSET)

OR CALL:

Eric Braun

(503) 808-3721

Jonathan Freedman

(206) 553-0266

DEQ State of Oregon Department of Environmental Quality
Washington State Department of Natural Resources
Department of Ecology State of Washington
US Army Corps of Engineers
NOAA

4.5

Oregon Department of Environmental Quality
DEQ
Washington State Department of Natural Resources
Department of Ecology

RSET Policy Group

Eric Braun Co-Chair, Corps
Jonathan Freedman Co-Chair, EPA
Stephanie Stirling, Corps Seattle,
Karen Kochenbach, Corps NWD
Mark Siipola, Corps Portland
James McMillan, Corps, Portland
Steve Juul Corps, Walla Walla
Nancy Munn, NMFS
Jim Anderson, ORDEQ
Tom Roick, ORDEQ
Jeremy Buck USFWS
Johnna Sandow, IDEQ
Laura Inouye WA DOE

US Army Corps of Engineers
EPA United States Environmental Protection Agency
National Oceanic and Atmospheric Administration

4.6

Activities in Past Year

- Held First Annual RSET public meeting October 2010
  - Adopted SMARM-like format:
    - Summary of sediment characterizations from past year
    - Review of current issues, proposed updates to SEF
    - Superfund update
    - Views from the Public
- Continued dialogue with PNWA on issues raised in project reviews on Lower Columbia
  - Discuss concerns raised by regulated public
  - Commitment to predictability and open information exchange with dredgers, labs and consultants

4.7

Activities in Past Year (continued)

- Portland Project Review Group (Portland district lead):
  - Holds weekly project calls, periodic meetings
  - Uses "SharePoint" data-sharing site to house and access SAPs and Characterization reports
  - Reviewed 44 projects during past calendar year:
    - 16 in Marine Waters; 28 in fresh water; 33 projects from permit applicants; 11 Corps Civil Works projects,
  - Implemented Superfund coordination for lower Willamette (parallels DMMP);
  - Began permit team meetings for projects in Lower Willamette to ensure permit / 401 cert. / ESA recommendations consistent w/ PRG conclusions

4.8

Activities in Past Year - continued

- Columbia - Willamette Sampling and Analysis Plan final guidance; public review comments incorporated;
- Chapter 11 updates (QA / QC guidance and data management): revisions underway to include most current guidance from RSET member agencies. RSET plans to seek input from public when draft is ready
- Portland Harbor Sampling Study: presentation later today
- Freshwater standards: undergoing rulemaking in Washington. RSET goal is eventual inclusion in SEF
- Management of new surface material (z-layer): Emerging Issue. Clarification paper to be developed

4.9

Bioaccumulation

- RSET recognizes that Target Tissue Levels in SEF don't provide clear guidance on how to assess bioaccumulation potential in sediment
- ODEQ has derived sediment values in their bioaccumulation guidance often fall below detection limits
- States of Washington and Oregon look at background differently
- RSET working to resolve differences between State guidance / Agency policies, and SEF guidance

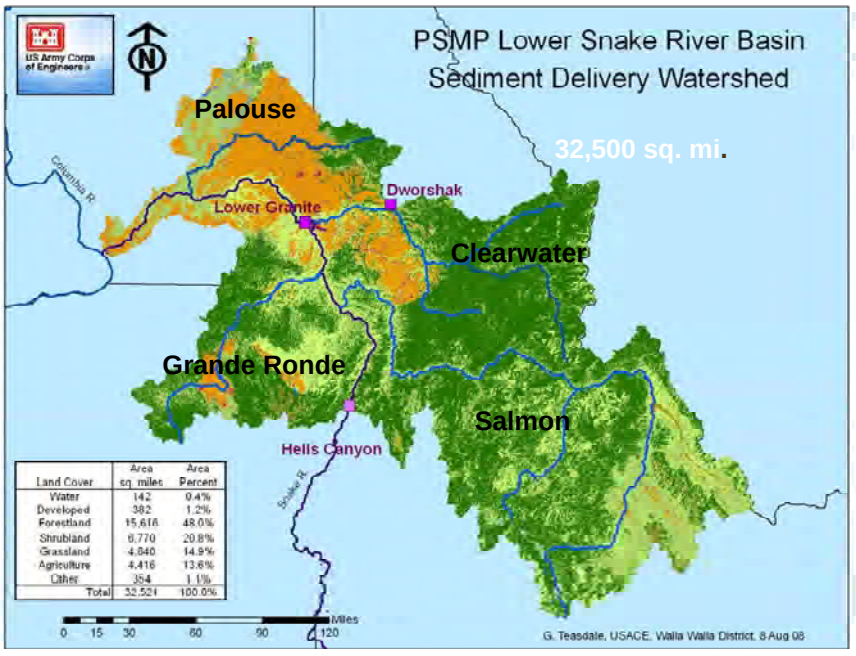
4.10

Other Regional Sediment Initiatives

Snake River Programmatic Sediment Management Plan (Corps Walla Walla district)

- Examining alternative methods for maintaining navigation channels
- Examining sediment inputs from uplands (ag. & forest lands); and identifying possible strategies for reducing them
- Evaluate in-water beneficial use options to improve fish habitat

4.11



4.12

Other Regional Sediment Initiatives
continued

- Mouth of the Columbia River Regional Sediment Management Plan
  - Coordination with multi-agency / stakeholder Lower Columbia Solutions Group
  - Analysis of potential disposal site locations at MCR to augment littoral sediment budget, protect jetties & coastline, avoid deep water disposal

Mouth of the Columbia River Bathymetry and 2006 Dredged Material Placement Sites

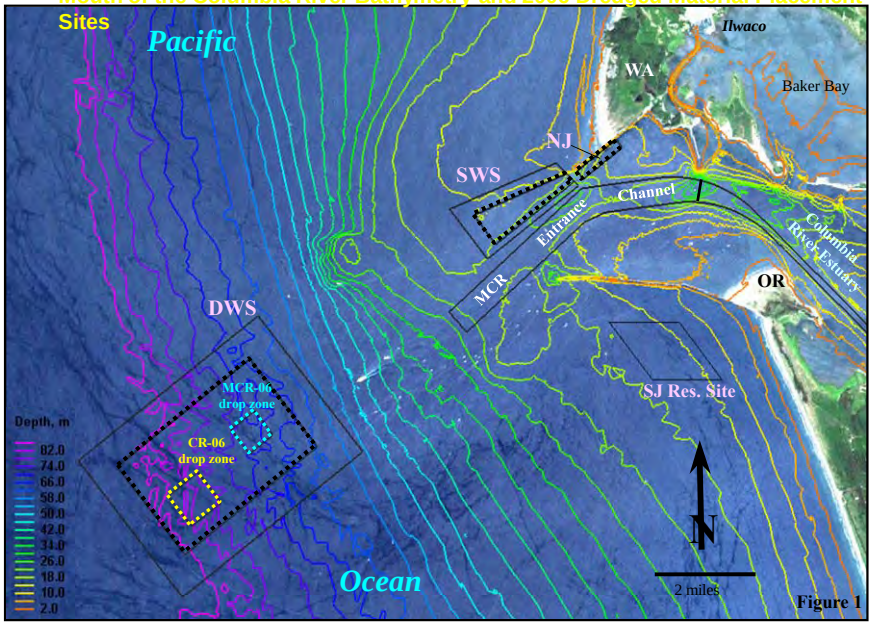


Figure 1

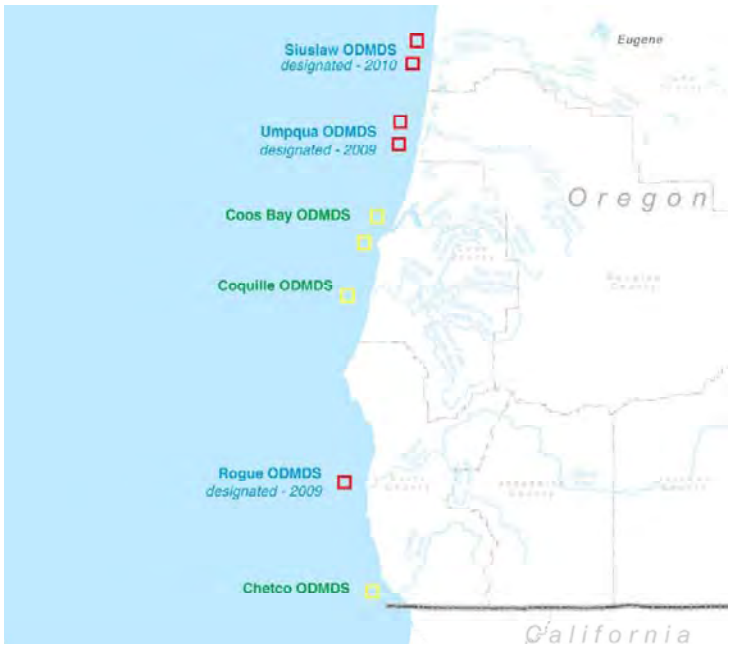
DWS= Deep Water Site, 102 MPRSA NJ Site = North Jetty disposal site, 404 CWA
SWS= Shallow Water Site, 102 MPRSA (formally Site E, 103 MPRSA)
SJ Res. Site = South Jetty research site, restricted use by EPA permit

Other Sediment Management Initiatives

- Five new EPA-designated ocean disposal sites on Oregon coast
  - Final designation allows for long term planning
  - Sediment primarily from Federal channels
  - Most sites shallow, dispersive & managed to supply littoral sediment budgets
- Tsunami damage in southern Oregon
  - Likely only a minor effect on Federal channel
  - Potentially major effect to sediment in Port basins
  - Additional characterization required to assess changes from 2010

4.15

4.16



4.17

Other Regional and National Initiatives

- **The Combined Dredged Material Testing Manual - merging the 1991 Ocean Testing Manual (Green Book) and the 1998 Inland Testing Manual, out for public review in latter half of 2011**
- **National Ocean Policy Task force (and 2010 EO): created the President's National Ocean Council. Regional Planning Bodies (such as the Coastal Marine Spatial Planning group) are forming to improve coordination within Regions.**
  - **West Coast Governor's agreement on Ocean Health (2006) has been very active & appears set to be west coast RPB.**
  - **We expect they will look at funding working groups on regional sediment management and other sediment issues.**

4.18

WA Sediment Management Standards

Rule Revision Updates

May 4, 2011

Chance Asher
WA Department of Ecology
Toxics Cleanup Program

5.1

Goals for today

Provide Updates SMS Rule Revisions

Freshwater Standards

Human Health

Background

We would like to hear from you – today or in the future

5.2

Rule Making Path Changed from MTCA and SMS to just SMS

2008 Scoping, Issues identified
- Incorporate new science into rule and guidance
- Coordinate MTCA & SMS
- Vapor intrusion
- Fish consumption rates

2009 Rulemaking begins
- Ecology files CR-101 announcing rulemaking
- Scoping continues
- Ecology prepares and posts issue summaries
- Convenes advisory groups

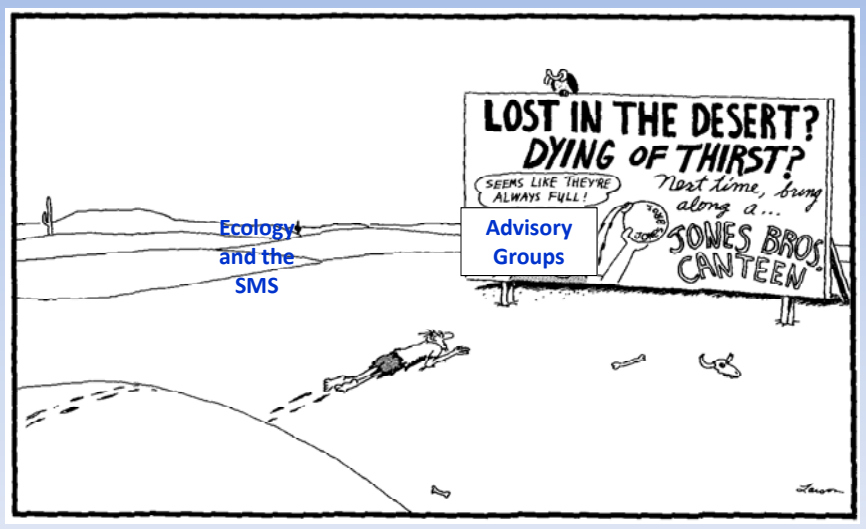
2010 Advisory groups discuss MTCA and SMS issues
- **Sediment human health**
- **Sediment background**
- **Sediment freshwater standards**
- **MTCA/SMS harmonization**
- Vapor intrusion
- Remedy selection
- Institutional controls
- Periodic reviews
- Toxicity
- MTCA method A
- Early life exposure
- Groundwater to surface water
- Lead cleanup levels
- Fish consumption rates

2011 Non-essential rulemaking halted

SMS rule revisions continue
- Added fish consumption rates
- Drafting rule language
- Resolving legal questions (ongoing)
- Dialogs with tribes
- Resume advisory group
- Deciding the flavor of advisory group.

5.3

Advisory Groups: Taken Ecology from wandering in the policy/technical desert to workable solutions



4

5.4

SMS Rule Revisions: Issues We Are Tackling

Bioaccumulatives: Human Health Risk

- SMS limited to a narrative standard: "No significant… risk".
- But no specifics: Default fish consumption rate, risk level, equations, assessment process.

Bioaccumulatives: Ecological Risk

Background: How to incorporate background concentrations when determining cleanup standards

- SMS only acknowledges "non anthropogenic background".
- MTCA: Both natural and area background are defined.

Freshwater Sediment Standards:

- SMS limited to a brief narrative standard.
- No numeric chemical or biological criteria for benthic toxicity.

5.5

SMS Rule Revisions: Proposed Path Forward

Freshwater Standards:

- Promulgate both chemical and biological criteria.
- Maintain current SMS framework.

Human Health Risk and Background: Two level SMS framework:

- Lower Bound MTCA framework (highest of PQL, Natural background, 10^{-6} risk).
- Upper Bound ***new framework*** (highest of PQL, "Regional" background, 10^{-5} risk).
- Equations and exposure parameters includes fish consumption.
- Developing guidance on cleanup process – risk management approach.

Bioaccumulatives - Ecological Risk:

- Developing a narrative standard.

5.6

SMS Rule Revisions: Freshwater Standards

- Establishing numeric criteria for protection of benthic community:
  - Chemical
  - Biological (bioassays)
  - SMS two level framework:
    - No adverse effects – Sediment Quality Standard
    - Minor adverse effects – Cleanup Screening Level
  - Same as marine standards – protect benthic community
- RSET: Cooperative approach for cleanup and dredging
- Sediment Quality Values report drafted
- Conducted scientific peer review: Building consensus
  - Sediment Workgroup – SMS rule advisory group
  - External experts
  - MTCA/SMS Science Panel

7

5.7

Human Health and Background Proposed Framework - More Detail

1. **Criteria two level framework.** Retain the current SMS two tier framework – cleanup standards set within a range between an upper and lower bound.
2. **Consideration of cost.** Retain SMS methodology to use net environment benefit, technical effectiveness, and cost to determine cleanup standards and remedy selection.
3. **Liability Resolution/Site Units.**
   - Allow settlements (contribution protection, covenant not to sue) for discrete site units within a larger site.
   - Allow for a process to settle liability for the larger site.
4. **Recontamination.** Allow Ecology options for releasing PLP liability for recontamination of a Site Unit if ongoing release is:
   - Not from the PLP or
   - Not under the authority of the PLP

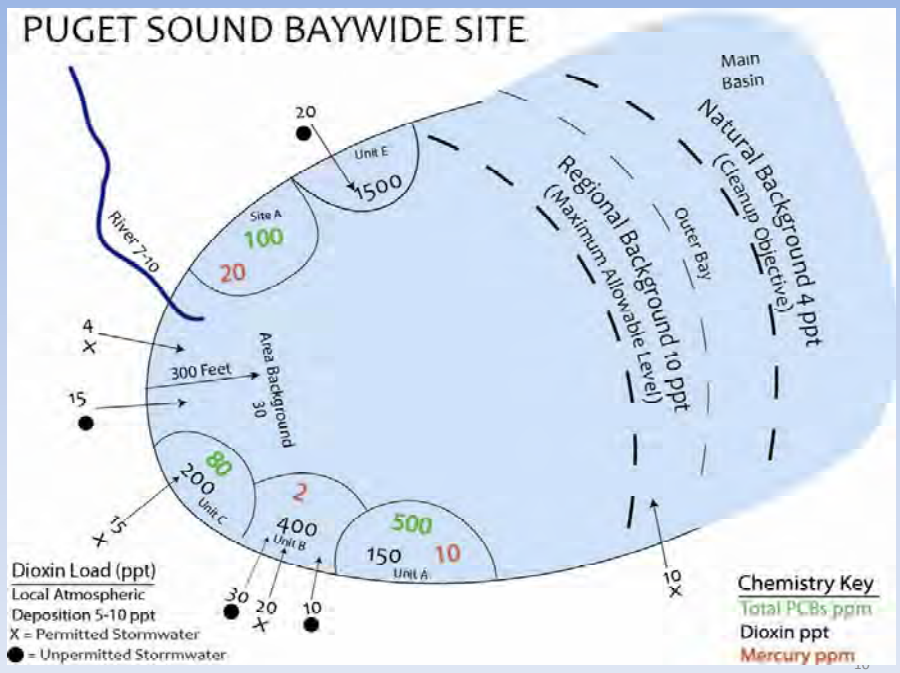
8

5.8

Specific issues we're grappling with

- Terminology: Harmonizing MTCA and SMS terminology such as remediation levels and cleanup standards.
- Default fish consumption rates – rule, guidance, timing.
- What criteria to use to determine how to settle liability for larger site (baywide or watershed wide contamination).
- Determining if a PLPs contaminant contribution to the larger site is "minimal".
- How to achieve the cleanup objective (lower bound) for the larger site given the real issue of stormwater contamination.
- Whether and how to use the Cleanup Settlement account for these types of baywide or watershed wide settlements.

5.9

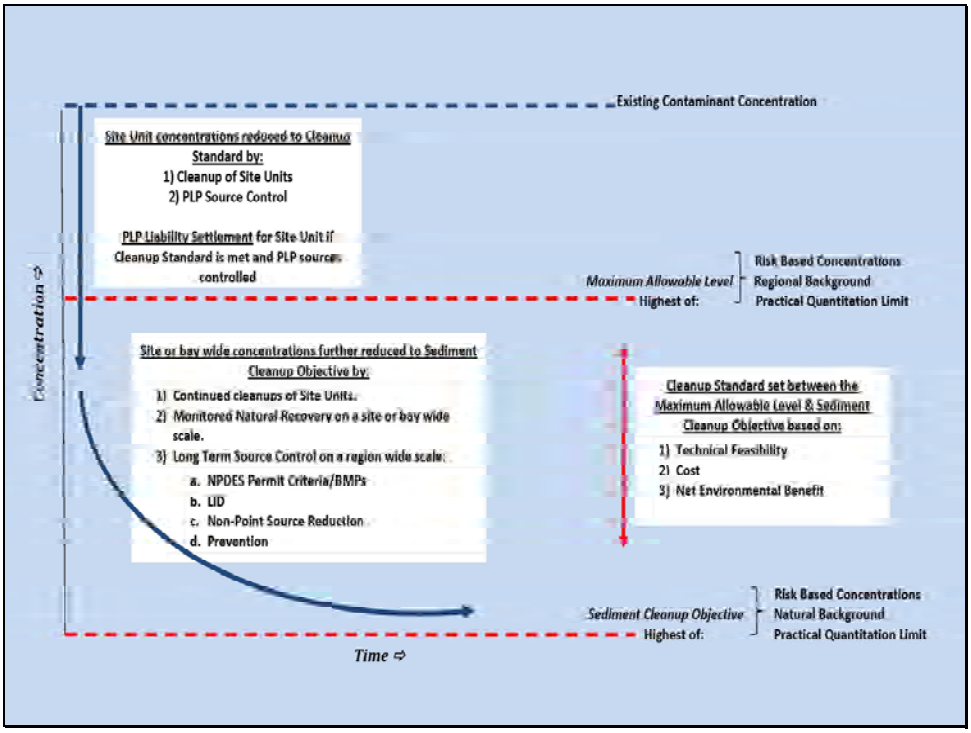


5.10

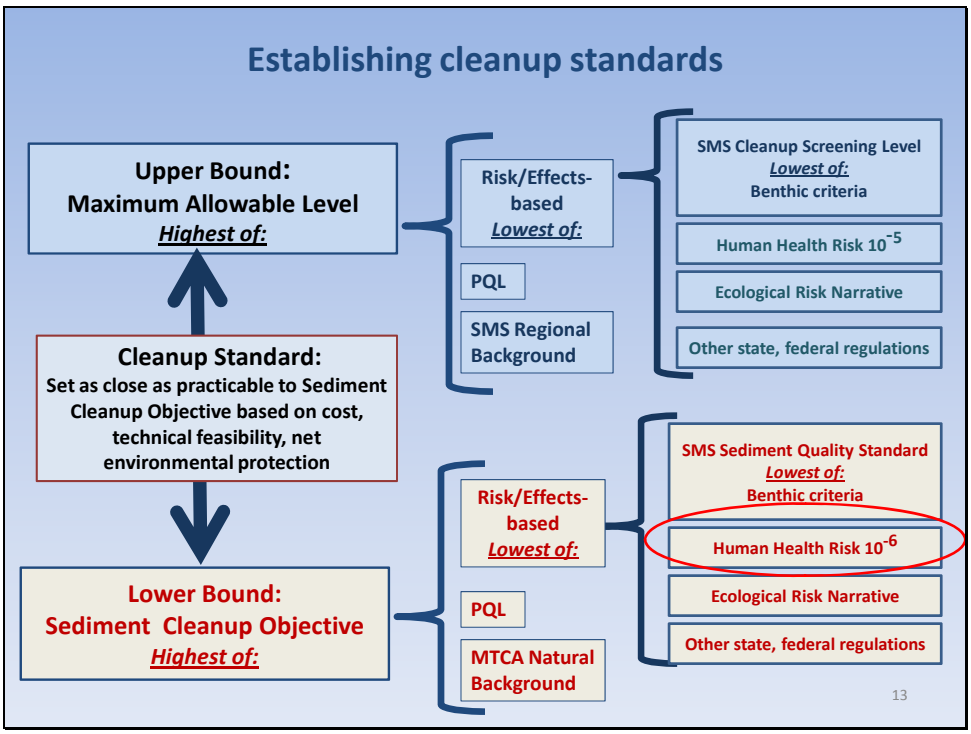

I have no idea what you're talking about...
...so here's a bunny with a pancake on its head.

11

5.11


Existing Contaminant Concentration
Site Unit concentrations reduced to Cleanup Standard by:
1) Cleanup of Site Units
2) PLP Source Control
PLP Liability Settlement for Site Unit if Cleanup Standard is met and PLP source controlled
Maximum Allowable Level
Highest of:
Risk Based Concentrations
Regional Background
Practical Quantitation Limit
Site or bay wide concentrations further reduced to Sediment Cleanup Objective by:
1) Continued cleanups of Site Units.
2) Monitored Natural Recovery on a site or bay wide scale.
3) Long Term Source Control on a region wide scale:
a. NPDES Permit Criteria/BMPs
b. LID
c. Non-Point Source Reduction
d. Prevention
Cleanup Standard set between the Maximum Allowable Level & Sediment Cleanup Objective based on:
1) Technical Feasibility
2) Cost
3) Net Environmental Benefit
Sediment Cleanup Objective
Highest of:
Risk Based Concentrations
Natural Background
Practical Quantitation Limit
Concentration ⇨
Time ⇨

5.12



5.13

Specific Human Health Revisions to SMS

- GOAL: Establish a simple risk management process to develop cleanup levels and standards ~ consistent with MTCA.
- Establish risk levels and background definition.
- Establish equations w/ sediment specific exposure parameters and pathways:
  - Concurrent Exposure Model: Ingestion and dermal exposure pathways
  - Fish Consumption Rates (still have decisions to make)
    - Default subsistence fish consumption rates (Rule or Guidance)
    - Criteria for site specific fish consumption rates (Rule or Guidance)
  - Adherence factors (Guidance)
  - Risk based concentrations (Guidance)
  - Diet fraction (Guidance)
  - Body Weight (Guidance)

14

5.14

Fish Consumption Rates
What We Know:

- The MTCA rule includes a default fish consumption rate of 54 grams/day.
- MTCA default rate does not reflect the amount of fish eaten in WA state by high fish consumers.
- Water Pollution Control Act/National Toxics Rule requirements are based on a fish consumption rate of 6.5 grams/day.
- Oregon DEQ has proposed a fish consumption rate of 175 grams/day to establish human health water quality criteria.
- Subsistence fishers (tribes, Asian Pacific Islanders, others) eat more, or would like to eat more, than current WA regulatory levels.

15

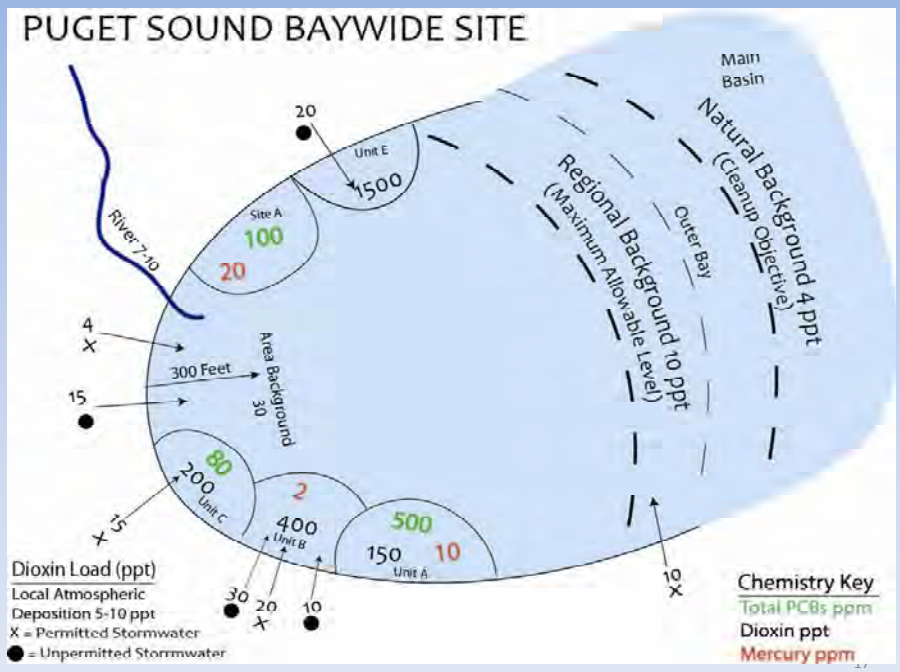
5.15

Fish Consumption Rates
We Still Have Decisions To Make – But Considering:

- Establishing default subsistence fish consumption rate (Rule).
- Establishing criteria for site specific fish consumption rates (Rule).
- Cross Program coordination – consistency on fish consumption rates.
- Applicability to SMS Cleanup versus Source Control requirements.
- Technical report in process – out for review Summer 2011.
- Timing for fish consumption rate rule promulgation has not been established.

16

5.16



5.17

Why would we settle liability for a Site Unit?

Cleanup of Site Units would result in:

- A **more expeditious cleanup** of the Baywide Site to cleanup goals over time by:
  - Reducing redistribution of Site Unit contamination to Baywide Site.
  - PLP source loading to Baywide Site reduced or eliminated.
- **Significant reduction of risk** to human health/environment:
  - Site Units can have significantly higher concentration than Baywide Site.
  - Site Units typically located in critical habitat nearshore areas.
  - Risk to fish, shellfish, and habitat is reduced.
  - Risk to human health is reduced from fish and shellfish consumption and dermal exposure.
- **Expedite habitat restoration** and reduce natural resource damage by getting cleanup done.

18

5.18

How would we settle liability for a Site Unit under the draft approach?

- **PLPs have two options:**
  1. Settle liability for the Site Unit only.
  2. Settle liability for both the Site Unit and the Baywide Site.
- Scope of the **covenant not to sue must be commensurate** with remedial actions.
- **Active cleanup measures** (i.e. dredging, capping) will be required for areas within the Site Unit with concentrations above regional background (with adjustments for natural recovery over 10 years).
- "Active" cleanup standard **must be below** the highest of regional background or 10^{-5} risk (that is, the upper bound).
- All settling **PLP sources** (stormwater, wastewater, upland contamination) must be **controlled t**o prevent recontamination above remediation levels.
- PLPs are **not liable for recontamination** caused by someone else.

19

5.19

How would we settle liability for a Baywide Site?

- In order for a PLP to settle their Baywide Site liability by contributing to the Cleanup Settlement Account they must:
  - Settle liability for the Site Unit.
  - Show their liability for the Baywide Site is insignificant or small relative to:
    - Baywide Site concentrations above the sediment cleanup objective.
    - Loading from past and existing non PLP sources.
- Scope of the covenant not to sue must be commensurate with remedial actions to reach Baywide Site sediment cleanup objective over the long term (decades).
- Settlement can include contribution in dollars to the Cleanup Settlement Account for further remedial actions:
  - **Long term natural recovery monitoring** of the Baywide Site.
  - **Further active cleanup** of discrete Baywide Site areas.
  - **Source control** to prevent loading to the Baywide Site.

20

5.20

How would Natural Background be established?

- Natural Background would be defined under 173-340-200 WAC.
- Natural Background would be established under 173-340-709 WAC.
- Currently "background" (regional or natural) data exists:
  - PSAMP: Ambient monitoring, Urban Waters Initiative monitoring
  - BOLD study
  - Ecology baywide sediment characterizations
- Ecology recognized there are data gaps and discussing how to fill them.

21

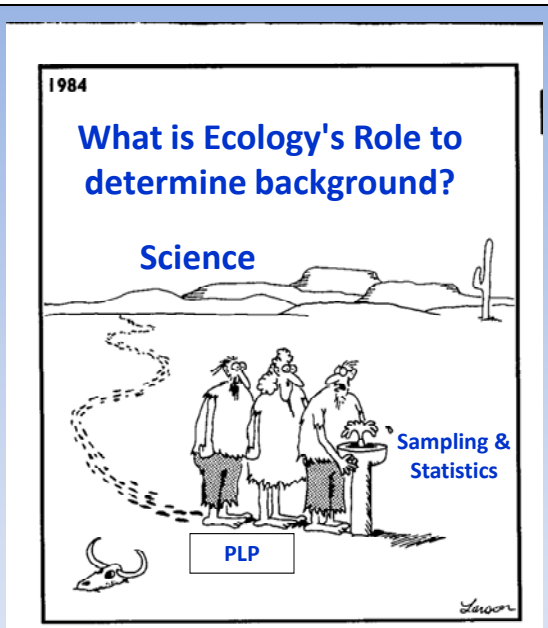
5.21

Regional Background Draft Definition
Still a Work in Progress

- ***Within a department defined geographic area, concentrations of any hazardous substances or toxic, radioactive, biological or deleterious substances in sediment, not attributable to significant identifiable sources or releases.***
- ***Regional background is intended to include low level, ubiquitous concentrations and are generally expected to be greater than or equal to natural background and less than area background as defined in WAC 173-340-200.***
- ***Calculation of regional background must exclude areas under the direct influence of known or suspected contaminant sources including, but not limited to, areas within a cleanup site.***
- ***Examples of a geographic area to determine regional background could include, but are not limited to, an embayment or watershed outside the direct influence of a significant source.***
- ***If a waterbody is not beyond the direct influence of a significant source, alternative geographic approaches to determine regional background may be used upon approval by the department.***

22

5.22



5.23

Timeline and Next Steps

2009	2010	2011	2012
MTCA & SMS rules			
	SMS rule only	File new CR-101	Revise draft rule language based on input
		Advisory group Summer/Fall	
		Input from tribes	Propose new rule target spring 2012
		Freshwater Sediment Standards report	Public comment period
		Fish Consumption Rate report	Adopt new rule target fall 2012
		Regulatory analyses (economic, EIS)	
		Informal review of draft rule language	

5.24

Information About SMS Rule Revisions

- **SMS Rule Revisions Website and ListServ:**
  http://www.ecy.wa.gov/programs/tcp/regs/2009MTCA/mtcaAmend.html

- **Fish Consumption Rates/Information on MTCA:**
  - Martha Hankins
    - E-mail: Martha.Hankins@ecy.wa.gov; (360) 407-6864

- **SMS Rule Revisions Technical Questions/Comments:**
  - Chance Asher
    - email: Chance.Asher@ecy.wa.gov; (360) 407-6914

- **Detailed Technical Questions on Freshwater Standards:**
  - Russ McMillan
    - E-mail: Russ.McMillan@ecy.wa.gov; (360) 407-7536

25

Regional Sediment Reference Material (SRM)

6.1

What is a Regional SRM?

- Regional Reference Material from local waters targeting regionally important COCs -- dioxins & PCBs
- Goals:
  - 10 year supply
  - Full statistical analysis including validation
  - Ongoing, current data management
- Bridge between PCB Aroclor and Congener analysis
- Independent, stand alone material, not directly linked to a specific location

6.2

Why an SRM?

- In response to 2009 SMARM public input and observed analysis issues
- DMMP guidelines require:
  - Low reporting limits
  - Unique mixture of regional contaminants
- QA/QC challenges best addressed by
  - Known reference material concurrently analyzed with environmental samples

6.3

Why is DMMP doing this?

- DMMP providing tool
  - Working with EPA OEA via the QATS contractor (Shaw, Las Vegas) to produce the SRM
  - Difficulty in finding dioxin and Aroclor reference materials at levels close to screening levels
  - Funded via 2010 EPA Puget Sound appropriation

6.4

Process

- Targeted COCs, concentrations and volumes
  - Dioxin 4-10 ng/kg TEQ dry weight; Aroclors 70-130 ug/kg dry weight
- Identified target areas best suited
  - Budd Inlet, Olympia - dioxin/furans
  - Duwamish River, T-117, Seattle - PCBs
  - Carr Inlet (Raft Island) – clean dilution
- Developed QAPP/SAP


6.5

Field Sampling

- Double Van Veen sampling was conducted Sept. 23rd , 24th , and 27th , 2010 on R/V Skookum
- Material was sieved to 10mm into 5-gal HDPE buckets – 27 buckets total
- Overnight shipped to QATS lab, Las Vegas


6.6

SRM Processing

- Target location sediments were air dried, sieved using 60 mesh sieve (<250 um) per ASTM E-11, and homogenized separately
- Initial range finding chemical analyses (Aroclors and Dioxins/Furans, Grain Size, TOC) were conducted
- Our intention was to combine and homogenize the samples to create 100 kg of final SRM
- T-117 selected

6.7

Current Status

- Material is in round robin process at CLP labs, with results due in July
- EPA OEA and QATS lab will perform data validation on all results
- QATS will store and maintain SRM, incl. stability testing and database to track reported results over time

6.8

Still to be resolved….

- Sample "gate-keeping" and procedures for use
- Specifics of the database format

6.9

T-117 typical sample (09/23/2010)

6.10

Field sieving T-117 (09/23/2010)

6.11

T-117 full bucket

6.12

Carr Inlet – weighing bucket (09/27/2010)

6.13

T-117 air drying (9/30/2010)

6.14

T-117 sample retained on 20 mesh sieve (>850 um) 10/19/2010

6.15

T-117 dry V-blender process (10/19/2010)

6.16

T-117 bulk with 60 mesh sieve (<250 um)

6.17

Bottles with EPA QA program labels

6.18

Thank you!

- SRM work group – David Kendall, David Fox, Laura Inouye, Erika Hoffman, John Hicks, Ginna Grepo-Grove, Maja Tritt, Jennifer Crawford, Tom Gries
- EPA Puget Sound group
- Ecology Environmental Assessment Program -- R/V Skookum, Randy Coots, Keri Heikkila
- Port of Seattle – T-117
- Windward Environ. -- Joanna Florer
- Shaw Environmental / QATS – Keith Strout


Implementation of New Interim Dioxin Guidelines

David Fox (USACE)
Erika Hoffman (EPA)

7.1

Process Recap

- April 2010: Revised interim dioxin guidelines (IDGs) released for 60-day public review; extended for 12 days
- July – September 2010: Agency deliberation on input received; additional revisions made
- September 15, 2010: Agency directors approve new IDGs
- December 6, 2010: New IDGs implemented

7.2

New Interim Guidelines

- Site Management Objective = 4 pptr TEQ for both dispersive and non-dispersive sites
- Screening levels
  - 4 pptr TEQ for disposal at dispersive sites
  - 4/10 pptr TEQ for non-dispersive sites
- Expanded reason-to-believe considerations
- Flexibility for non-dispersive disposal using case-by-case and small-business considerations

7.3

Changes Made Since the April 2010 Proposal

1. Increased testing for projects using dispersive sites to address tribal concerns
2. Elimination of automatic triggering of bioaccumulation testing for dredged material exceeding 10 pptr for non-dispersive disposal

7.4

Dioxin Testing since 2010 SMARM

- Suitability determinations completed before December 6, 2010 used former IDGs
- Only two projects with dioxin data for review since implementation of new IDGs

7.5

Dioxin Testing since 2010 SMARM

- Projects evaluated under former IDGs:
  - South Park Bridge - Seattle
  - Nippon Paper – Port Angeles
  - Bellingham Cold Storage
  - Port of Bellingham Squalicum Gate 3
- Projects since implementation of new IDGs:
  - Port of Everett Marina
  - Port of Tacoma – Blair Waterway Berths 3 and 4

7.6

South Park Bridge

(evaluated under former IDGs)

- 2 DMMUs tested for dioxin
- 0.7 and 1.6 pptr TEQ
- Met the former IDGs for Elliott Bay
- Would have met the new IDGs for Elliott Bay

7.7

Nippon Paper Outfall

(evaluated under former IDGs)

- 2 core samples tested for dioxin
- 0.04 and 0.09 pptr TEQ
- Met the former IDGs for Port Angeles
- Would have met the new IDGs for Port Angeles

7.8

Bellingham Cold Storage

(evaluated under former IDGs)

- 2 DMMUs tested for dioxin
- 1.7 and 10.6 pptr TEQ (VWA = 6.3 pptr)
- Met the former IDGs for Elliott Bay (max = 12.2 pptr; VWA = 8.7 pptr)
- Under the new IDGs, 1 DMMU would have been suitable for dispersive or non-dispersive disposal; the other DMMU would have failed.

7.9

POB Gate 3

(evaluated under former IDGs)

- 4 composited DMMUs tested in Round 1
  - Range = 6.2 to 47.1 pptr
- Individual core samples from 2 DMMUs with lowest dioxin concentrations (6.2 and 10.6 pptr) tested in Round 2
  - Range of individual cores = 7.3 to 23.6 pptr
- 3 individual core samples met the former IDGs for Elliott Bay
  - Range = 7.3 to 10.8 pptr
  - VWA = 8.6
- Under the new IDGs, none of the material would have been eligible for open-water disposal
- Port of Bellingham has elected to dispose all of the material upland

7.10

Port of Everett Marina

(evaluated under new IDGs)

- 8 DMMUs tested for dioxin
- Range = 3.9 to 19.4 pptr
- 1 DMMU met the new IDGs and will be dredged separately and disposed at the Port Gardner site
- Options being considered for case-by-case review of remaining DMMUs:
  - Advanced maintenance dredging
  - Additional dioxin testing

7.11

Port of Tacoma
Blair Waterway – Berths 3 & 4

(evaluated under new IDGs)

- 4 composited DMMUs tested in Round 1
  - Range = 2.7 to 11.1 pptr; project VWA = 6.8 pptr
- Individual cores from 3 DMMUs with highest dioxin concentration (4.2, 6.2 and 11.1 pptr) tested in Round 2
  - Range = 1.2 to 8.2 pptr; project VWA = 5.0 pptr
- Options being considered for case-by-case review:
  - Sequencing of material from Berths 3 & 4, followed by dioxin monitoring at the Commencement Bay site
  - Sequencing with another project to bring VWA below 4 pptr
  - Mix of upland and in-water disposal

7.12

How would Everett Marina and Berths 3 & 4 have fared under the former IDGs?

- Port of Everett Marina
  - Former IDGs for Port Gardner site:
    - Upper limit = 5.2 pptr
    - VWA = 4.1 pptr
  - 1 DMMU would have passed; all others would have failed
  - Same outcome as under new IDGs, but with no flexibility for case-by-case decision-making
- Port of Tacoma – Blair Berths 3 & 4
  - 33,300 cubic yards would have failed and 8,800 cy would have passed under old IDGs
  - Same outcome as under new guidelines, but with no flexibility for case-by-case decision-making

7.13

Projects in Commencement Bay Tested under Former IDGs

- Former IDGs for Commencement Bay were much more restrictive than the new IDGs:
  - Upper limit = 5.2 pptr
  - VWA = 2.4 pptr
- Projects evaluated under the former IDGs that would fare better under the new IDGs:
  - Puyallup Tribal Terminal – Blair Waterway
  - Port of Tacoma Blair-Hylebos Redevelopment

7.14

Guideline Comparison

Project	Failed Volume (CY) Old IGLs	New IGLs
South Park Bridge	0	0
Nippon Paper	0	0
Bellingham Cold Storage	0	3,470
POB Gate 3	44,684	49,884
Everett Marina	102,700	102,700*
POT Berths 3 & 4	33,300	33,300*
Puyallup Tribal Terminal	83,045	0
POT Blair-Hylebos	38,828	0

*Case-by-case review may reduce the failed volume under the new interim guidelines

7.15

Testing Summary

- Minor increases in failed material for Bellingham projects
- Much less restrictive guidelines for projects in the Tacoma area (and Everett to a lesser extent)
- Case-by-case determinations will likely reduce the volume of failed material compared to the former IDGs
- Case-by-case review is a developing science

7.16

Future Work

- Protocols for bioaccumulation testing
- Evaluation guidelines for site-monitoring data
- Guidelines for PCBs and other bioaccumulatives

7.17

Questions?

7.18

Refinements of Biological Test Methods

Jack Q Word

WDNR
WDOE
USACE-Seatlle District
EPA Region 10

NEWFIELDS

8.1

Modifications

- ***Neanthes* Growth Test**
  - **Role of gut contents in growth calculation**
  - **Dry weight versus ash-free dry weight**
- **Larval Test**
  - **Entrapment in flocculent layer of fine sediments**
  - **Resuspension method modifications**

NEWFIELDS

8.2

Status

- Presented preliminary results at SMARM 2010
- Met with DMMT to consider incorporation into DMMP methods
- Review all data in hand

NEWFIELDS

8.3

Neanthes Growth Test

- **Reference failures particularly with fine sediments**
- **Varying amounts of sediment appearing in worms**
- **Coarse sand used as control substrate**
- **Other biomass-based tests use AFDW**
  - ***Hyalella* chronic**
  - ***Chironomus* chronic**

NEWFIELDS

8.4

Observations

- A remarkably high percentage of the worm biomass is sediment, up to 46%
- Sediment content is variable within a treatment and across treatments
- Generally speaking the higher proportions of sediment occurs in sandy sediment.
- More important are the relative differences within a test – particularly between the references and controls and the test treatments and specific references
  - 5 fine grained references that failed with DW passed reference performance using AFDW

NEWFIELDS

8.5

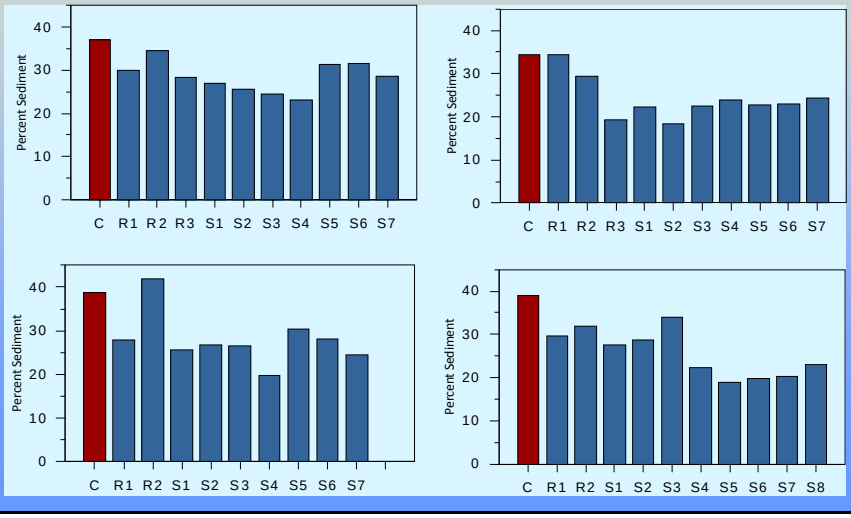
Neanthes Growth Test

Percentage of weight that is sediment:

Controls: 34% (21% to 46%)

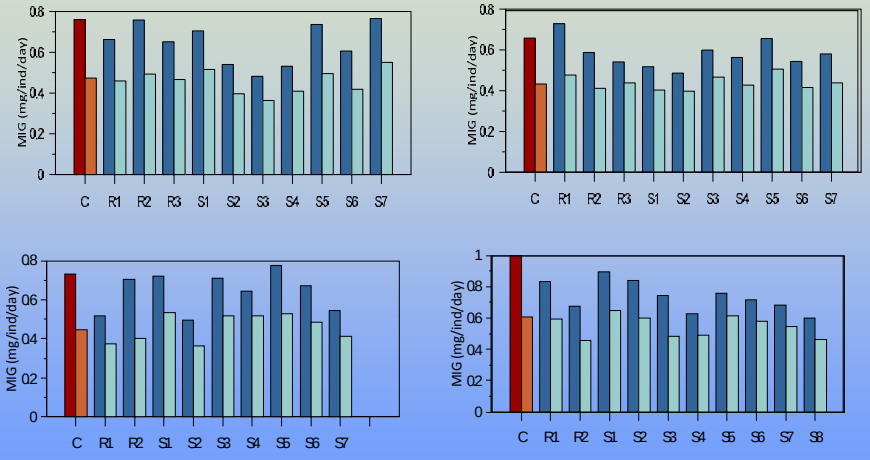
References: 28% (19% - 34%)

Treatments: 26% (17% to 40%)



8.6

Neanthes Growth Test

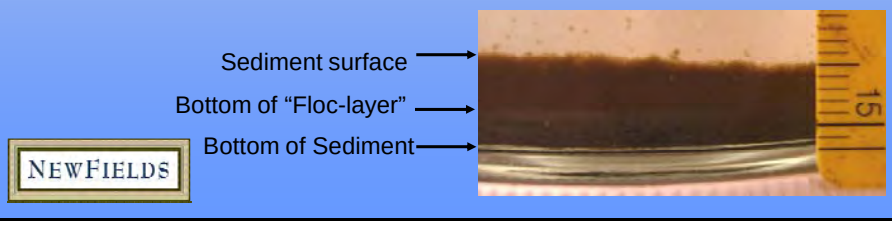


NEWFIELDS

8.7

Larval Test

- **Indiscriminate failures in sediment with flocculent layers**
  - **High proportion of finest fines**
  - **Certain types of woody debris**
- **Low recoveries of larvae**
- **All larvae normal "D-shaped" larvae**
- **Not predictive based on percent fines**



NEWFIELDS

8.8

Larval Test

- **Tested three manipulations:**
  - **Standard PSEP larval test**
  - **Resuspension**
    - **Follow standard termination methods of decanting overlying water, homogenizing, and subsampling**
    - **Return water to test jar with sediment**
    - **Sediment and overlying water are remixed with perforated plunger (15 seconds)**
    - **Allow to settle for 8 to 12 hours**
    - **Decant and resample**

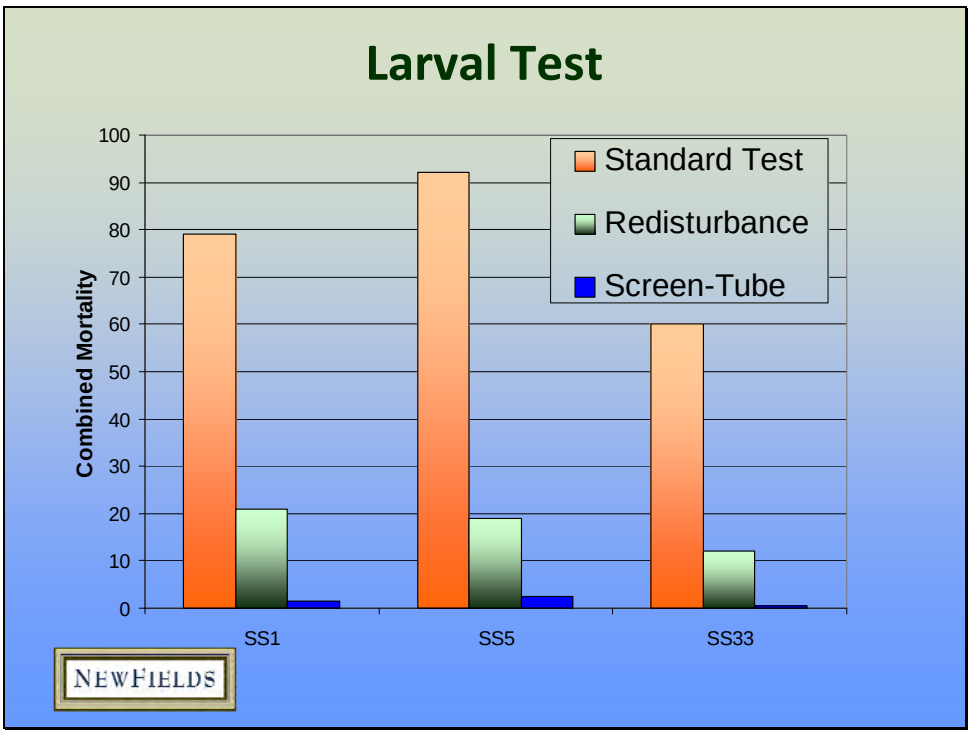
NEWFIELDS

8.9

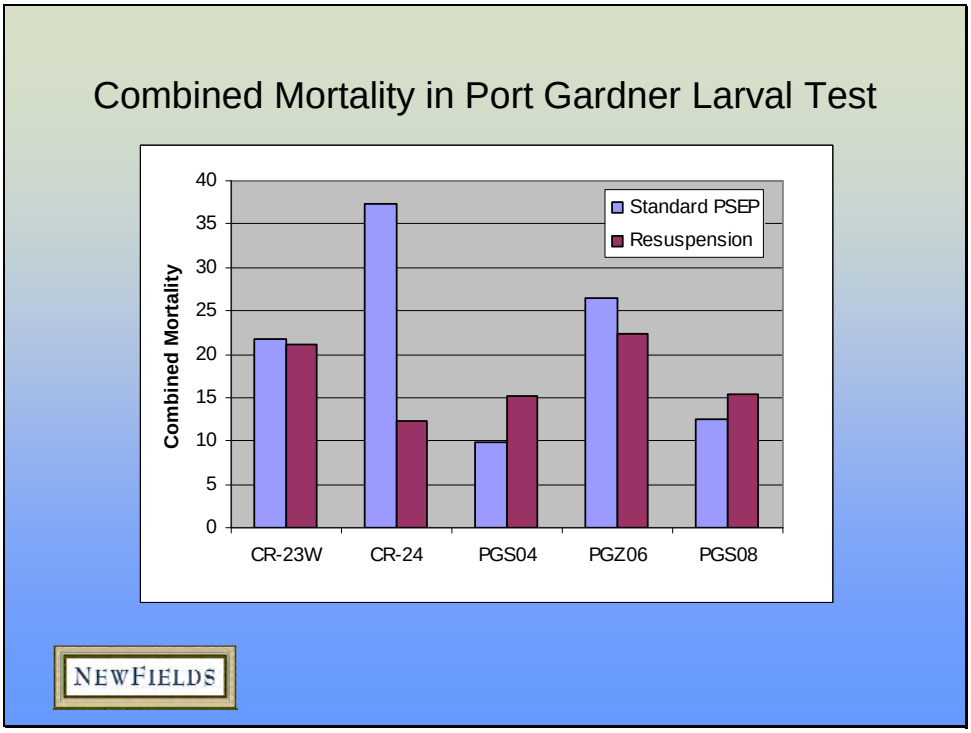
Treatments	Percent Fines	Number Normal	Combined Mortality
Control	--	271	2.5
SS-1 Standard	83.2	58	50.8
SS-5 Standard	95.1	21	61.2
SS-33 Standard	70.7	110	48.7
SS-1 Redisturbance	83.2	214	20.9
SS-5 Redisturbance	95.1	220	18.8
SS-33 Redisturbance	70.7	240	11.5
Screen Tube Control	--	214	7.1
SS-1 Screen Tube	83.2	224	1.5
SS-5 Screen Tube	95.1	235	2.5
SS-33 Screen Tube	70.7	238	0.4

NEWFIELDS

8.10


Larval Test
Combined Mortality
100
90
80
70
60
50
40
30
20
10
0
Standard Test
Redisturbance
Screen-Tube
SS1
SS5
SS33
NEWFIELDS

8.11


Combined Mortality in Port Gardner Larval Test
Combined Mortality
40
35
30
25
20
15
10
5
0
Standard PSEP
Resuspension
CR-23W
CR-24
PGS04
PGZ06
PGS08
NEWFIELDS

8.12

Path Forward

- Continue to collect both AFDW and resuspension data
- Additional 17 sediment treatments from the Duwamish this month
- Consider incorporation of both method revisions next year

NEWFIELDS

PSDDA Dispersive Site - Fate and Transport Analysis
Rosario Strait, Port Townsend, and Port Angeles

Dave Michalsen, PE, Coastal Engineer
Scott Brown, Coastal Engineer

U.S. Army Corps of Engineers, Seattle District

Sediment Management Annual Review Meeting
4 May 2011

US Army Corps of Engineers
BUILDING STRONG.

9.1

Purpose and Scope

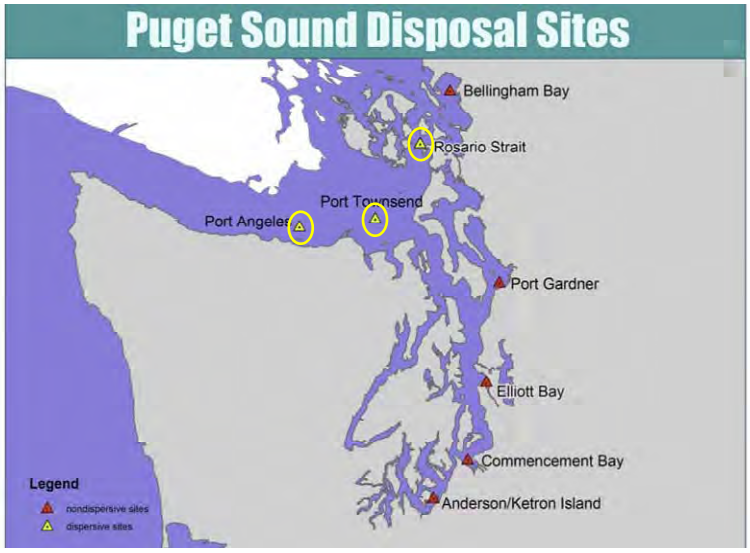
- What is the influence of dispersive PSDDA sites at nearby shellfish harvesting areas?
  - What is the possibility for transport to critical habitat areas?
- First investigate the tidal hydraulics
- Validate model with field data
- Investigate at sediment FATE and transport pathways
  - F&T Model results presented here are PRELIMINARY

9.2

Outline

- Background on Dispersive PSDDA Sites
- Numerical model analysis results
  - Hydrodynamics (Coastal Model System - FLOW)
  - FATE and Transport (Particle Tracking Model)
- Plans for field data collection (late 2011)
  - ADCP Current profile transects for model calibration / validation

9.3



9.4

Background Data

Dispersive PSDDA Site	Depth (feet)	Dimensions	Cumulative Volume 1989-2009 (CY)
Port Angeles	435	7000' x 7000' circular	22,344
Port Townsend	361	7000' x 7000' circular	47,610
Rosario Strait	97-142	6000' x 6000' circular	1,932,758

9.5

Port Townsend Site Source Materials

SURVEY_ID	Survey Name
KEYS11AF028	USACE Keystone Ferry Terminal, DY91
TOWN81AF129	USACE Port Townsend Marina, DY99
PHMPT1AF216	Port Townsend Point Hudson Marina, DY06
DKC051AP219	Driftwood Key Community Club, DY05
DKC061AP220	Driftwood Key Community Club, DY06
PTMAR1AF260	USACE Port Townsend Marina Navigation Channel & Coast Guard, DY09

9.6

Rosario Strait Site Source Materials

SURVEY_ID	Survey Name
SWINC1AF002	USACE Swinomish Channel, DY89
BPOIL1AF024	BP OIL FERNDALE REFINERY DEEPENING - FC, DY91
ANCHO1BF029	Anchor Cove Marina, DY91
BELL11BF030	USACE Bellingham O&M, DY92
SHELL1AF055	Shell Oil Pier, Anacortes, DY93
LACMA1AF064	LaConner Marina, DY93
SWINR1AF104	USACE Swinomish Channel, DY95
SQUAL1BF103	USACE Squalicum Waterway Sediment Characterization, DY95
BLAIN1AF016	Bellingham, Port of, Blaine Marina, DY90
SQUAL1AF150	USACE Bellingham O&M, Squalicum Waterway, DY01
LACON1AF164	La Conner Marina, DY01
SWINR1AF175	USACE Swinomish Channel O&M, DY03
ANAC31CF169	Anacortes, Port of, Cap Sante Marina, DY01
ANCVM1AF197	Anchor Cove Marina Maintenance Dredging, DY04
ANAC11AF153	Dakota Creek Shipyard, Anacortes, DY 2001

9.7

Areas of interest

- Lower Elwha Klallam Tribe (LEKT) has identified shellfish harvesting areas of interest
  - Freshwater Bay (near Port Angeles)
  - Dungeness / Sequim Bay (near Port Townsend)
  - Protection Island (near Port Townsend)

9.8

Coastal Modeling System - FLOW

- 2D depth averaged tidal circulation model
- Forced by water surface elevation time series generated by tidal constituents at two offshore boundaries
  - Neah Bay
  - Cherry Point
- Telescoping grid for high resolution
- Implicit numerical solver allows longer time steps for longer model simulations

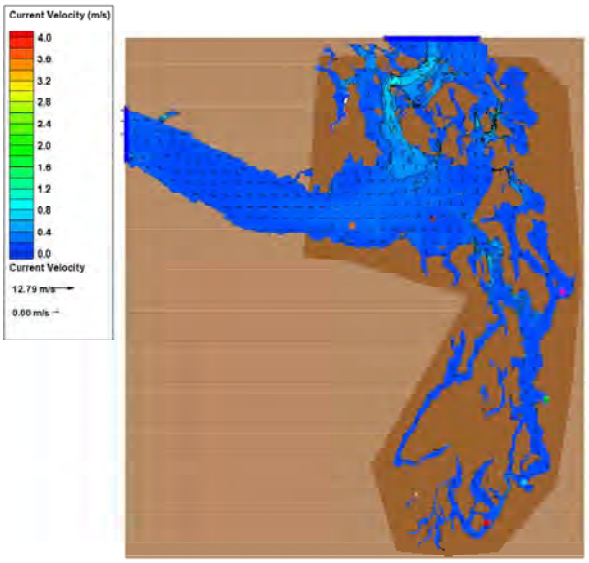
9.9

Numerical Modeling

- Hydrodynamics
  - Coastal Modeling System – FLOW
    - *Developed by USACE ERDC Coastal Hydraulic Laboratory – Coastal Inlets Research Program (CIRP)*
- Sediment FATE & Transport
  - Particle Tracking Model (PTM)
    - Developed jointly *by USACE ERDC Coastal Hydraulic Laboratory* CIRP and Dredging Operations Environmental Research Program (DOER)

9.10

CMS Model Domain



Simulation

Spring tide event
Time step = 30 min
Duration = 120 hours

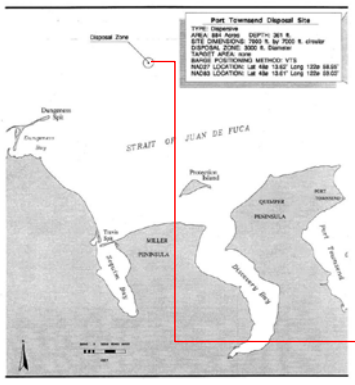
1. Colors represent current velocity magnitude (meters/ second)

2. Vectors represent current direction

Full size movie

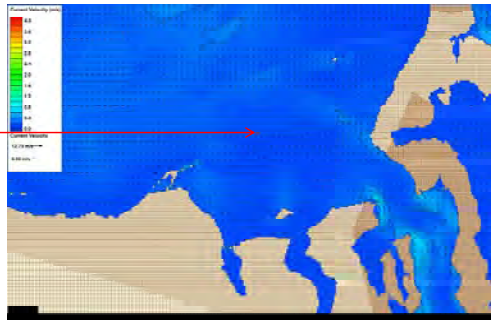
9.11

Port Townsend Dispersive Site



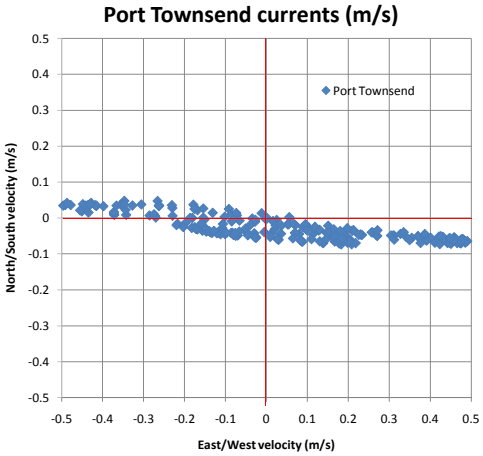
Full size movie

Simulated Currents during a Spring Tide (Dec 2009)



9.12

Tidal ellipse



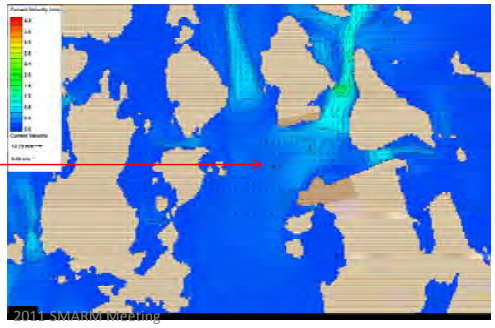
Primary direction at site is east/west with max current magnitude ~ 0.5 m/s

9.13

Rosario Strait Dispersive Site

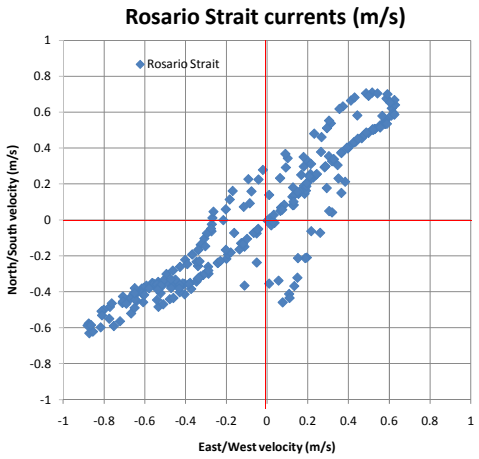
Full size movie

Simulated Currents during a Spring Tide (Dec 2009)



9.14

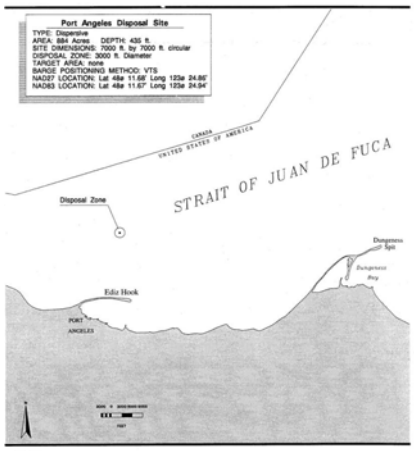
Tidal ellipse

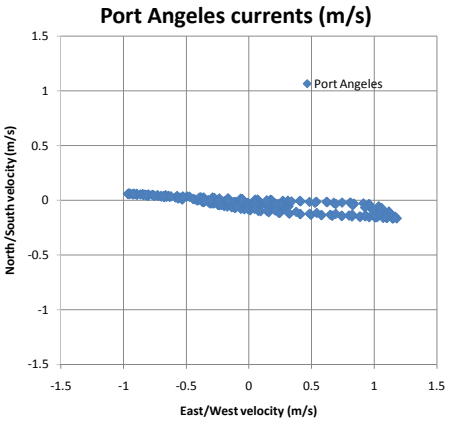


Primary direction at site is northeast/southwest with max current magnitude ~ 1.1 m/s

9.15

Port Angeles Dispersive Site





Primary direction at site is east/west with max current magnitude ~ 1.1 m/s

9.16

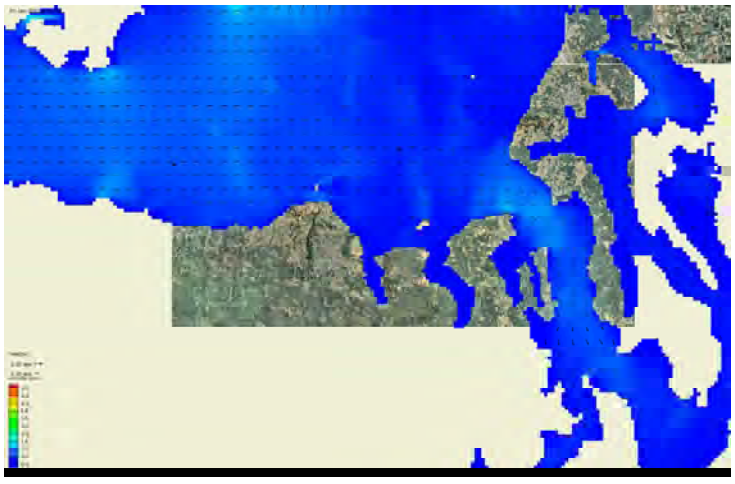
Coastal Modeling System - PTM

- Lagrangian particle tracker (i.e. tracks individual particles through space)
- Simulates process of advection, diffusion, settling, deposition, and re-suspension

- Sediment source release is defined by mass per unit time (kg/s)
- Sediment grain size specified (d35, d50, d90)

9.17

PTM Simulation for PT and PA Sites



PRELIMINARY RESULTS

Model assumptions
1. Sand (d50 = 0.2 mm)

2. Point source

3. Placement Rate = 0.05 kg/s

Full size movie

9.18

Planned Field Data Collection

- Acoustic Doppler Current Profiler (ADCP) roving transects (summer/Fall 2011)
  - Performance Work Statement being finalized
  - Validate hydrodynamic model results
  - Determine any areas where vertical stratification is apparent (i.e. affect of Elwha R. plume at Port Angeles Site)

- Re-Calibrate PTM model

Portland ARRA Dredge Prism Sampling Study

May 4, 2011
Laura Inouye, Ecology
James McMillan, USACE Portland District
Jeremy Buck, USFWS
Wendy Briner, USACE Portland District
Jonathan Freedman, EPA

Special thanks to other agency staff and AECOM who assisted in SAP review and field work!

10.1

Introduction: Why was this study conducted?

During the development of the RSET's SEF, question arose regarding how many samples were needed to adequately represent the dredge prism and Z-layer.

Some RSET agencies were concerned that the number of samples being collected prior to dredging was insufficient to obtain an accurate average concentration of a contaminant in the dredge prism.

The 20+ years of DMMP disposal site monitoring at deepwater marine sites were considered to be of limited use to alleviate concerns related to the specific needs of freshwater listed species in this area.

10.2

Incremental Sampling Theory

(A REALLY BRIEF OVERVIEW)

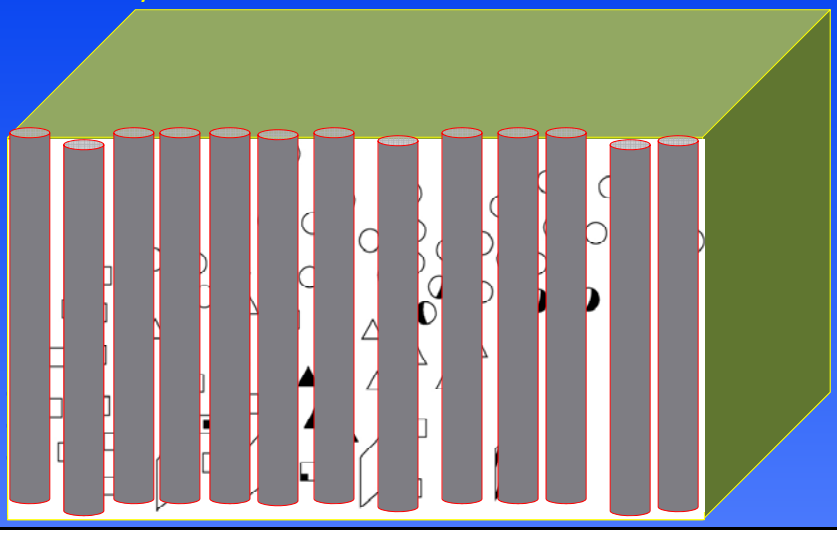
The best way to obtain a reasonable estimation of the average concentration of a chemical in a "block" of sediment is to collect many, equal-sized increments from many random locations and analyze a larger mass compared to conventional sampling...metals require larger mass (10 g) for extraction than currently typically extracted (1 g).

10.3

Incremental Sampling Theory

(A REALLY BRIEF OVERVIEW)

Chemicals are heterogeneously distributed in sediments, even in a well mixed system.



10.4

OBJECTIVES

Assuming a 30-core incremental sample (IS30) represents "true" conditions for the dredge unit, how many cores are needed to consistently come up with the correct evaluation for the dredge prism?

- Mathematical "compositing" of cores
- Comparison of dredge prism and "Z"-layer to FW screening values (2006 interim values)
- Anti-degradation evaluation

10.5

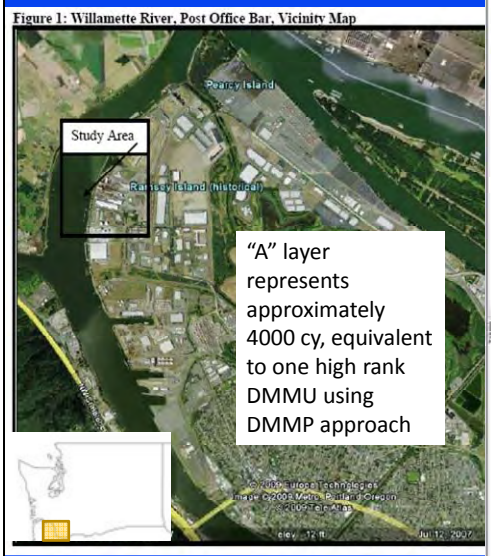
OBJECTIVES

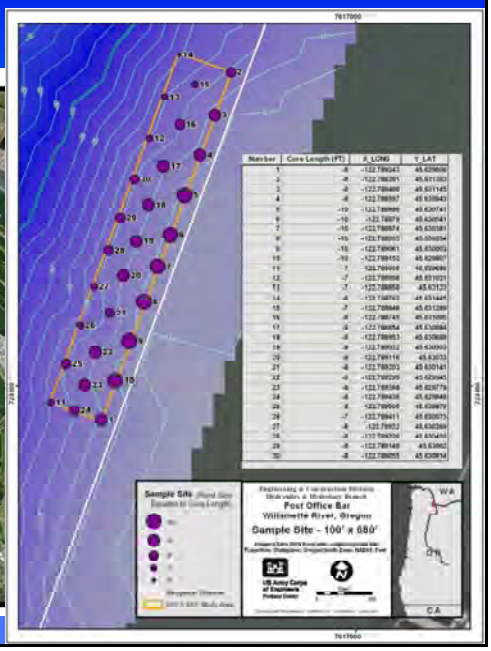
How many cores do you need in an incremental sampling event to characterize the sediments?

- Incremental samples from 10, 20, and 30 cores taken for comparison
- THIS PART OF THE STUDY IS NOT PRESENTED HERE (Data still being evaluated).

10.6

Sampling Design





10.7

Data Analysis

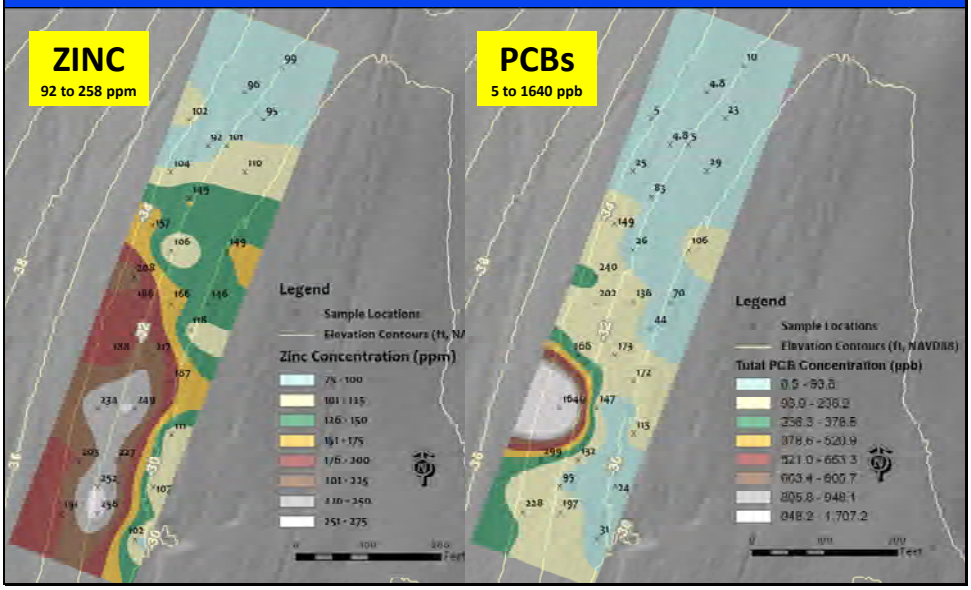
Although a wide array of CoCs were analyzed for in all samples, only DDX, PCBs, and Zinc had SL exceedences or were the cause of failed antidegradation, so only data for these compounds will be presented here.

"A" Layer	Zinc	total PCB	DDD	DDE	DDT
MIN	87	10	1.0	1.0	1.0
MAX	114	33	4.1	3.5	1.0
median	103	10	1.7	2.2	1.0
average	103	11	1.8	2.3	1.0

"Z" Layer	Zinc	total PCB	DDD	DDE	DDT
MIN	92	10	1.0	1.0	1.0
MAX	258	1640	13.0	18.0	87.0
median	149	101	4.2	4.7	1.0
average	157	157	5.0	5.7	6.0

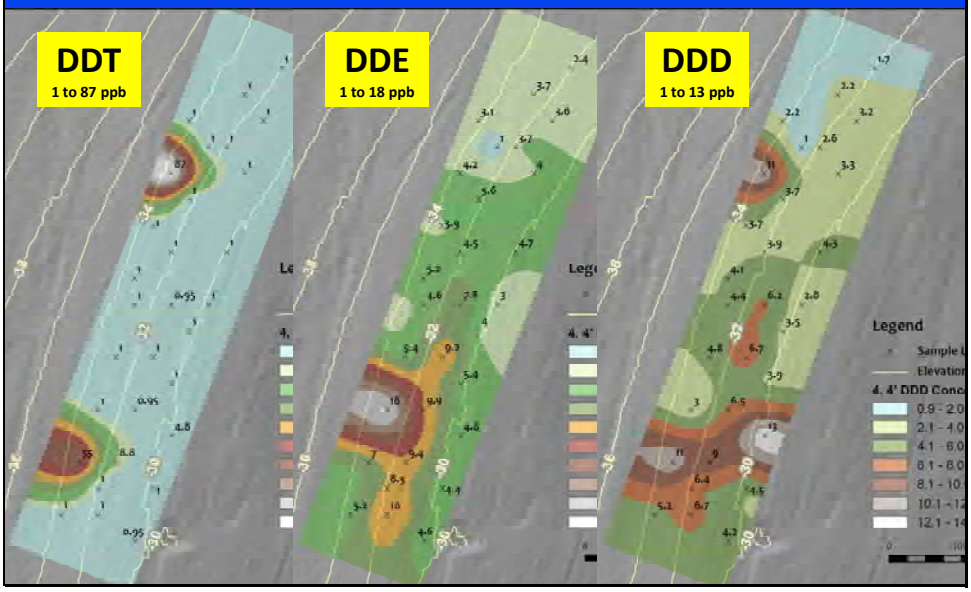
10.8

Distribution of the driving chemicals in the Post Office Bar Z-Layer



10.9

Distribution of the driving chemicals in the Post Office Bar Z-Layer



10.10

Comparisons: How many cores needed to represent the material?

- Only the decision drivers, DDX, PCBs, and Zn, were followed; decisions compared against the IS30 results.
- Mathematical "compositing" of individual cores into groups of 1, 2, 3, 5, and 6 ("A" and "Z" layers separately)
- Stratified random, no repeating use of cores
  - N=1, 30 values each for "A" and "Z"
  - N=2, 15 values each for "A" and "Z"
  - N=3, 10 values each for "A" and "Z"
  - N=5, 6 values each for "A" and "Z"
  - N=6, 5 values each for "A" and "Z"
- Stratified random, allow repeat use of cores
  - 10 values each for all core "composites"

10.11

Data summary

INCREMENTAL SAMPLE RESULTS

	2006 FW SL	Result Unit	IS30 A avg	IS30 A stdev	IS30 Z avg	IS30 Z stdev	Antidegradation
Zinc	130	mg/kg	94.7	2.5	**155.7**	7.6	**fail**
total PCBs	60	ug/kg	10.3	0.6	**137.0**	27.7	**fail**
4,4'-DDD	16	ug/kg	2.5	1.2	5.3	1.7	**fail**
4,4'-DDE	9	ug/kg	2.6	1.1	3.8	0.1	fail?
4,4'-DDT	12	ug/kg	2.7	1.0	5.9	7.0	fail?

"A" layer passes SLs
"Z" layer fails SLs
FAILS ANTIDEGRADATION

10.12

Data summary

INCREMENTAL SAMPLE RESULTS

	2006 FW SL	Result Unit	IS30 A avg	IS30 A stdev	IS30 Z avg	IS30 Z stdev	Antidegradation
Zinc	130	mg/kg	94.7	2.5	**155.7**	7.6	**fail**
total PCBs	60	ug/kg	10.3	0.6	**137.0**	27.7	**fail**
4,4'-DDD	16	ug/kg	2.5	1.2	5.3	1.7	**fail**
4,4'-DDE	9	ug/kg	2.6	1.1	3.8	0.1	fail?
4,4'-DDT	12	ug/kg	2.7	1.0	5.9	7.0	fail?

"A" layer passes SLs
"Z" layer fails SLs
FAILS ANTIDEGRADATION

SINGLE CORE representing material

Individual cores	2006 FW SL	Result Unit	cores A avg	cores A stdev	cores Z avg	cores Z stdev
Zinc	130	mg/kg	104	5	**157**	55
total PCBs	60	ug/kg	11.1	4.5	**157.0**	293.0
4,4'-DDD	16	ug/kg	1.8	0.7	5.0	2.9
4,4'-DDE	9	ug/kg	2.3	0.6	5.7	3.2
4,4'-DDT	12	ug/kg	1.0	0.0	6.0	18.2

30 individual cores
"A" layer passes for all cores (30/30)
"Z" layer failed in 63% of the cases (19/30)
Antidegradation failed in 97% of the cases (29/30)

10.13

Data summary

INCREMENTAL SAMPLE RESULTS

	2006 FW SL	Result Unit	IS30 A avg	IS30 A stdev	IS30 Z avg	IS30 Z stdev	Antidegradation
Zinc	130	mg/kg	94.7	2.5	**155.7**	7.6	**fail**
total PCBs	60	ug/kg	10.3	0.6	**137.0**	27.7	**fail**
4,4'-DDD	16	ug/kg	2.5	1.2	5.3	1.7	**fail**
4,4'-DDE	9	ug/kg	2.6	1.1	3.8	0.1	fail?
4,4'-DDT	12	ug/kg	2.7	1.0	5.9	7.0	fail?

"A" layer passes SLs
"Z" layer fails SLs
FAILS ANTIDEGRADATION

TWO CORE composite represents material (no repeats allowed)

2 core composites, no repeats	2006 FW SL	Result Unit	cores A avg	cores A stdev	cores Z avg	cores Z stdev
Zinc	130	mg/kg	103	4	**157**	27
total PCBs	60	ug/kg	11.1	3.9	**156.7**	190.0
4,4'-DDD	16	ug/kg	1.8	0.4	5.0	1.8
4,4'-DDE	9	ug/kg	2.3	0.4	5.7	2.0
4,4'-DDT	12	ug/kg	1.0	0.0	6.0	13.0

15 "mathematical composites"
"A" layer passes for all composites (15/15)
"Z" layer failed in 93% of the composites (14/15)
Antidegradation failed in 100% of the cases (15/15)

10.14

Data summary

INCREMENTAL SAMPLE RESULTS

	2006 FW SL	Result Unit	IS30 A avg	IS30 A stdev	IS30 Z avg	IS30 Z stdev	Antidegradation
Zinc	130	mg/kg	94.7	2.5	**155.7**	7.6	**fail**
total PCBs	60	ug/kg	10.3	0.6	**137.0**	27.7	**fail**
4,4'-DDD	16	ug/kg	2.5	1.2	5.3	1.7	**fail**
4,4'-DDE	9	ug/kg	2.6	1.1	3.8	0.1	fail?
4,4'-DDT	12	ug/kg	2.7	1.0	5.9	7.0	fail?

"A" layer passes SLs
"Z" layer fails SLs
FAILS ANTIDEGRADATION

THREE CORE composite represents material (no repeats allowed)

3 core composites, no repeats	2006 FW SL	Result Unit	cores A avg	cores A stdev	cores Z avg	cores Z stdev
Zinc	130	mg/kg	103	3	**157**	22
total PCBs	60	ug/kg	11.0	2.4	**156.0**	172.5
4,4'-DDD	16	ug/kg	2.0	0.4	5.0	1.2
4,4'-DDE	9	ug/kg	2.0	0.4	6.0	1.5
4,4'-DDT	12	ug/kg	1.0	0.0	6.0	10.0

10 "mathematical composites"
"A" layer passes for all composites (10/10)
"Z" layer failed in all composites (10/10)
Antidegradation failed for all composites (10/10)

More than 3 cores resulted in 100% concordance with IS30 decisions

10.15

Data summary

INCREMENTAL SAMPLE RESULTS

	2006 FW SL	Result Unit	IS30 A avg	IS30 A stdev	IS30 Z avg	IS30 Z stdev	Antidegradation
Zinc	130	mg/kg	94.7	2.5	**155.7**	7.6	**fail**
total PCBs	60	ug/kg	10.3	0.6	**137.0**	27.7	**fail**
4,4'-DDD	16	ug/kg	2.5	1.2	5.3	1.7	**fail**
4,4'-DDE	9	ug/kg	2.6	1.1	3.8	0.1	fail?
4,4'-DDT	12	ug/kg	2.7	1.0	5.9	7.0	fail?

"A" layer passes SLs
"Z" layer fails SLs
FAILS ANTIDEGRADATION

REPEATS allowed for composites; n= 10 random groups for each "n"

10 "mathematical composites"; 1 CORES PER COMPOSITE
"A" layer passes for all composites (10/10)
"Z" layer failed in 60% of the composites (6/10)
Antidegradation failed for 90% of the composites (9/10)

10 "mathematical composites "; 2 CORES PER COMPOSITE
"A" layer passes for all composites (10/10)
"Z" layer failed in all composites (10/10)
Antidegradation failed for all composites (10/10)

More than 2 cores resulted in 100% concordance with IS30 decisions

10.16

Conclusions

1. This study was conducted in a "high ranked" area with substantial contaminant heterogeneity in the Z-layer.

2. Compositing of 2 to 3 cores CONSISTENTLY represents the dredge prism for both SL and antidegradation evaluation for conditions at Post Office Bar

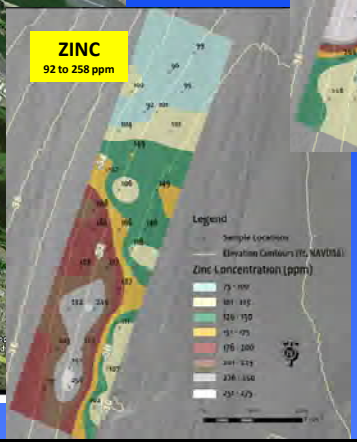
3. There is still a lot of data mining that can be done with the volume of data gathered in the ARRA project:
   - Analytical variability (IS sample replicate analysis, lab replicates)
   - IS sample comparison (IS10 vs IS20, vs IS30)
   - Potential utility of IS sampling for project characterization

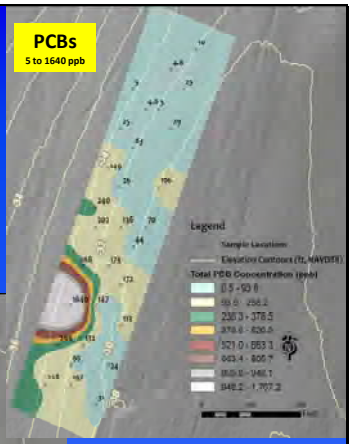
Lessons Learned

Logistics

- Respect difficulty of sample collection; sampled in ideal conditions:
  - Weather
  - Recovery/refusal
  - Positioning
- Field time is extensive under IS – sampling and core processing labor-intensive

QUESTIONS?





10.19

Larval Rockfish Ichthyoplankton Study: DMMP Puget Sound Disposal Site Assessment

David Kendall, Ph.D.

11.1

2010 ESA Consultation on DMMP Puget Sound and Strait of Juan de Fuca Disposal Sites

- DMMP Agencies submitted Programmatic Biological Evaluation (PBE) in August 2010, initiating formal consultation with NMFS and USFWS on the Puget Sound disposal sites
- PBE assessed all listed species, including the recently listed rockfish species: canary rockfish, yelloweye rockfish, and bocaccio rockfish

11.2

December 22, 2010 Biological Opinion, NMFS, regarding DMMP Disposal Sites

- NMFS Biological Opinion (BO) assessed disposal impacts to listed rockfish species.
- BO concluded: "the proposed action is not likely to jeopardize the continued existence of the Puget Sound/Georgia Basin Distinct Population Segments (DPSs) of yellowyeye rockfish, canary rockfish, and bocaccio. No critical habitat has been designated for these species, therefore, none will be affected."

11.3

December 22, 2010 Biological Opinion, NMFS, regarding DMMP Disposal Sites

- However, BO concluded that the disposal could impact larval fish
- The BO estimated extent of Take for 3 species at nondispersive sites:
  - 88,092 yelloweye rockfish larvae
  - 37,519 canary rockfish larvae
  - 781 bocaccio rockfish larvae

11.4

Endangered Species Act Conservation Recommendation directing the DMMP Study

- Conduct or support comprehensive ichthyoplankton surveys near each of the PSDDA program dispersive and non-dispersive sites within the Puget Sound/Georgia Basin.
- Corps/DMMP agencies agreed to BO conservation recommendation.

11.5

NMFS (EPA funded) Study: Evaluate Ecological Health of Puget Sound's Pelagic Foodweb

- NMFS (**Marine Science Center**) study focus:
  - Sample across various sub-basins of Puget sound to evaluate how food web conditions vary across Puget Sound
  - Develop biological metrics to monitor ecosystem health

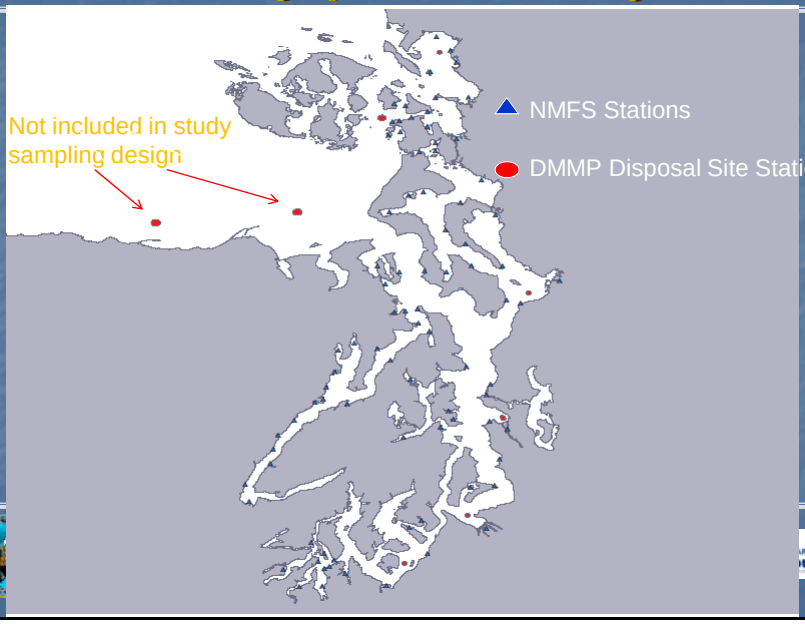
11.6

DMMP Focused Study

- DMMP agencies invited to participate in NMFS study:
  - Collect ichythoplankton data at 6 of 8 disposal sites in Puget Sound
  - Assess rockfish larvae presence and abundance
    - Monthly sampling at 102 Stations (April – October)
    - Additional 4 months of sampling at 6 DMMP sites (November – February)

11.7

Proposed Sampling Stations for Ichthyoplankton Study



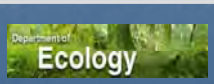
11.8

DMMP Cooperative Agreement with NMFS to Enable Disposal Site Evaluations

1. Fund field and laboratory technician for 7 month field effort at 102 Stations, including 6 disposal sites.
2. Fund field and laboratory technician for an additional 4 month field effort restricted to 6 DMMP disposal sites (November – February).
3. Enumerate all rockfish larvae collected at DMMP sites.
4. If rockfish larvae abundances at sites exceed Take totals, DMMP agencies may fund genetic analyses to differentiate species collected at sites.
   - Identifying rockfish larvae to species generally requires genetic analysis.


11.9

Questions?

11.10

Update of Marine Screening Levels

May 4, 2011
Laura Inouye, Ecology

Special thanks to David Fox (Corps) for DAIS evaluations
David Kendall (Corps) and Tom Gries (Ecology) for historical perspective
All the DMMP representatives for their reviews and comments

12.1

Why do we need to revise the marine SLs?

- **1989:** PSDDA marine SLs adopted.
- **1996-1999:** AET updated, but never adopted into the SMS. Some updates were made to the DMMP marine SLs based on this work.
- **2003-2005:** RSET Chemistry Subcommittee established, and met to review existing information on FW and Marine Chemistry
- **2009:** RSET adopted some of the 1994 revised AETs.
  - Chemistry subgroup lead by Todd Thornburg reviewed AET updates.
  - Incorporated updates to replace older SLs based on either detection limits or 10% of HAETs, and eliminated SLs that were not strongly supported.
- 2011: DMMP proposes adopting of the revised RSET marine SLs.

12.2

What are the changes?

Chemical	DMMP Marine SL (dry weight)	RSET Marine SL (dry weight)	Ecology recommended PQL
STANDARD CHEMICALS OF CONCERN			
Metals (mg/kg)			
Chromium	267 (BT)	260	87
Nickel	140	---	47
Chlorinated Hydrocarbons (µg/kg)			
1,3-Dichlorobenzene	170	---[2]	57
Volatile Organic Compounds (µg/kg)			
Trichloroethane	160	---[2]	3.2
Tetrachloroethane	57	---[2]	3.2
Ethylbenzene	10	---[2]	3.2
Total Xylene	40	---[2]	3.2
Miscellaneous Extractables (µg/kg)			
Hexachloroethane	1400	---[2]	20
Hexachlorobutadiene	29	11	10
Pesticides/PCBs (µg/kg)			
p,p'-DDD	---	16	3.3
p,p'-DDE	---	9	2.3
p,p'-DDT	---	12	6.7
Total DDT (sum of 4,4' DDx)	6.9	---	6
Aldrin	10	***9.5***	1.7
Chlordane (total)	10	***2.8***	1.7
Dieldrin	10	***1.9***	2.3
Heptachlor	10	***1.5***	1.7
gamma-BHC (Lindane)	10	---	1.7

12.3

Evaluation of Potential Economic and Environmental Impacts of the new SLS

- Corps' Dredged Analysis Information System (DAIS) database, which includes data for approximately 260 projects and 20 disposal site monitoring events
- DMMP suitability determinations for the dredging projects.
- Presence of other exceedences, bioassay testing results, etc. considered.
- Technical feasibility (detection limits)

12.4

SLs being dropped off the CoC list: Nickel

- DMMP SL: 140 ppm
- As a natural element, this compound is always detected in sediments.
- Past Exceedences: 4 projects (3 of 4 in Bellingham)
  - 2 projects, only Ni SL exceeded, no bioassays required based on AET information (SL was listed as >140 ppm)
  - 1 project, 3 DMMUs had exceedences for only Nickel, bioassays were triggered; all passed non-dispersive guidance, one failed dispersive guidance.
  - 1 project had multiple exceedences for other CoCs.
- Past Exceedences: 1 monitoring event
  - Bellingham, bioassays passed.

12.5

SLs being dropped off the CoC list: Lindane

- DMMP SL: 10 ppb*
- Detected in numerous projects
- Past Exceedences: 2 projects
  - 1 project, only Lindane SL exceeded, no bioassays required (BPJ)
- Past Exceedences: 1 monitoring event (31 ppb)
  - Commencement Bay, 2003
  - Bioassays all passed

* Based on detection limits

12.6

SLs being dropped off the CoC list:

1,3-Dichlorobenzene, hexachloroethane, trichloroethene and tetrachloroethene

- Only detected in a few projects
  - 1,3-Dichlorobenzene: 3 projects
  - Hexachloroethane: 5 projects
  - trichloroethene : 3 projects
  - tetrachloroethene : 3 projects
- Never exceeded DMMP SL (project or disposal site monitoring)
- Note that dropping these compounds will eliminate the Volatile Organics from the CoC list

12.7

SLs being dropped off the CoC list:

Ethylbenzene and total xylenes

- Only detected in a few projects
  - Ethylbenzene: 11 projects, 4 of which exceeded SLs
  - Total xylenes: 20 projects, 4 of which exceeded SLs
- No cases where these exceedences were not accompanied by other CoC exceedences.
- Never detected in non-dispersive site monitoring.

12.8

Revised SLs: Chromium

- The revised SL (260 ppm) will be lower than the current DMMP BT (267 ppm). *
- No exceedences of 260 ppm SL ever reported in DAIS

* Based on the 1988 AET for benthic community effects.

12.9

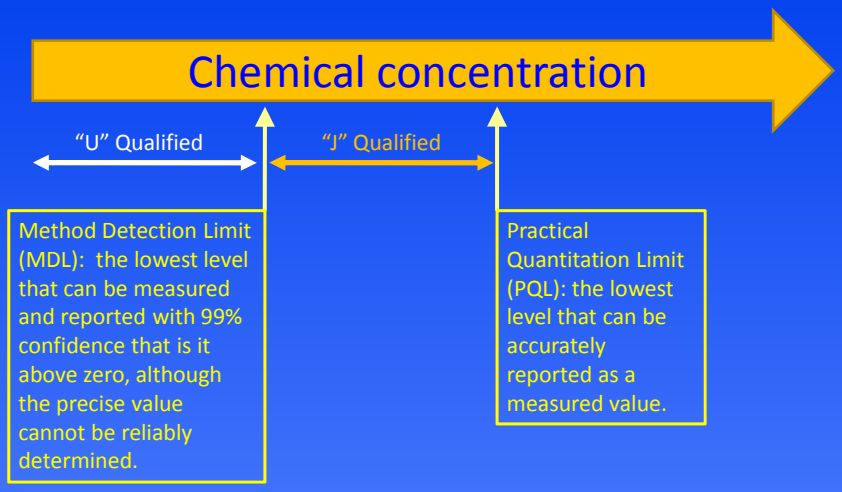
Revised SLs: Hexachlorobutadiene

- The revised SL (11 ppb) will be lower than the current DMMP SL (29 ppb)*.
- Detected in 5 projects, 2 projects had detected values between the DMMP and RSET SLs.
  - One project would have had bioassays triggered by this compound alone.
  - HALF the projects in DAIS had reporting limits above the RSET SL
  - Ecology recommends a PQL of 10 ppb; average reporting limit in DAIS was 10.99 ppb.

*DMMP SL (29 ppb) based on 10% the 1986 amphipod HAET
RSET SL (11 ppb) based on 1988 AET for benthic community effects

12.10

A short diversion: Reporting Limits



Specific terminology can vary between laboratories

12.11

Revised SLs: Aldrin

- The revised SL (9.5 ppb) will be lower than the current DMMP SL (10 ppb)*.
- Detected in multiple projects
  - only 3 projects had detected values between the DMMP and RSET SLs.
  - In all cases these were associated with exceedences for other compounds
- Ecology Recommended PQL is 1.7 ppb

*DMMP SL (10 ppb) based on detection limits
RSET SL (9.5 ppb) based on 1994 recalculations of AETs

12.12

Revised SLs: Total Chlordanes

- The revised SL (2.8 ppb) will be lower than the current DMMP SL (10 ppb)*.
- Detected in multiple projects, 19 projects had detected values between the DMMP and RSET SLs.
  - 11 projects had multiple exceedences.
  - Seven projects would have had bioassays triggered by this compound alone; all but one had bioassays triggered by other compounds in other DMMUs.
  - A single project (on the Duwamish) would have had bioassays triggered solely by total chlordanes.
- Although 51 projects had reporting limits above the RSET SL, Ecology recommends a PQL of 1.7 ppb

*DMMP SL (10 ppb) based on detection limits
RSET SL (2.8 ppb) based on 1994 AET for amphipod mortality

12.13

Revised SLs: Dieldrin and heptachlor

- The revised SLs will be lower than the current DMMP SLs*.
- Multiple projects had detected values between the DMMP and RSET SLs.
  - Dieldrin: 11 projects had multiple exceedences, 6 projects with other DMMUs also triggering bioassays; 1 project that would have had bioassays triggered solely from dieldrin
  - Heptachlor : 7 projects had multiple exceedences, 2 projects with other DMMUs also triggering bioassays; 1 project that would have had bioassays triggered solely from heptachlor
- **Ecology recommended PQLs are slightly higher than RSET SLs.** Given PQLs that are only slightly higher than the SLs, and the fact that MDLs should be lower than the PQLs, laboratories should be able to generate "J" flagged data at or below the SL.

*DMMP SL based on detection limits (10 ppb for both)
RSET SL based on 1994 AETs (1.9 and 1.5 ppb, respectively); PQLs are 2.3 and 1.7 respectively

12.14

Revised SLs: DDT and products

- The revised SLs will be higher than the current DMMP SLs*.
- Current DMMP SL based on total DDT; RSET has individual product SLs.
- 196 DMMUs had exceedence of DMMP SL, but only 6 of these where DDX was the only exceedence, bioassays would not have also been triggered by RSET SL, and the bioassays failed. All were in high ranked areas.
  - three of the six cases, there were other, more plausible, explanations for the bioassay failures (e.g. high ammonia/sulfides, QA issues).
- DAIS supports revised SLs: 42 DMMUs for which a) the SL for total DDT was exceeded; b) there was one or more SL exceedance for other CoCs; and c) the bioassays passed.

*DMMP SL (sum DDT, 6.9 ppb) based on detection limits
RSET SLs for DDD and DDE (16 and 9 ppb respectively) based on the 1988 AET for benthic community effects; SL for DDT (12 ppb) based on the 1994 AET for echinoderm abnormality.

12.15

Summary

Chemical	DMMP Marine SL (dry weight)	RSET Marine SL (dry weight)	Ecology recommended PQL
STANDARD CHEMICALS OF CONCERN			
Metals (mg/kg)			
Chromium	267 (BT)	260	87
Nickel	140	---	47
Chlorinated Hydrocarbons (µg/kg)			
1,3-Dichlorobenzene	170	---[2]	57
Volatile Organic Compounds (µg/kg)			
Trichloroethane	160	---[2]	3.2
Tetrachloroethane	57	---[2]	3.2
Ethylbenzene	10	---[2]	3.2
Total Xylene	40	---[2]	3.2
Miscellaneous Extractables (µg/kg)			
Hexachloroethane	1400	---[2]	20
Hexachlorobutadiene	29	11	10
Pesticides/PCBs (µg/kg)			
p,p'-DDD	---	16	3.3
p,p'-DDE	---	9	2.3
p,p'-DDT	---	12	6.7
Total DDT (sum of 4,4' DDx)	6.9	---	6
Aldrin	10	***9.5***	1.7
Chlordane (total)	10	***2.8***	1.7
Dieldrin	10	***1.9***	2.3
Heptachlor	10	***1.5***	1.7
gamma-BHC (Lindane)	10	---	1.7

1. Evidence indicates that for SLs being dropped or increased, there are little to no expected environmental impacts
2. Evidence indicates that for SLs being lowered, there are little to no expected impact to projects.
3. For a few compounds, laboratories need to be aware that the SLs are approaching or below recommended PQLs, and strive for MDLs that would be at/below the SLs.
4. Best professional judgment will be applied when reporting limits are above the SLs but below the Ecology-recommended PQLs.
5. All compounds whose SLS have been dropped will continue to be analyzed for during site monitoring.

12.16

QUESTIONS?

Reliability Statistics FOR DUMMIES

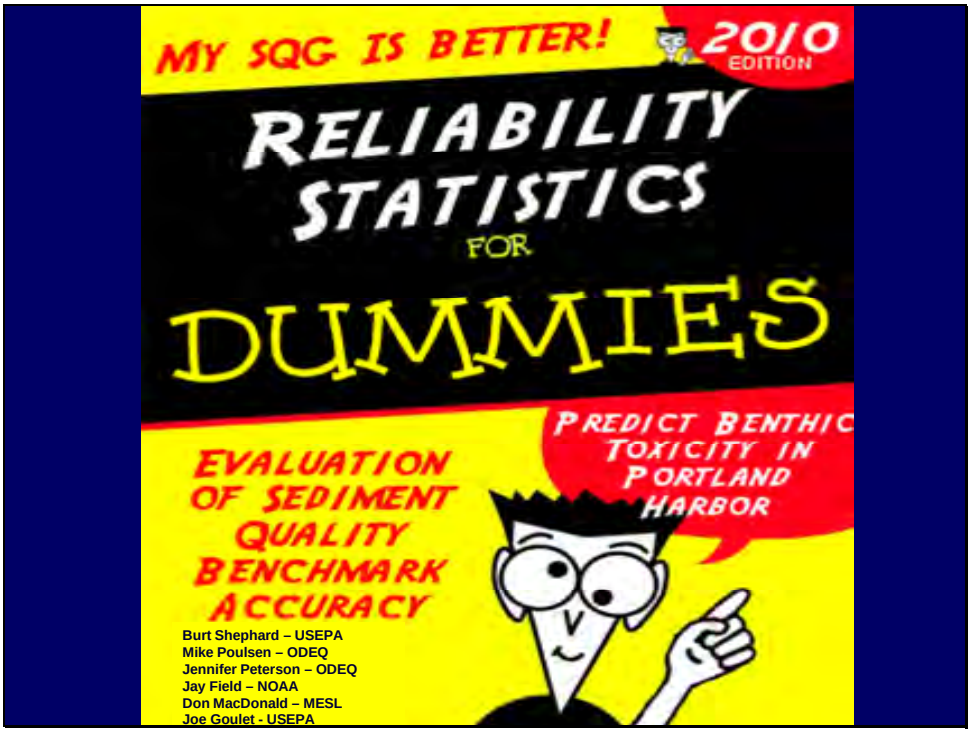
A Guide to Sediment Quality Benchmark Accuracy for the Rest of Us

Burt Shephard
U.S. Environmental Protection Agency, Seattle

Sediment Management Annual Review Meeting

May 4, 2011

13.1



13.2

What Does Reliability Mean?

- Reliability is a general term indicating the level of agreement between
  - toxicity to benthic invertebrates as predicted by exceedance of chemical SQBs and
  - true toxicity as represented by empirically measured sediment toxicity test results

13.3

Portland Harbor BERA Benthic Toxicity Evaluation

- 1469 surface sediment stations for chemistry
- 293 stations with co-occurring sediment chemistry and toxicity data
  - *Chironomus dilutus* 10-day survival, biomass
  - *Hyalella azteca* 28-day survival, biomass
- Is the survival or biomass of benthic invertebrates below acceptable levels as predicted from sediment quality benchmarks? BERA measurement endpoint, compare sediment chemistry to SQBs
- How reliable are our SQB predictions of toxicity?

13.4

How Are Reliability Statistics Calculated? Contingency Tables

		Observed toxicity: Toxic	Observed toxicity: Nontoxic	Totals
Predicted toxicity	Toxic	A	B	Samples predicted to be toxic (A + B)
	Nontoxic	C	D	Samples predicted to be nontoxic (C + D)
	Totals	Toxic samples (A + C)	Nontoxic samples (B + D)	All samples (N = A + B + C + D)

A - true positives (e.g. toxic samples the model correctly predicts to be toxic)
B - false positives (e.g. nontoxic samples the model incorrectly predicts to be toxic)
C - false negatives (e.g. toxic samples the model incorrectly predicts to be nontoxic)
D - true negatives (e.g. nontoxic samples the model correctly predicts to be nontoxic)

A, B, C and D are counts of the four possible toxicity predictions obtained by comparing measured sediment chemistry to an SQB

13.5

Reliability Goals Proposed in the Portland Harbor BERA

1. **Overall reliability** (fraction of correct predictions, goal ≥ 0.80)
2. **False negative rate** (what fraction of observed toxic stations were incorrectly predicted as nontoxic, goal ≤ 0.20)
3. **False positive rate** (what fraction of observed nontoxic stations were incorrectly predicted as toxic, goal ≤ 0.20)
4. **Predicted no hit reliability** (probability a station does not elicit toxicity if it is predicted to be nontoxic, goal ≥ 0.90)

13.6

Three Factors that Affect Some Reliability Statistics

- Prevalence of toxicity
- Selection of sediment quality benchmark (SQB) value
- Overlap between toxic and nontoxic sediment concentrations

13.7

Toxicity Prevalence in the Feasibility Study

Toxicity test	Count of toxic stations	Prevalence of Level 2 plus Level 3 toxicity
Chironomus survival	49 / 293	16.7%
Chironomus biomass	55 / 293	18.8%
Hyalella survival	21 / 293	7.2%
Hyalella biomass	73 / 293	24.9%

O.R. = (true positives + true negatives) / total number of samples

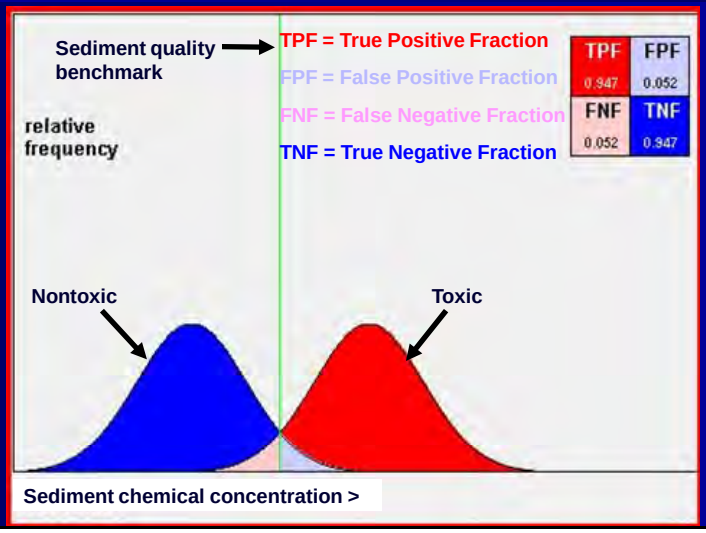
O.R. = [(prevalence) x (sensitivity)] + [(1 – prevalence) x (specificity)]

(Sensitivity = proportion of truly toxic samples correctly predicted)

(Specificity = proportion of truly nontoxic samples correctly predicted)

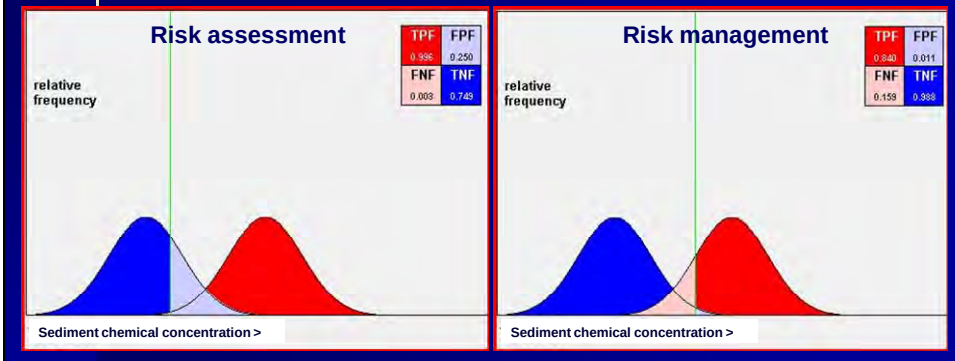
13.8

Selection of the SQB
What is the Most Reliable SQB?



13.9

What if SQB is Lower or Higher than Optimal?

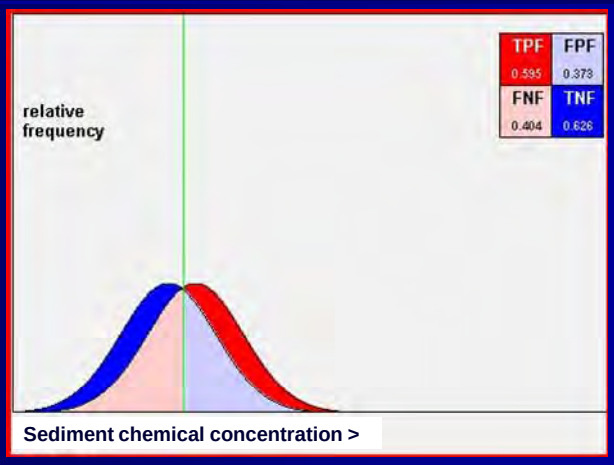


SQB is low: Few false negatives, but many false positives.

SQB is high: Few false positives, but many false negatives.

13.10

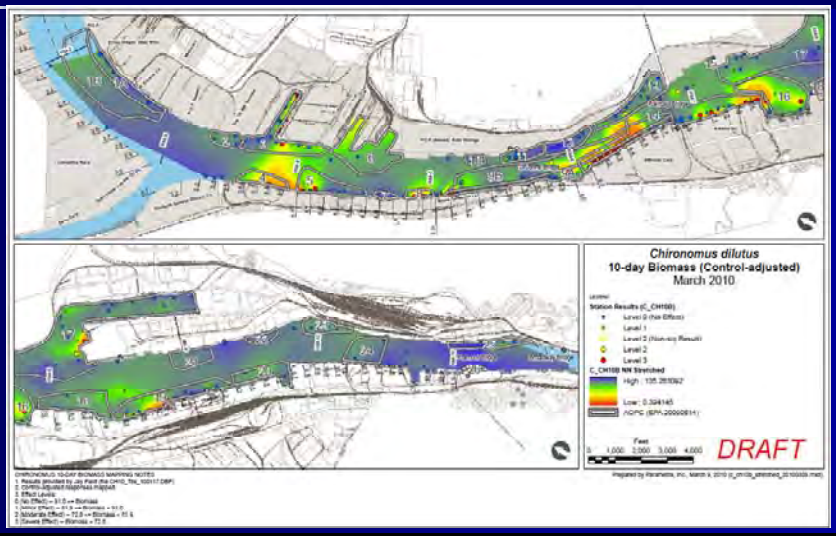
What if There is Extensive Overlap Between Toxic and Nontoxic Sediment Concentrations?



No SQB or model, no matter how good it is, will be able to reliably separate toxic from nontoxic samples.

13.11

Example of What SQBs Try to Predict: *Chironomus* biomass reduction



13.12

Some Reliability Analyses May Not Be Very Reliable When Prevalence is Low: Dieldrin SQB (21.5 µg/kg) from the FPM

		Observed toxicity: Toxic	Observed toxicity: Nontoxic	Totals	
Predicted toxicity	Toxic	1 A	0 B	Samples predicted to be toxic	1
	Nontoxic	20 C	271 D	Samples predicted to be nontoxic	291
	Totals	Toxic samples 21	Nontoxic samples 271	All samples	292 N

Measures of Predictive Model Classification Accuracy for: *Hyalella* survival dataset for dieldrin

- 0.0719 = Prevalence = (A + C) / N
- Looks good → 0.9315 = Correct classification rate (overall accuracy) = (A + D) / N
- 0.9281 = Overall diagnostic power = (B + D) / N
- 0.0476 = Sensitivity = A / (A + C)
- 1.0000 = Specificity = D / (B + D)
- Looks good → 0.0000 = False positive rate = B / (B + D)
- Not so good → 0.9524 = False negative rate = C / (A + C)
- 1.0000 = Positive predictive power = A / (A + B)
- Looks good → 0.9313 = Negative predictive power = D / (C + D)
- 0.0685 = Misclassification rate = (B + C) / N
- 0.0476 = Bias = (A + B) / (A + C)

13.13

Problems with Reliability Statistics if Prevalence Departs Substantially from 50:50

- Values of some reliability statistics are directly dependent on prevalence
- Reliability statistics may indicate you have a good model or sediment quality benchmark even when the SQB has little or no ability to separate toxic from nontoxic stations
- This is a statistical and data distribution issue, not a problem with insufficient or the wrong type of data

13.14

Problems with Reliability Statistics if Prevalence Departs Substantially from 50:50

- It is also not a problem limited to one particular method of deriving SQBs, it is an issue for all methods and models used to develop SQBs
- No single reliability statistic is available that provides all needed information. Multiple reliability statistics must be evaluated to fully evaluate the predictive accuracy of SQBs.

13.15

How Can We Address these Issues?

- Derive SQBs from datasets with roughly equal numbers of toxic and nontoxic samples
  - (not a readily available option for Portland Harbor)
- Use additional reliability statistics that are either
  - Unaffected by prevalence of toxicity, or
  - Explicitly take prevalence into account, or
  - Can be adjusted for prevalence effects
- Such statistics commonly used in medical diagnostics, meteorology, and ecology to predict rare events
  - Disease incidence
  - Storm frequency
  - Presence of rare or endangered species in a habitat

13.16

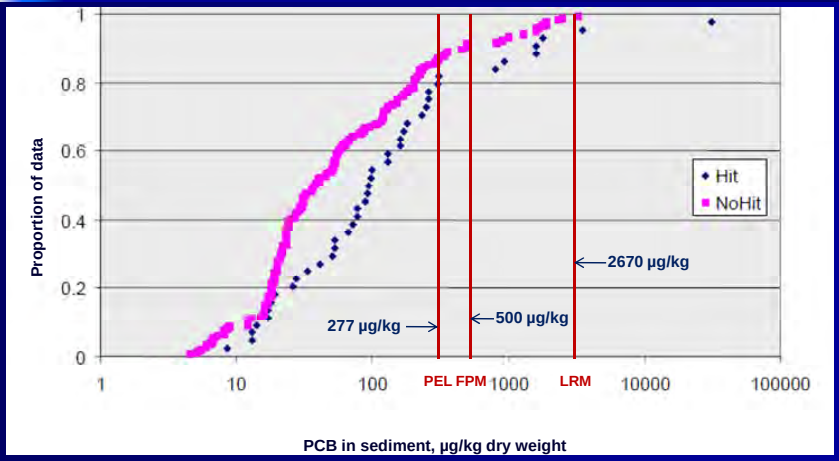
What Other Reliability Statistics Did We Identify?

1. Bias
2. Kappa
3. Prevalence adjusted bias adjusted kappa (PABAK)
4. Chance agreement
5. Overall diagnostic power
6. Misclassification rate
7. Odds ratio
8. Hanssen-Kuipers discriminant
9. Normalized mutual information
10. Positive likelihood ratio
11. Negative likelihood ratio
12. Pretest odds
13. Posttest odds
14. Posttest probability

Bias appears to be a particularly useful statistic

- Bias is the systematic tendency of a model or SQB to over- or underpredict toxicity
  - Termed systematic error in medical epidemiology
- Interpretation of bias estimator (range 0 to ∞)
  - Bias < 1: Toxicity underestimated (i.e. SQB too high, not protective)
  - Bias = 1: No bias
  - Bias > 1: Toxicity overestimated (i.e. SQB too low, conservative)

PCB Sediment Quality Benchmarks Derived by Three Different Methods



13.19

Reliability Statistics for Total PCBs from Various Sediment Benchmarks

(best performing SQB according to each statistic highlighted in yellow)

Reliability statistic	PEL (277 µg/kg)	FPM (500 µg/kg)	LRM – t50 (2670 µg/kg)
Overall reliability	0.81	0.80	0.84
Sensitivity	0.15	0.15	0.03
Specificity	0.93	0.91	0.99
False negative rate	0.85	0.85	0.97
False positive rate	0.07	0.09	0.01
Pred. hit reliability	0.27	0.24	0.33
Pred. no-hit reliability	0.86	0.86	0.85
Bias	0.56	0.64	0.08
Kappa	0.10	0.08	0.03
PABAK	0.62	0.59	0.69
Chance agreement	0.79	0.78	0.83
NMI	0.92	0.92	0.91
Posttest probability	0.27	0.24	0.33

13.20

Summary

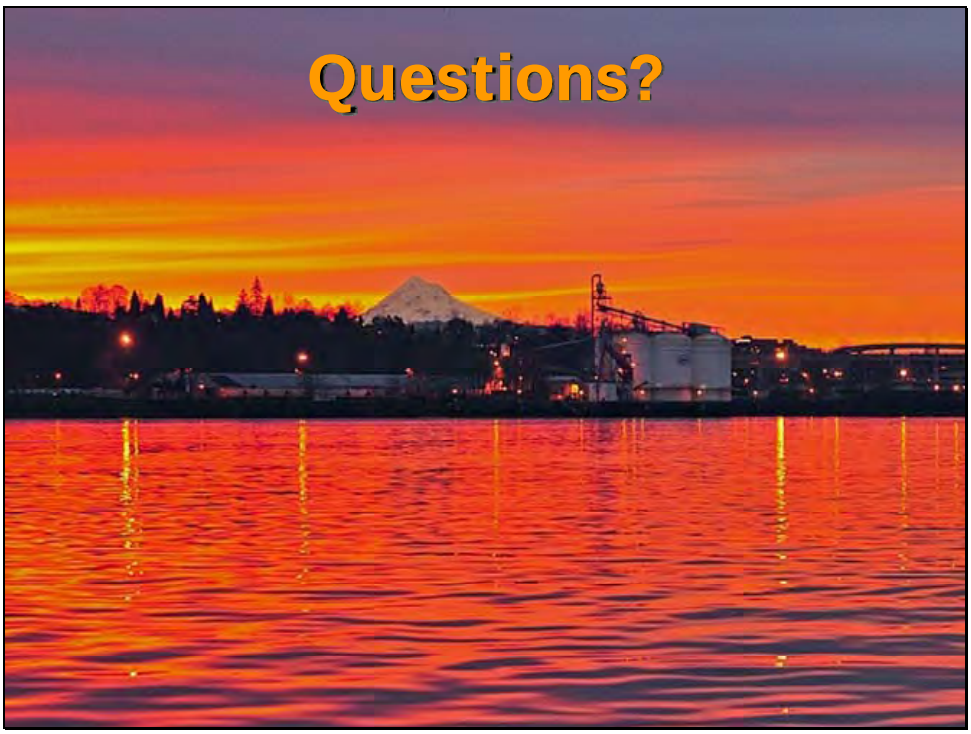
1. No single reliability statistic is superior to other statistics in all situations. Multiple statistics are required to fully evaluate reliability.
2. Low (or high) toxicity prevalence adversely affects, and can bias calculation and interpretation of several commonly used reliability statistics.
3. The prevalence effect is a statistical and data distribution effect, not a lack of data effect.

13.21

Summary

4. Prevalence affects the interpretation of the reliability of sediment quality benchmarks derived by any method. It is not limited to affecting benchmarks derived by a particular model.
5. The lower the prevalence, the more sure we can be that a negative test indicates no toxicity, but the less sure we can be that a positive result indicates the presence of toxicity.
6. Our proposed solution to the issues identified is to base our reliability evaluations primarily on statistics whose values are either unaffected by prevalence (e.g. false positives), or which explicitly can be adjusted to account for prevalence.

13.22


Questions?

Roosevelt Regional Landfill Dredged Sediment Management

Sediment Management Annual Review Meeting

May 4, 2011

14.1

Proven History

- Began accepting waste in 1991
- Accepting dredged sediment with free liquids since 2003
- Largest waste-by-rail operation in the United States and the largest MSW landfill in Washington
- Developed in partnership with Klickitat County
- Exceeds Washington regulatory requirements for non-arid MSW Landfills

2

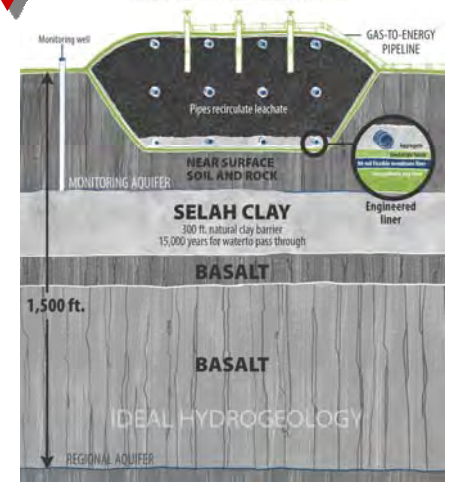
14.2

Allied Waste Roosevelt Regional Landfill

- 2,000 Acre Permit
- >240M CY Permit Airspace
- Dredged Sediment Demonstration Project
- Have accepted >1.5M tons of dredged sediment since 2003

14.3

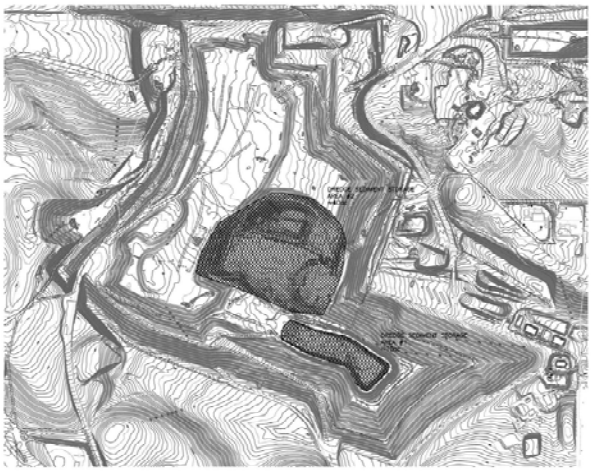
Environmental Commitment



- Siting Considerations:
  - Transportation
  - Favorable Climate
  - Beneficial Topography
  - **Ideal Hydrogeology**
- Designed to Non-Arid Standards
- Liner
- Self-Contained Leachate Management

14.4

Constructed Dredge Area



5

14.5

Constructed Dredge Area

6

14.6

Constructed Dredge Area

7

14.7

Sustainability in Action – LFG to Energy

- **Plant Opened in 1999**
  - Operated by KPUD
  - 10MW Generating Capacity
  - I/C Engine Technology
- **Plant Expansion – Under way**
  - Additional 27MW Capacity
  - 2-10MW Combustion Gas Turbines
  - 1-7MW Steam Turbine
  - Existing Plant Remains Online
  - Total Capacity = 37MW

Enough Power for 30,000 Homes

8

14.8

Upland Disposal Benefits

- Environmental security
- Moisture absorbed by waste mass
  - No increase in leachate production
  - No side slope seep
- Difficult to quantify benefits
  - Increased landfill gas production – offset use of fossil fuels for electrical generation
  - Improved waste stabilization

Thank You

15.1

15.2

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Appendix V

2011 SMARM Clarification Papers

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July 18, 2011 Final

DMMP CLARIFICATION PAPER

Marine Sediment Quality Screening Levels: Adopting RSET Marine SLs for Use in DMMP

Prepared by Laura Inouye (Ecology) and David Fox (Corps)

INTRODUCTION

One purpose of the RSET Sediment Evaluation Framework is to "provide a regionally consistent framework for evaluating the suitability of dredged material for in-water disposal." However, with publication of the Sediment Evaluation Framework in 2009, the RSET marine SLs for 15 compounds now differ from those used by the DMMP (Table 3).

To help maintain a regionally consistent framework, the Dredged Material Management Program (DMMP) is committed to adopting the RSET guidance where possible. However, before adopting the updated SLs, the DMMP agencies needed to review the technical feasibility of the new SLs and the potential impacts to projects in Washington State and the environment.

BACKGROUND

Apparent Effect Threshold values (AETs) derived in the late 1980s (Barrick et al., 1988) are the basis of numeric guidelines adopted by the Puget Sound Dredged Disposal Analysis (PSDDA) program (PSDDA,1988; 1989) and also numeric sediment quality standards adopted by the State of Washington in the Sediment Management Standards (Ecology 1991). In an effort to keep the regional AETs current, the Department of Ecology (Ecology) incorporated new chemistry and toxicity data into the AET database in 1994 and recalculated dry weight- and organic carbon-normalized AETs (Gries and Waldow, 1996). A regulatory workgroup reviewed the recalculated AETs in a series of workshops in 1996 and 1997 and provided recommendations to the DMMP agencies. The DMMP agencies updated the program's numeric guidelines using the 1994 amphipod AETs as recommended by the workgroup, but declined to use the echinoderm-based AETs until more work could be done (DMMP, 1997).

In 1998, a sediment larval workshop was held in an attempt – among other things – to resolve issues related to the use of the 1994 echinoderm AETs (DMMP, 1998). That same year, Ecology developed AETs based on inhibition of growth in *Neanthes arenaceodentata* juveniles. However, further work was terminated before technical and policy issues could be resolved (Ecology, 1999). For this and other reasons, the 1994 echinoderm and 1998 Neanthes AETs have not been used to amend the SMS rule or update the DMMP numeric guidelines.

Between 2003 and 2005, the Regional Sediment Evaluation Team (RSET) Chemistry subcommittee met to review existing information on freshwater and marine chemistry. In 2009, RSET adopted some of

the 1994 AET values – including echinoderm – as screening level guidelines (SLs). The changes focused on revising DMMP SLs that were based on detection limits or where chemicals did not have a defined toxicity threshold. The RSET marine SLs are listed in the final Sediment Evaluation Framework document (RSET, 2009).

PROBLEM IDENTIFICATION

There are 15 compounds for which RSET and DMMP guidelines differ. The reasons for this divergence fall into two groups:

Group 1: Presently on DMMP list but not adopted by RSET

Group 1 includes eight compounds for which RSET did not establish SLs due to a lack of correlation between sediment chemistry and toxicity. These compounds were not included in the RSET SL list since they do not have a defined toxicity threshold. Washington State standards had not been established for these compounds for the same reason. These compounds include nickel, 1,3-Dichlorobenzene, hexachloroethane, lindane, and all volatile organics presently on the DMMP chemicals of concern (CoC) list, as shown in Table 1.

Table 1. Group 1 compounds.

Chemical	DMMP Marine SL (dry weight)	RSET Marine SL (dry weight)
Metals (mg/kg)		
Nickel	140	---
Chlorinated Hydrocarbons (µg/kg)		
1,3-Dichlorobenzene	170	---
Volatile Organic Compounds (µg/kg)		
Trichloroethene	160	---
Tetrachloroethene	57	---
Ethylbenzene	10	---
Total Xylene	40	---
Miscellaneous Extractables (µg/kg)		
Hexachloroethane	1400	---
Pesticides/PCBs (µg/kg)		
gamma-BHC (Lindane)	10	---

To be entirely consistent with RSET, the DMMP would drop all these chemicals from their CoC list. But before dropping these compounds the DMMP agencies need to ensure that exceedances of the DMMP SLs for these compounds in past dredging projects have not been associated with bioassay failures.

Group 2: Different Marine SLs for DMMP and RSET

The second group of compounds has different SLs for RSET than those currently in place for DMMP. This group consists of chromium, hexachlorobutadiene, aldrin, total chlordane, dieldrin, heptachlor, and DDT, DDD, and DDE, as shown in Table 2. To be consistent with RSET, all DMMP Marine SLs would be set equal to the RSET SLs.

Table 2. Group 2 compounds.

Chemical	DMMP Marine SL (dry weight)	RSET Marine SL (dry weight)
Metals (mg/kg)		
Chromium	267 (BT)	260[1]
Miscellaneous Extractables (µg/kg)		
Hexachlorobutadiene	29	11[2]
Pesticides (µg/kg) [3]		
p,p'-DDD	---	16
p,p'-DDE	---	9
p,p'-DDT	---	12
Total DDT (sum of 4,4') DDX)	6.9	---
Aldrin	10	9.5
Chlordane (total)	10	2.8
Dieldrin	10	1.9
Heptachlor	10	1.5

EVALUATION OF TECHNICAL FEASIBILITY AND POTENTIAL IMPACTS OF UPDATED RSET SLs

Technical Feasibility - The technical feasibility of the updated RSET SLs was evaluated through a comparison to practical quantitation limits (PQLs). The PQL represents the lowest level that can be accurately reported as a measured value. That often depends on the lowest concentration standard used to generate the calibration curve. The method detection limit (MDL) is the lowest level that can be measured and reported with 99% confidence that is it above zero, although the precise value cannot be reliably determined. The reporting limit (RL) is usually equivalent to the PQL. However, the RL may be less than the PQL, depending on contract requirements, the laboratory, and parameter in question. Values between the PQL and the MDL are often reported with a "J" qualifier.

[1] Based on PSDDA 1998, and adopted into Washington State SMS rule.
[2] Hexachlorobutadiene value differs from the DMMP SL (29 ppb). The 11 ppb value presented here was proposed for the Washington State SMS rule (Ecology, 1991) although the OC-normalized value was eventually promulgated into the rule.
[3] All pesticide SL values differ from the DMMP SL values. Most of these values are based on a draft report reassessing amphipod and echinoderm larval AETs (Gries and Waldow, 1996).

Potential Impacts– The DMMP agencies utilized two primary sources of data in the evaluation of potential environmental and project impacts:

1. The Corps' Dredged Analysis Information System (DAIS) database, which includes data for approximately 260 projects and 20 disposal site monitoring events; and
2. DMMP suitability determinations for the dredging projects.

Evaluations are summarized for each compound or class of compounds below.

Analysis of Group 1 Chemicals

Nickel: This metal is abundant in crustal material (soils) and is nearly always detected in sediments. However, The DMMP has observed exceedances of the 140 mg/kg SL in only four projects (three of which were in Squalicum Waterway in Bellingham Bay). Three of these projects had at least one dredged material management unit (DMMU) for which nickel was the only SL exceedance. In two of these cases, the DMMP agencies did not require bioassays because the lowest apparent effects threshold (LAET), upon which the SL was based, was not a well-established number (it was listed as > 140 mg/kg). In the third case, bioassays were performed for three DMMUs for which nickel was the only SL exceedance. All three DMMUs passed the guidelines for non-dispersive disposal. One of these DMMUs was found unsuitable for dispersive disposal. Nickel was also found at concentrations above the SL at the Bellingham Bay non-dispersive disposal site in the 1993 monitoring event, but was not shown to be associated with toxicity, as the full suite of bioassays passed.

Lindane: This compound has been detected in numerous projects, but only twice above the existing DMMP SL of 10 ug/kg. There was only one DMMU for which Lindane was the only SL exceedance, but bioassays were not run on this DMMU for other reasons. It was also detected at levels exceeding the maximum level (ML) of 31 ug/kg at the Commencement Bay non-dispersive disposal site in the 2003 monitoring event, but was not shown to be associated with toxicity, as the full suite of bioassays passed.

1,3-Dichlorobenzene, hexachloroethane, trichloroethene and tetrachloroethene: These compounds have only been detected in a few projects (three projects for 1,3-dichlorobenzene, trichloroethene, tetrachloroethene; five projects for hexachloroethane). None of these detections have been SL exceedances. There have been no exceedances of the DMMP SL at any of the non-dispersive disposal sites.

Ethylbenzene and total xylenes: Ethylbenzene has been detected in 11 projects, four of which had exceedances of the DMMP SL of 10 ug/kg, and one of which exceeded the DMMP ML of 50 ug/kg. Xylenes have been detected in 20 projects, four of which had exceedances of the DMMP SL of 40 ug/kg, and three of which exceeded the DMMP ML of 160 ug/kg. There have been no exceedances of the DMMP SL at any of the non-dispersive disposal sites. Although bioassays were triggered and failures were observed in several projects, in no case was ethylbenzene or total xylenes the only CoC involved. In each case, there were multiple exceedances of other SLs and MLs. Based on this

experience, it is highly likely that elevated concentrations of ethylbenzene and total xylenes will be accompanied by SL exceedances for other COCs. These latter SL exceedances will still result in the performance of bioassays, so that dropping ethylbenzene and total xylenes would have no adverse effect on the ability of chemical testing to detect potentially toxic sediments.

Analysis of Group 2 Chemicals

Chromium: The RSET SL is 260 mg/kg and is the 1988 AET for benthic community effects. This is also the value adopted for the SQS in the Washington State Sediment Management Standards rule (Ecology, 1991). The DMMP agencies did not set an SL for chromium in 1988 but did establish a bioaccumulation trigger (BT) of 267 mg/kg in 2003 (Hoffman, 2003). There are no projects in DAIS that exceed 260 mg/kg. Therefore, adopting the RSET SL and lowering the BT to equal the SL would have had no impact on past projects.

Hexachlorobutadiene: The RSET SL is 11 ug/kg and is based on the 1988 AET for benthic community effects (Barrick et al., 1988). The same value was adopted as the SQS (Ecology, 1991). The current DMMP SL of 29 ug/kg is 10% of the highest 1986 AET (HAET) (290 ug/kg; PSDDA, 1988).

Hexachlorobutadiene has been detected in five DMMP projects, two of which fell between the RSET and DMMP SLs. Only one of these projects (in the Sitcum Waterway) would have had bioassays triggered by this compound alone. Therefore, adopting the lower SL would have had a relatively small impact regarding the requirement for bioassays. However, half of the projects had reporting-limit exceedances of the RSET SL for this compound. A review of reporting limits for nondetects in DAIS revealed that, while highly variable, the average was 10.99 ug/kg. The Department of Ecology's Sampling and Analysis Plan Appendix (SAPA; Ecology, 2008) recommends a practical quantitation limit (PQL) of 11 ug/kg. With improving analytical capabilities, the lower SL should be achievable.

Aldrin: The RSET SL is 9.5 ug/kg and is based on both the amphipod and echinoderm AET values recalculated in 1994. This is compared to the DMMP SL of 10 ug/kg based on detection limits that were achievable in the late 1980s. Aldrin has been detected in multiple projects, but only three times between 9.5 and 10 ug/kg. Those cases were all accompanied by other SL exceedances, so that reducing the SL would have had no effect on the number of bioassays required. The Ecology SAPA (2008) recommended a PQL of 1.7 ug/kg, so analytical capabilities should be sufficient for the lower SL.

Total chlordane: The RSET SL is 2.8 ug/kg and is set by the 1994 AET for amphipod mortality. This is compared to the DMMP SL of 10 ug/kg. The DMMP SL was set by detection limits at the time the PSDDA SLs were adopted. Chlordane is in reality a mix of chemicals, and has been reported in many ways over the years – as total chlordane, technical chlordane, alpha-chlordane, and simply as "chlordane". In 2007, DMMP defined "total chlordane" programmatically as the sum of cis-chlordane (aka alpha-chlordane), trans-chlordane, cis-nonachlor, trans-nonachlor and oxychlordane. These compounds have been detected in numerous projects, with 19 projects having detected concentrations

falling between the RSET and DMMP SLs. In seven of these projects, chlordane alone would have triggered bioassays for one or more DMMUs, but all but one of these projects already had bioassays run for other DMMUs, so that bioassay testing for these projects would not have been triggered by chlordane alone. A single project, located in the Duwamish Waterway, would have had bioassays triggered solely by this class of compounds (i.e., there were no exceedances of any other SLs for any of the DMMUs). The balance of the 19 projects had DMMUs with multiple exceedances of SLs for other compounds - in addition to chlordane - that would have triggered bioassays within the DMMUs. Although there have been 51 projects - some recent - with reporting limits above the RSET SL, the Ecology SAPA (2008) recommended a PQL of 1.7 ug/kg for chlordane, so analytical capabilities should be sufficient for the lower SL.

Dieldrin and heptachlor: The RSET SLs for dieldrin and heptachlor are 1.9 ug/kg and 1.5 ug/kg respectively, and both were set by 1994 AETs – the echinoderm AET for dieldrin and the amphipod AET for heptachlor. This is compared to the DMMP SL of 10 ug/kg for both compounds. The DMMP SLs were set by detection limits at the time the PSDDA SLs were adopted.

Dieldrin has been detected in multiple projects, with 18 projects (64 DMMUs) having detected exceedances between the RSET and DMMP SLs. In six of these projects, dieldrin alone would have triggered bioassays for one or more DMMUs, but each of these projects already had bioassays run for other DMMUs, so that bioassay testing for these projects would not have been triggered by dieldrin alone. A single project, located in Grays Harbor, would have had bioassays triggered solely by this compound (i.e., there were no exceedances of any other SLs for any of the DMMUs). The balance of the 18 projects had DMMUs with one or more exceedance of SLs for other compounds.

Heptachlor has been detected in multiple projects, with ten projects (24 DMMUs) having detected exceedances between the RSET and DMMP SLs. In two of these projects, heptachlor alone would have triggered bioassays for a single DMMU, but each of these projects already had bioassays run for other DMMUs, so that bioassay testing for these projects would not have been triggered by heptachlor alone. A single project, located in Lake Washington, would have had bioassays triggered solely by this compound (i.e., there were no exceedances of any other SLs for any of the DMMUs). The balance of the ten projects had DMMUs with one or more exceedance of SLs for other compounds.

For both dieldrin and heptachlor, the Ecology SAPA- recommended PQL is higher than the RSET SL (dieldrin PQL is 2.3 ug/kg; heptachlor PQL is 1.7 ug/kg). Given PQLs that are only slightly higher than the SLs, and the fact that reporting limits may be lower than the PQLs, laboratories should be able to generate "J" flagged data at or below the SL. However, for dieldrin, there have been 118 projects with reporting limits above 1.9 ug/kg, and for heptachlor, there have been 53 projects with reporting limits above 1.5 ug/kg, many of these being recent projects. Based on this data, the RSET SLs appear to be beyond what has been historically achieved by analytical laboratories.

DDT, DDD, and DDE: While DMMP has an SL of 6.9 ug/kg for the summed p,p'-DDX compounds (aka "total DDT"), RSET has a separate SL for each of the p,p'-DDX constituents. RSET's SLs are 16 ug/kg for DDD, 9 ug/kg for DDE, and 12 ug/kg for DDT. The SLs for DDD and DDE are based on the 1988 AET for benthic community effects. The RSET SL for DDT is based on the 1994 AET for echinoderm abnormality. Given that the individual RSET SLs are all greater than the DMMP SL for the summed constituents, there would be no economic or analytical project impact from the adoption of the RSET SLs.

Evaluation of potential environmental impacts showed that of 196 DMMUs where the DMMP SL for total DDT was exceeded, there were only six DMMUs where a) Total DDT was the only SL exceedance; b) bioassays would not also have been triggered by exceedances of the RSET DDX SLs; and c) the bioassays failed. All of these were in high-ranked areas, and no single DMMU exceeded 4,000 cy.

In three of the six cases, there were other, more plausible, explanations for the bioassay failures (e.g. high ammonia/sulfides, QA issues). In addition, further evaluation of the DAIS data provided evidence that DDT may not be toxic at levels as low as the existing DMMP SL. There were 42 DMMUs for which a) the SL for total DDT was exceeded; b) bioassays would not also have been triggered by exceedances of the RSET DDX SLs; c) there was one or more SL exceedance for other CoCs; and d) the bioassays still passed. The DAIS data, therefore, appear to corroborate the RSET re-evaluation of the AETs and provide a strong argument for eliminating the DMMP SL of 6.9 ug/kg for total DDT.

PROPOSED ACTION/MODIFICATION

The DMMP agencies propose accepting all the RSET SLs, with minor caveats. Our evaluation determined that the environmental risk and economic impact of this action is low, and the technological challenges manageable.

Nickel, lindane, 1,3-dichlorobenzene, hexachloroethane, total DDT, and the volatile compounds trichloroethene, tetrachloroethene, ethylbenzene, and total xylenes, will be dropped from the standard DMMP CoC list.

Dropping the volatiles (trichloroethene, tetrachloroethene, ethylbenzene and xylenes) from the standard list of chemicals of concern would eliminate an entire analytical group, thereby simplifying field sampling and reducing testing costs. Because volatiles have never been the sole trigger for bioassay testing in the 23-year history of DMMP, the risk of otherwise suitable dredged material containing unacceptable levels of volatiles appears to be small. All compounds whose SLs are being dropped will continue to be monitored at the disposal sites.

The RSET SLs for chromium, hexachlorobutadiene, aldrin, total chlordane, dieldrin, heptachlor, DDT, DDD, and DDE, will be adopted. Project proponents and laboratories should be aware that the Ecology-recommended PQLs will need to be met or surpassed for hexachlorobutadiene, total chlordane, dieldrin and heptachlor in order to avoid SL exceedances. It is recognized that it will take time for some laboratories to accomplish this. Therefore, best professional judgment (BPJ) will be applied by the DMMP agencies during dredging year 2012 when sample-specific reporting limits are above the SLs for any of these four chemicals. The ability of laboratories to meet the revised SLs will be reviewed prior to the 2012 SMARM. Further need for BPJ beyond the 2012 SMARM will be evaluated at that time.

Bioaccumulation Triggers (BTs) will continue to exist for chromium and total DDT. The chromium BT will be changed to 260 mg/kg to match the new SL. The existing BT for total DDT (the sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT) will remain unchanged at 50 ug/kg.

Table 3. Summary table of all proposed changes.

Chemical	DMMP Marine SL (dry wt)	DMMP Basis for SL[1]	RSET Marine SL (dry wt)	RSET Basis for SL[1]	Ecology recommended PQL
Metals (mg/kg)					
Chromium	267 (BT)	DMMP BCoC	260[2]	1988 AET B	87
Nickel	140	1988 AET A&B	---[3]	---	47
Tributyltin: ***NO CHANGES PROPOSED***					
Polynuclear Aromatic Hydrocarbons (µg/kg): ***NO CHANGES PROPOSED***					
Chlorinated Hydrocarbons (µg/kg)					
1,3-Dichlorobenzene	170	1988 AET	---[5]	---	57
Phthalates (µg/kg): ***NO CHANGES PROPOSED***					
Volatile Organic Compounds (µg/kg)					
Trichloroethene	160	EqP ML/10 (PSDDA, 1988 = EPTA)	---[5]	---	3.2
Tetrachloroethene	57	1988 AET B	---[5]	---	3.2
Ethylbenzene	10		---[5]	---	3.2
Total Xylene	40		---[5]	---	3.2
Phenols (µg/kg): ***NO CHANGES PROPOSED***					
Miscellaneous Extractables (µg/kg)					
Hexachloroethane	1400	EqP ML/10 (PSDDA, 1988 = EPTA)	---[5]	---	20
Hexachlorobutadiene	29	1986 AET A/10	11[4]	1988 AET B	10
Pesticides/PCBs (µg/kg) [5]					
p,p'-DDD	---	---	16	1988 AET B	3.3
p,p'-DDE	---	---	9		2.3
p,p'-DDT	---	---	12	1994 AET E	6.7
Total DDT (sum of 4,4')	6.9	1986 ∑HAET/10	---	---	6
Aldrin	10	Analytical detection limits ~ 1989	9.5	1994 AET A	1.7
Chlordane (total)	10		2.8		1.7
Dieldrin	10		1.9	1994 AET E	2.3
Heptachlor	10		1.5		1.7
gamma-BHC (Lindane)	10		---	---	1.7

[1] A = Amphipod; B = Benthic; E = Echinoderm

[2] Based on PSDDA 1988, and adopted into Washington State SMS rule.

[3] These compounds were not included in the RSET SL list since they do not have a defined toxicity threshold. No values were promulgated in the Washington State SMS rule, so for consistency, they were not included in the RSET SL list.

[4] Hexachlorobutadiene value differs from the DMMP SL (29 ppb). The 11 ppb value presented here was proposed for the Washington State SMS rule (Ecology, 1991) although the OC-normalized value was eventually progmulated into the rule.

[5] All pesticide SL values differ from the DMMP SL values. Most of these values are based on a draft report reassessing amphipod and echinoderm larval AETs (Gries and Waldow, 1996).

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