U.S. Army Corps of Engineers
Seattle District

WASHINGTON STATE DEPARTMENT OF Natural Resources

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING

MAY 2, 2006

MEETING MINUTES

Prepared for:
DMMP Agencies

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LIST OF ACRONYMS AND ABBREVIATIONS

AET	Apparent Effects Threshold
ALCU	Aquatic Lands Cleanup Unit (formerly known as SMU)
AWA	Area-weighted average
BCOC	Bioaccumulative chemicals of concern
BMP	Best Management Practices
BT	Bioaccumulation trigger
BTEX	Benzene, toluene, ethylbenzene, xylene analysis
CAD	Confined Aquatic Disposal
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
COC	Contaminant/Chemical of Concern
CRADA	Cooperative Research and Development Agreement
CSMP	Cooperative Sediment Management Program (Washington State)
cy	cubic yard(s)
DDT	Dichloro-diphenyl-trichloroethane
DL	Detection Limit
DMEF	Dredged Material Evaluation Framework
DMMP	Dredged Material Management Program
DO	Dissolved Oxygen
DOE	Washington State Department of Ecology
Ecology	Washington State Department of Ecology
EDC	Endocrine disrupting chemicals
EIS	Environmental Impact Statement
EMAP	Environmental Monitoring and Assessment Program
ENR	Enhanced Natural Recovery
EPA	U.S. Environmental Protection Agency
ERDC	Environmental Resources Development Center (formerly known as WES)
ESA	Endangered Species Act
GP	Georgia Pacific Corporation
IDW	Inverse-Distance Weighted
IM	Information management
ISIS	Integrated Site Information System
LAET	Lowest Apparent Effects Threshold
MDL	Method Detection Limit
ML	Maximum level
MTCA	Model Toxics Control Act
MWAC	Middle Waterway Action Committee
NEPA/EIS	National Environmental Policy Act/Environmental Impact Statement
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association

NPDES	National Pollutant Discharge Elimination System
NWRDT	Northwest Regional Dredging Team
ODEQ	Oregon Department of Environmental Quality
PAH	Polycyclic aromatic hydrocarbon
PBDE	Polybrominated diphenyl ether
PCB	Polychlorinated biphenyl
PEC	Probable effects concentration
Ppb	parts per billion
PSAMP	Puget Sound Ambient Monitoring Program
PSAT	Puget Sound Action Team
PSDDA	Puget Sound Dredged Disposal Analysis
PSI	Puget Sound Initiative
PSNS	Puget Sound Naval Shipyard
PSR	Pacific Sound Resources
PSWQAT	Puget Sound Water Quality Action Team
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial investigation/feasibility study
RL	Reporting limit
ROD	Record of Decision
RSET	Regional Sediment Evaluation Team
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SEDQUAL	Sediment Quality Information System
SL	Screening level
SMARM	Sediment Management Annual Review Meeting
SMS	Sediment Management Standards
SMU	Sediment Management Unit (now, ALCU)
SPI	Sediment profile imagery
SUA	Site Use Authorization
SVOC	Semi-volatile organic compound
SVPS	Sediment vertical profile system
TBT	Tributyltin
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
WDFW	Washington State Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WES USACE	Waterways Experiment Station (now ERDC)

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING MINUTES

The Cooperative Sediment Management Program (CSMP) held its 18th consecutive annual review meetin on dredging, disposal and sediment management issues on May 2, 2006. The 2006 Sediment Management Annual Review Meeting (SMARM) was hosted by EPA Region 10 and held at the Federal Center South in Seattle, Washington. The Dredged Material Management Program (DMMP) is an interagency cooperative program that includes the Seattle District U.S. Army Corps of Engineers (USACE); the U.S. Environmental Protection Agency (EPA), Region 10; the Washington Department of Natural Resources (DNR); and the Washington Department of Ecology (Ecology). The public issues summary, meeting agenda, list of attendees, and the PowerPoint presentations of the speakers are included as Attachments 1, 2, 3, and 4 respectively.

WELCOME AND OPENING REMARKS

Mr. Wayne Wagner, USACE, Seattle District, convened the meeting with welcoming remarks and thanked the sponsors, DMMP and the Sediment Management Unit (SMU), the moderator, and the lead agency, USACE. He also thanked the hosts, EPA. He reminded the audience of the objectives and purpose of SMARM:

- Obtain public input on proposed changes to the DMMP Management Plans through **Issue Papers** and **Clarification Papers.**
- Discuss disposal site management actions and changes.
- Summary of Ecology Cleanup Activities.
- Summary of EPA Regional Cleanup Activities.
- Review recent past project testing activities, and obtain public input on proposed changes to the DMMP.
- Presentation and discussion of Public Issue Papers.

- Comments and discussion on Status Reports of ongoing actions of DMMP and SMU Program.

He urged those with comments on Public Issues and Sediment Management Standards (SMS) issues to fill out a card at the back of the room. Comments needed to be submitted by June 5, 2006, to be addressed by the DMMP and Sediment Management Standards Program in this years SMARM summary He then introduced Gary Voerman for the opening remarks.

Gary Voerman, EPA, introduced himself as the manager of Aquatic Resources in the EPA Region 10 office. He extended thanks to Dr. Dave Kendall (USACE) and his staff, Erika Hoffman (EPA), and Jonathon Freedman (EPA), and expressed regrets that the regional administrator could not attend. He began by presenting the biggest challenge as the increased workload with a lack of resources and said that gaps would need to be filled through creativity, increased efficiency, and perhaps training. Mr. Voerman questioned whether multiple agencies were necessary to sign off on evaluations and whether one agency could perform the tasks with more trust among other agencies. He wanted to highlight two important programs: the Columbia River Toxics Initiatives and the Snake River Programmatic Environmental Impact Statement (EIS).

The Puget Sound Dredged Disposal Analysis (PSDDA) evolved into DMMP when it expanded to cover all of Washington. Among its accomplishments, it has become a model for interagency cooperation and has established best science, peer-reviewed sediment testing. Now, there has been significant progress on a sediment management manual that will cover Washington, Oregon, Idaho, and Alaska to manage both clean and contaminated sediment. The work is expanding but it is challenging to find the resources. However, there are new opportunities for resources such as Coastal America, a collaborative federal program, as well as corporate partnerships and watershed programs. The National Estuary Program has been active and has received funding. Since Governor Gregoire has announced her intentions to restore Puget Sound, we must work together to make the most of new opportunities.

Wayne Wagner introduced ***Lauran Warner, who provided a tribute***acknowledging the losses of two outstanding individuals who will be greatly missed by the regulatory and sediment community. She spoke of Anne Robinson, who was a regulatory project manager at USACE, a

world traveler, passionate environmentalist, and humanitarian. She then spoke of Dick Gilmur who was a major force at the Port of Tacoma with a deep passion for his work and for life.

Mr. Wagner then introduced the panel: Rich Doenges of DNR, Kathryn DeJesus of Ecology, Gary Voerman of EPA, and David Kendall of Seattle District USACE. Mr. Wagner requested that comments be held until presentations are complete and, when asking questions, speakers should stand and identify themselves. He finished with an introduction of David Kendall as the next speaker to begin the Agency Reports segment of the meeting.

Slides

PP0.1 18^{th} Sediment Management Annual Review Meeting

PP0.2 2006 SMARM

PP0.3 Meeting Objectives and Purpose

PP0.4 Meeting Objectives and Purpose (continued)

PP0.5 Summary and Closing

PP0.6 Anne Robinson

PP0.7 Dick Gilmur

AGENCY SUMMARY REPORTS

1. DMMP Testing Summary (Dr. David Kendall, Corps).

David Kendall began by saying that, after 22 years, cleanup progress has been made, but problems persist inPuget Sound. The Puget Sound Initiative (PSI) will bring much needed attention and resources to continue the efforts. Progress during the 2005 dredging year has included 24 project reviews totaling 925,854 cubic yards (CY) of sediment. Only two projects were over 100,000 CY, with the remaining 22 projects under 50,000 CY. Three projects were in Model Toxics Control Act (MTCA) cleanup areas. Project sediment quality testing reviews found no material unsuitable for unconfined open-water disposal. One project required bioassay testing, all of which passed, and no bioaccumulation testing was triggered by the testing conducted. David then summarized DMMP actions completed since the last SMARM, which included, two DMMP reports (e.g., 2005 SMARM Minutes; and the Biennial Report for Dredging Years 2004 and 2005); two clarifications (Summary of the Site Use Authorization Requirements for WDNR; and Sediment Larval Test Species Recommended for DMMP) were

completed, while several proposed DMMP actions were not completed due to workload constraints and lack of resources (SMARM Process: Reducing levels of effort; and Sediment Management Programs: Consistent Interpretation of Toxicity Test Results).. In closing, he emphasized that the new reality of DMMP are high workloads and low resources.

Slides

PP1.1 Sediment Management Annual Review Meeting
PP1.2 (photo)
PP1.3 Where Are We Now
PP1.4 The Big Picture
PP1.5 The Big Picture (continued)
PP1.6 Modifications completed since the last SMARM
PP1.7 Unfinished DMMP Modifications
PP1.8 DMMP Reports Completed
PP1.9 The Big Picture (continued)
PP1.10 Dredging Year 2006 Characterizations
PP1.11 Dredging Year 2006 Characterizations (continued)
PP1.12 Dredging Year 2006 Findings
PP1.13 Dredging Year 2006 Findings (continued)
PP1.14 Dredging Year 2006 Biological Testing Summary
PP1.15 Dredging Year 2006 Projects
PP1.16 Project Updates
PP1.17 Ongoing/Future Projects
PP1.18 Ongoing/Future Projects (continued)
PP1.19 The Big Picture (continued)
PP1.20 Ongoing/Emerging Issues
PP1.21 For more DMMP information

2. DNR 2006 Disposal and Monitoring Activities (Peter Leon, DNR).

Peter Leon began by saying that the DMMP Program was busy with three monitoring events in 2005. Anderson Ketron had a new baseline survey performed (the original baseline was in 1989), Commencement Bay was revisited after receiving material from Blair Waterway, and

Elliott Bay chemical analysis of onsite stations was performed after post dredge monitoring in East Waterway revealed concerns. He thanked John Nakayama of SAIC, Charlie Eaton of the Kittiwake, and the DMMP agencies and staff.

He continued with his annual progress report of the active DMMP sites around Puget Sound, outlining disposal and monitoring activities at Anderson Ketron, Commencement Bay, and Elliott Bay. To summarize, Anderson Ketron's monitoring framework was intended to answer three questions with the following data collection:

1. **Does dredged material remain on site?**
    - Sediment Vertical Profiling System (SVPS)
    - Sediment Chemistry
2. **Are biological effects conditions exceeded?**
    - Sediment Chemistry
    - Sediment Bioassays
3. **Are adverse effects to off-site biological resources observed?**
    - Tissue Chemistry
    - Infaunal Community Structure

The monitoring tools used for the baseline survey were similar to those of a tiered full monitoring event (slide 7). Modifications to testing were SVPS and sediment chemistry, conducted at benchmark stations. Challenges during sample collection included insufficient tissue at all but two stations and sandy conditions at AKB01, requiring a new benchmark station for benthic sampling in the Northwest corner of the site. Results of the survey were good with SVPS results indicating high Organism Sediment Index (OSI), deep Apparent Redox Potential Discontinuity (RPD) Layer, Stage III communities, and a small dredged material (DM) footprint at the center of the disposal site. Sediment conventionals were consistent with the station types, and 2005 chemistry concentrations were lower than 1989 values and all below Sediment Management Standards (SMS), Sediment Quality Standards (SQS), and bioaccumulation trigger (BT) values, with acceptable field variability. All bioassays passed. (A two-hit failure at

AKZ01 was not corroborated by other testing). AKS10 had high *Neanthes* mortality rates, which was not found in a retesting. There was a decrease in arthropods from the 1989 study, which may have been due to sampling differences, timing (after the 2005 seasonal die off of adults and before the juvenile arrival), and/or area-wide trends. All hypotheses were accepted but hypothesis six (no significant decrease to benthic infaunal species abundance offsite) is accepted tentatively, pending a rerun of benthic analysis with a smaller sieve size.

Commencement Bay 2005 monitoring activities included SVPS, which found deep RPD, high OSI, Stage III throughout most of the site, and a recent DM footprint consistent with 2001, 2003, and 2004. A clarification was issued recently regarding the soft-tier guideline proposed in 2002 to increase the soft-trigger to 500,000 CY.

Elliott Bay onsite stations, top 10 centimeters, were tested for the target chemicals of concern (COC) from the post-dredge monitoring results from the East Waterway, with the top 2 cm archived. The 0-10 cm analysis reported PCB concentrations above the DMMP screening levels (SL) for total PCB, which triggered the analysis for the 0-2 cm samples. The 0-2 cm concentrations were lower than 0-10 cm concentrations, but were still above DMMP SL. Explanations for higher levels of PCB in the 0-10 cm interval could be disposal history (placing cleaner material over "less clean" material) or mixing from bioturbation. SVPS results were good with deep RPD, high OSI values, and Stage III communities. Z1 and S2 were the only stations with new DM.

Mr. Leon closed by announcing that Port Gardner will receive a full-monitoring effort as well as a dioxin baseline evaluation in 2006.

Slides

PP2.1 2005 Dredged Material Management Program Monitoring Program

PP2.2 Thank you

PP2.3 Agenda

PP2.4 Puget Sound DMMP Sites

PP2.5 Monitoring Framework

PP2.6 Anderson/Ketron Disposal Site

PP2.7 Baseline Monitoring Tools

PP2.8 2005 Anderson/Ketron New Baseline: Modifications

PP2.9 2005 Anderson/Ketron New Baseline Results

PP2.10 2005 Anderson/Ketron New Baseline Results: Sampling Locations

PP2.11 2005 Anderson/Ketron New Baseline Results: SVPS – Dredged Material Distribution

PP2.12 2005 Anderson/Ketron New Baseline Results: SVPS Analysis

PP2.13 2005 Anderson/Ketron New Baseline Results: Sediment Chemistry

PP2.14 2005 Anderson/Ketron New Baseline Results: Sediment Chemistry (continued)

PP2.15 2005 Anderson/Ketron New Baseline Results: Sediment Chemistry (continued)

PP2.16 2005 Anderson/Ketron New Baseline Results: Tissue Chemistry

PP2.17 2005 Anderson/Ketron New Baseline Results: Bioassays

PP2.18 2005 Anderson/Ketron New Baseline Results: Bioassays

PP2.19 2005 Anderson/Ketron New Baseline Results: Benthic Community Analysis

PP2.20 2005 Anderson/Ketron New Baseline Results: Benthic Community Analysis (continued)

PP2.21 2005 Anderson/Ketron New Baseline Results: Benthic Community Analysis (continued)

PP2.22 2005 Anderson/Ketron New Baseline Evaluation: Does Dredged Material Remain On Site?

PP2.23 2005 Anderson/Ketron New Baseline Evaluation: Has DM disposal caused biological effects conditions to be exceeded?

PP2.24 2005 Anderson/Ketron New Baseline Evaluation: Has DM disposal caused unacceptable adverse effects to biological resources offsite?

PP2.25 Commencement Bay

PP2.26 2005 Commencement Bay Physical Monitoring: Sampling Locations

PP2.27 2005 Commencement Bay Physical Monitoring: SVPS Analysis

PP2.28 Elliott Bay Disposal Site

PP2.29 2005 Elliott Bay Contaminant Study: Sampling Locations

PP2.30 2005 Elliott Bay Contaminant Study: Target COCs

PP2.31 2005 Elliott Bay Results: SVPS

PP2.32 2005 Elliott Bay Results: Sediment Chemistry

PP2.33 Future Activities: Summer 2006

PP2.34 Thank You!

3. SMS Cleanup and Source Control Activities (Kathryn DeJesus, Ecology).

Kathryn DeJesus began by saying that many changes have occurred at the Ecology Toxics Cleanup office. Brett Betts retired and Tom Gries moved to a new program. They have filled vacancies to address new responsibilities: Stacie Singleton will be developing tools, updating guidance, and addressing wood waste guidelines, and Chance Asher will be working on source control, assisted by veteran Sharon Brown. An additional position was filled in Spokane: Brendan Dowling will be working on freshwater sediment guidelines.

Due to headquarters reorganization, SMU is now known as "Aquatic Lands Cleanup Unit" (ALCU). Sections have been split up by functions. Her unit, Land and Aquatic Cleanup, will have more of a focus on cleanup and will lead some cleanups under the PSI. There will be a lot of work and a lot of resources available. She covered the Toxics Cleanup Program's role in the new PSI work, which will cover sediment cleanup as well as upland sites impacting the sound. She said they would also be working with the Water Quality Program to get a handle on source control. They have in-house staff for MTCA rule development and IT, which will work on the redevelopment of SEDQUAL. An interagency design team, led by Noel Marshall, will help address as many needs as possible. Freshwater criteria are under development. Dave Sternberg is assigned to Regional Sediment Evaluation Team (RSET) process.

Resources include funds added to MTCA accounts from gas taxes, remedial action grants, and a partnering with the DNR. These new resources will add fifteen new positions, and additional DMMP support is in the works. When DMMP resources were waning, Ecology got the message and requested an additional full-time position to support DMMP.

Ms. DeJesus moved on to cover the status of state-lead sediment sites. She highlighted work at Skykomish, which has been taking a lot of time and effort. She explained the history of the site as a locomotive refueling station and that approximately 20 acres of land is contaminated with petroleum to fifteen feet deep, with a groundwater path to sediments through seeps. This summer, they will be removing soil and sediment to remove several hundred thousand gallons of fuel to prevent it from entering the river.

Slides

PP3.1 Sediment Management in the Toxics Cleanup Program

PP3.2 Changes in the Toxics Cleanup Program

PP3.3 Staff Changes

PP3.4 The "What" = "Aquatic Lands Cleanup Unit"

PP3.5 Toxic Cleanup Program HQ

PP3.6 The "Why" = Puget Sound Initiative

PP3.7 The "How" = MTCA Increases

PP3.8 The Other "How" = Broader Agency Support

PP3.9 The Other "How" = Broader Program Support

PP3.10 SEDQUAL Redevelopment

PP3.11 Transition to "Enviroqual"

PP3.12 Data Migration Project

PP3.13 some…State Lead Sediment Sites

PP3.14 Skykomish River – BN/SF

PP3.15 That's Enough

4. Regional CERCLA Activities (Sheila Eckman, EPA).

Sheila Eckman presented a snapshot of cleanup activities of the past year. They were able to have a successful year with the help of state partners, federal agencies, consultants, and environmental groups.

Commencement Bay cleanup is almost complete. Hylebos remediation was completed this year with dredging and capping. Thea Foss Waterway, a 71-acre site, was also completed this year, with over 500,000 CY dredged and 30 acres capped. The area around the Occidental facility is severely contaminated and an investigation and cleanup is planned for the next three years. This is a Resource Conservation and Recovery Act (RCRA) corrective action site under a joint effort investigation with Ecology. The joint effort is working very well with an excellent technical team. Ms. Eckman highlighted some details about the Hylebos cleanup, which covered over 80 acres and required dredging of over 1 million CY of sediment. A Commencement Bay fish tissue monitoring will be started to measure the effect of the cleanups.

The Harbor Island update focused on East Waterway, which is in negotiations with the Port of Seattle to do a Remedial Investigation/Feasibility Study (RI/FS) and complete cleanup. Supplemental sampling with cleanup action is expected in the next couple of years. Todd

Shipyard was finished this year and, with careful planning, was completed while the shipyard remained fully operational and was very successful. They have also had positive reviews of the conveyor-belt capping technique and the cable-arm bucket used at the Todd Shipyard site.

The Lower Duwamish Waterway (LDW) is currently in the RI stage with some early actions. Phase II sampling is almost complete. Ecology is the lead for source control. A RI/FS is expected to be complete in 2008 followed by a cleanup decision.

Early action sites include Duwamish Diagonal (which has been completed and is being monitored); Slip 4 with a cleanup plan out soon; T-117; and Boeing Plant 2 (a RCRA site with cleanup expected in 2008). T-117, a Port of Seattle site, had a sediment plan issued but there were recontamination concerns that led to upland sampling. High PCBs were found and delayed sediment cleanup until upland remediation is complete. Lockheed West has just been added to the list and Ecology and Port of Seattle have completed the upland portion of the site. Quendall Terminals, located in Lake Washington, is another new site that has just been added to the Superfund list.

Other sediment projects include Portland Harbor (in the RI stage with two early action sites) and McCormick & Baxter (in-water work completed). Ms. Eckman presented a summary of the progress made over 20 years. With the PSI, EPA is developing a toxics cleanup strategy with a goal to clean up 300 acres of contaminated sediments. In closing, Ms. Eckman presented a slide summarizing national updates, including the release of national contaminated sediment guidance and a directive to the National Academy of Sciences to review dredging at Superfund sites, which will include four or five sites within the Puget Sound Region. In closing, she encouraged anyone with questions or in need of more information to contact the EPA.

Slides

PP4.1 EPA Region 10 Superfund Puget Sound Sediment Cleanup

PP4.2 (map)

PP4.3 Hylebos Waterway

PP4.4 (photos)

PP4.5 (photos)

PP4.6 Occidental

PP4.7 Thea Foss Waterway

PP4.8 Commencement Bay 2006-2007

PP4.9 (map)

PP4.10 East Waterway – Harbor Island

PP4.11 Todd Shipyard

PP4.12 (aerial photo)

PP4.13 (photo)

PP4.14 (photo)

PP4.15 (map)

PP4.16 Lower Duwamish Waterway

PP4.17 Phase 2 Sampling Summary

PP4.18 (photos)

PP4.19 (map)

PP4.20 Terminal 117

PP4.21 T-117 Early Action

PP4.22 Slip 4

PP4.23 (aerial photo)

PP4.24 Boeing Plant 2

PP4.25 Lockheed West

PP4.26 Other Sediment Projects

PP4.27 EPA Superfund Cleanup Progress in Puget Sound to Date

PP4.28 EPA Puget Sound Priority

PP4.29 National Update

PP4.30 EPA Contacts

Wayne Wagner announced there would be time for questions before the break, and reminded audience members to stand and introduce themselves when asking questions or making comments.

Questions/Comments

Question: Allan Chartrand, of Parsons, inquired about the status of the tri-annual review of SMS.

Response: Kathryn DeJesus replied that she has staff working on it and acknowledged that they needed to do better and are happy to hear concerns.

Question: Heather Trim, of People for Puget Sound, asked Sheila Eckman how the EPA's Toxics Strategy will work with PSAT and other programs for the PSI and was wondering if these would be separate efforts.

Response: Ms. Eckman responded that they are still trying to figure out the details of coordination.

Comment: John Dohrmann, Puget Sound Action Team, brought up a toxics report from EVS for EPA and, from that report, EPA has taken the lead to develop a strategy for coordination. He added that there is enough overlap in committees and programs to provide coordination.

BREAK

Wayne Wagner announced the next group of presentations on the Regional Sediment Evaluation Team (RSET) Update and introduced Stephanie Stirling as the first speaker.

REGIONAL SEDIMENT EVALUATION TEAM (RSET) UPDATE
5a. Sediment Evaluation Framework (Stephanie Stirling, Corps).

Stephanie Stirling said she was standing in for Jim Reese. She began her presentation by saying that the general consensus was that the process was worthwhile and workshops over the years have taken place to improve the process, make consistent decisions, and leverage support from higher levels of management. The Sediment Evaluation Framework (SEF) will reduce uncertainties and provide consistent guidance and application with site-specific flexibility.

The RSET relies on technical/policy subcommittees, which are open to everyone, to make recommendations for the Dredged Material Evaluation Framework (DMEF)/SEF revision. She covered the SEF philosophy and progress on the draft SEF. Since the Draft SEF was released for public comment in September 2005, they have begun coordinating with the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS), updating freshwater guidelines, addressing bioaccumulation, and reconciling with other documents, manuals, programs, and policies. The draft review resulted in a variety of comments from ports, agencies,

and environmental groups that ranged from editorial to major technical and policy disagreements. Their job now will be to reconcile these comments and concerns and they do not expect an interim implementation to be signed off for another six months.

5b. Freshwater Guidelines Update (Dr. Taku Fuji).

Taku Fuji took the podium to address freshwater guidelines in the SEF. He said focus has been on marine sites and freshwater guidelines need to be evaluated. One impetus was that the existing Columbia River DMEF SLs are based on Marine/Estuarine PSDDA values. Ecology has been working on a two-phase effort to gather and determine the reliability of existing regional data. The strategy for drafting the freshwater guideline portion of the SEF was increased communication for consistency. He noted that, because of the timeline, a placeholder was included in the 2005 draft using values derived from the Floating Percentile Method (FPM) and was intended to initiate discussion among stakeholders and the regulatory community. He placed emphasis on comments made indicating a significant show of concern regarding the methodologies and current suite of biological tests for freshwater. Trustee agency made comments regarding the Endangered Species Act (ESA), the process for updating SLs, and chemical mixtures. Future work will include a triage for comments, though he is heartened by increased staff. September 2006 is the target for an Interim Implementation Draft.

5c. Bioaccumulation Update (Teresa Michelsen, Avocet Consulting).

Dr. Michelsen was introduced to speak about the bioaccumulation sediment evaluation framework. She said that bioaccumulation testing was previously done on-the-fly based on Tier III evaluation. BTs are currently based on bioassays, not bioaccumulation. They will build a COC list and categories and the DMMP can move forward in developing the guidelines. She acknowledged that the Draft SEF out now has caused some concern that every project will need bioaccumulation testing but said that testing will be required only if there is a problem with bioaccumulation of COCs within the site region or at the site.

Among the comments received, she said none were regarding methods, which were fairly standard by now. Based on comments, they need to identify key terms, perform ground-truthing on practicality and cost of some guidelines, assess endpoints to be used, address suggestions and alternative ideas for interim screening, and discuss bioaccumulation during dredging. A policy conflict observed in the comments was the cleanup agencies' focus on local impacts at specific sites and the regional focus of the RSET.

Dr. Michelsen made mention that in reconvening the bioaccumulation subcommittee, they need an Ecology representative. There is funding for technical consultants to identify input

parameters for human health exposure scenarios. They had hoped to find regional data from the Portland Harbor and LDW studies to help identify input parameters for wildlife and human health exposure scenarios. However, the path from tissue to sediments for a BT value has not yet been defined.

Stephanie Stirling took the podium again to summarize with emphasis that freshwater guidelines are not as developed as marine; there is a good process in place for adaptive management (referring to SMARM) but it needs to be institutionalized regionally and needs to be consistent but also site-relevant. She added that resources are not currently available for the long term goals, which include addressing reference site evaluation process, freshwater bioaccumulation test species, evaluation of a 10-day (versus longer) term freshwater bioassays, and the review and refinement of biological interpretive criteria. She concluded by stating that there will be a beta-test of the RSET process in Portland Harbor.

Slides

PP5.1 RSET/SEF Update
PP5.2 (cartoon)
PP5.3 General Consensus
PP5.4 How Will the SEF Help
PP5.5 RSET Philosophy
PP5.6 SEF Philosophy
PP5.7 What have we accomplished in draft SEF?
PP5.8 What have we accomplished in draft SEF? (continued)
PP5.9 SEF Review Comments
PP5.10 (photo)
PP5.11 Key Issues
PP5.12 Comment Review
PP5.13 Next Steps
PP5.14 (cartoon)
PP5.15-19 Freshwater Screening Values
PP5.20 (cartoon)
PP5.21-25 Bioaccumulation Framework
PP5.26 (cartoon)

PP5.27 Where Do We Go From Here

PP5.28 Where Do We Go From Here (someday)

PP5.29 Portland Beta Test

PP5.30 (photo)

Questions/Comments

Comment: Eric Johnson, Washington Public Ports Association, said he had many policy questions in virtually every aspect of the presentation. He acknowledged DMMP's cooperative multi-agency process with policy changes going through the annual review process, but expressed concern that RSET may dictate policy to DMMP and wanted clarification on "unfunded mandate," a term used in the presentation.

Response: Ms. Stirling responded by saying that the reconciliation she spoke of included the normal DMMP process with a vision of a similar process throughout the region, which would include DMMP agencies and others in the review of RSET policy issues.

Comment: Taku Fuji added that the 1998 Columbia River Program update process was being considered as a larger effort that would encourage consistency, cooperation, and communication.

Comment: Eric Johnson said that Puget Sound and coastal estuaries are not shared with the other states and he was concerned that RSET was to take the place of an unbroken process.

Response: Erika Hoffman, EPA, responded by presenting the bioaccumulation workgroup as an example of fixing a broken process. RSET has taken the reins on that, bringing in new resources and minds.

Comment: Eric Johnson said he found it odd that state agencies did not take the lead on bioaccumulation and that it took place in Oregon rather than in the Puget Sound region.

Response: Dr. Michelsen responded by saying that Ecology had been participating until recently, when funding and staff shortages interfered.

Question: Tom Gries, Ecology asked whether the DMMP will go through the evaluation process on RSET policies. There's room for inconsistency if DMMP does not adopt RSET policies.

Response: Ms. Stirling said she prefers "regionally-specific" to "inconsistent" but that best science should be the ultimate determination.

Comment: Dr. Michelsen added that there would be solid foundation and reasons for regional differences and encouraged everyone to use the evaluation process, and Stephanie agreed and reminded the audience that there are opportunities to participate in the active subcommittees working on new guidance. Get involved!

Wayne Wagner thanked Mr. Johnson for his comments and recognized them as a clear and understandable challenge to RSET and then announced a break for lunch.

BREAK FOR LUNCH

REALLY IMPORTANT PROGRAMS

6. Puget Sound Initiative (John Dohrmann, Puget Sound Action Team).

John Dohrmann, of the Puget Sound Action Team (PSAT), highlighted three elements of the Puget Sound Initiative (PSI): funding for contaminated sites, legislation, and partnership. Their assignment is to identify key actions to recover the Sound by the year 2020, encourage public involvement, create an organizational structure, review funding sources and set spending priorities, and recommend how scientific knowledge should be organized and applied. The key issues are freshwater; habitat protection and restoration; species and food-web; contamination from toxics and nutrients/pathogens; and storm-water.

He wanted to encourage people to participate in the forums and workshops and the May 15 technical forum. Legislation asked the Governor to form a focus group for the "outer coast," the Ocean Policy Workgroup, and earmarked money to make recommendations on issues like erosion, fisheries, natural resources, and aquaculture among others. However, he pointed out that these workshops overlap with PSI Puget Sound workshops.

Slides

PP6.1 Puget Sound Initiative

PP6.2 Puget Sound Partnership

PP6.3 Charges to the Partnership

PP6.4 Issues

PP6.5 May 15 Forum at UW

PP6.6 Six General Public Forums in May

PP6.7 www.pugetsound partnership.org

7. SEDQUAL Updates (Noel Marshall, Ecology).

Noel Marshall of Ecology was introduced to talk about the development and implementation of "the new SEDQUAL." He explained that it would become one central regional repository for both upland and sediment data submission with all data being imported through a web-module. Combining upland and sediment data will be valuable for source control and complex sites that include both elements.

The application will no longer provide a stand-alone system so data must be imported into the Environmental Information Management System (EIM) before utilizing analysis tools. The import module will include a function to allow the user's field names to be mapped to the EIM data field names and that the data format can then be saved as "your profile," a template for future imports. No CDs will be required to store and share data, so versions will no longer be an issue and everyone will be working with the same data from one central database.

So far, EIM has been augmented to accommodate all sediment data types currently housed in SEDQUAL, all surveys and stations have been loaded into production EIM with result data to follow shortly, and a design team has been formed to prioritize work and ensure the resulting product is a fully operating, consistent system.

Future progress hinges on the transfer of data with complete transparency, and trainings will be scheduled for October 2006 for the Phase I deployment. Phase II will be continued for Apparent Effects Thresholds (AET) criteria development, but all other tools and data should be included in Phase I. The system will be open to the public, but will have a login required to control data file download sizes.

Slides

PP7.1 SEDQUAL Redevelopment

PP7.2 Overview

PP7.3 Redevelopment Vision

PP7.4 Why the change

PP7.5 What will change

PP7.6 Benefit gained

PP7.7 What has been done so far

PP7.8 What has been done so far (continued)

PP7.9 Next Steps

PP7.10 Conclusions

PP7.11 Questions?

PP7.12-15 (graphics)

PP7.16 SEQUAL Redevelopment Statement of Intent

Questions/Comments

Question: Erika Hoffman, EPA, brought up the lack of tissue data in SEDQUAL and wanted to know if there would be any commitment for larger projects to include tissue data (like LDW or Portland Harbor).

Response: Noel Marshall responded that the starting point is just to get what is already in SEDQUAL and Kathryn DeJesus added that the need for more tissue data is recognized and that she has funding and staff dedicated to the task. She will have a full-time employee in Environmental Assessment Program for verification and import of data.

Comment: Teresa Michelson expressed concern that there would no longer be a stand-alone application. CDs were an advantage on large projects where users did not want to work with the main database or wait until the data could be verified and imported. For instance, one project may have twenty years worth of data and she doubts that Ecology could handle the verification process so she would still like to have access to a stand-alone system.

Response: Noel Marshall said in response that they will have to figure that out on a case-by-case basis. They're flexible and may be able to provide a stand-alone client application.

Question: Russ Heaton wanted some clarification on the download limits that Noel mentioned when he was explaining the login requirement, and wondered if special permission could be granted for large data downloads.

Response: Noel Marshall said that the EIM has limitations and they have funding to do load testing. But, yes, special permission could be granted for larger data downloads.

Comment: Mark Siipola, USACE, Portland District, said that they use SEDQUAL as their database at the Portland office and said they did not have the funding to switch to the EIM database. He added that although they are happy to share their data, their purpose was not to populate Ecology's database. He also brought up duplicate data, having discovered that some USACE data had been entered into the database twice by unknown sources.

Comment: Noel Marshall said that Martin Payne is in charge of the data migration and they probably won't catch everything, but that this is a great opportunity for a major data cleanup. If anyone knows of data issues, they should definitely contact him via email. Additionally, if there are specific design or programmatic needs, they should be sent to Stephanie Stirling. Agencies are encouraged to get involved. Noel added that, in response to Helen Pressley, Ecology, 90% of the data should be imported in a month or so and that the outliers will be addressed in time for testing in October.

Comment: Roger McGinnis, Hart Crowser Chemist, considered the number of data qualifiers as overzealous and thought they may create inconsistencies and a huge level of effort. He suggested a commercial laboratory representative be included on the team.

Response: Tom Gries defended the list of qualifiers, saying it had already been reviewed by Ecology staff, including PhD chemists, and whittled down from a larger list. He added that the list was driven by Superfund guidelines and would therefore be useful for many applications and programs.

REALLY COOL PROJECTS

8. Puget Sound Naval Shipyard (Ted Benson, Ecology).

Ted Benson began his presentation of the Operable Unit B of the Puget Sound Naval Shipyard (PSNS) by announcing that since SMU had been renamed, he was a proud card-carrying member of the ALCU. He went on to mention his previous presentations on statistical protocols regarding COCs and on an innovative program, Dredge Abuse Resistance Education (D.A.R.E.). Based on his education, experience, and work history, he presented the statistics and mathematics of time, power, money, and knowledge, as well as the command structures in place for work on the PSNS (with the Navy as lead agency, and Ecology providing comments).

He went through the timeline of the site since 2002, which included combined dredging and disposal to the Confined Aquatic Disposal Unit (CAD) and the discovery of a "slosh area" onto state-owned aquatics lands the following year. They addressed that area with 'Enhanced Natural Recovery' (ENR), which is sometimes incorrectly referred to as a thin layer cap, but he wanted to clarify that it is not a cap. Two rounds of post-remedial monitoring have occurred since then, with the five-year review in the near future. The primary objective for the slosh area in the Record of Decision (ROD) was an Area-Weighted Average (AWA) of 3 mg/kg OC-Normalized PCBs, down from the 7.8 mg/kg starting point. The Navy model predicted an AWA of 4.1 mg/kg and that incoming sediments would further attenuate to the site AWA goal. The first round of monitoring revealed that the CAD is working and the ENR is working with Stage III recolonization, but the AWA in the slosh area increased from 7.8 mg/kg to 11 mg/kg. The second round of monitoring draft results indicated that recovery is not working, in his opinion. The Navy is looking at data variability and Mr. Benson used a "chocolate chip cookie" analogy to explain the variability of sediments in Sinclair Inlet, with PCBs as the chocolate chips. Samples were collected, composited, and then subsampled and the data revealed high variability with outliers in the PCB values. He suggested paint chips as a source, where 20% of chipped paint is lost to the environment and are made up of 30% PCBs by weight. He encouraged Ecology to investigate micrographic analysis. To analyze the entire sample, sediments would be milled to micrometer-sized particles for a homogenized sample and would be more representative of an AWA.

Mr. Benson summarized by saying the CAD isolation was doing well and the cap and the ENR were working well there, but other areas of cleanup did not work as they had anticipated. Navy, EPA, Ecology, DNR, and tribes are all committed to the cleanup of this site.

Slides

PP8.1 Puget Sound Naval Shipyard Cleanup Status Report

PP8.2 Our New Unit Title

PP8.3 I Embrace These Changes!

PP8.4 Previous Presentations at SMARM

PP8.5 Statistical Analysis

PP8.6 Statistics (cont.)

PP8.7 An Innovative Program

PP8.8 The Findings

PP8.9 A New Mathematical Proof

PP8.10 Back to My Subject

PP8.11 My Relationship With the Navy

PP8.12 Command Structure of Naval Forces (Navy Viewpoint)

PP8.13 Actual Command Structure

PP8.14 What Does This Have to Do With the Puget Sound Naval Shipyard?

PP8.15 CERCLA Lead Agency

PP8.16 How Does That Apply to the Puget Sound Naval Shipyard (OU-B)?

PP8.17 PSNS Superfund Response Structure

PP8.18 Where We Are Now

PP8.19 Where We Are Now (cont.)

PP8.20 Remedial Action and Monitoring Results

PP8.21 First Round of Monitoring

PP8.22 Second Round of Monitoring

PP8.23 Is Recovery Occurring?

PP8.24 A Technical Discussion

PP8.25 Analogies

PP8.26 The Chocolate Chip Cookie Analogy

PP8.27 Sediment and Chocolate Chip Cookies

PP8.28 (photos)

PP8.29 PCBs – Organic Carbon Normalized

PP8.30 Where Do the Chips Come From?

PP8.31 How Chocolately is your Cookie?

PP8.32 Eat the Entire Cookie!

PP8.33 Analyze the Entire Sample!

PP8.34 Conclusions

PP8.35 Next Year's Presentation

Questions/Comments

Comment: John Wakeman offered an alternative hypothesis regarding PCB associated with charred wood fragments. He added that there is an established basis for how finely sediments are milled and uncertainty can be calculated.

Question: Heather Trim of People for Puget Sound asked whether there was something unique about PSNS that set it apart from other shipyards that would be seeing similar problems.

Response: Mr. Benson said he has looked at other shipyards and can't answer that question but will continue to investigate.

Comment: Doug Hotchkiss, Port of Seattle, offered information on the microscopic grain analysis, a standard geological technique. He explained that paint chips look different than rock grains and they can be targeted.

9. PAH Bioavailability as measured through Fluid Extraction (Joe Kreitinger, RETEC).

Joe Kreitinger said he would talk about the development of screening objectives on the East coast for polycyclic aromatic hydrocarbons (PAHs). He explained that, ten years ago, the need for a better predictor of toxicity was revealed. High variability was found in terrestrial toxicity data and no apparent relationship was found between PAH concentration and toxicity, even when the concentrations were much higher than Probable Effects Concentration (PEC). Risk managers need a better toxicity predictor that considers bioavailability. Hudson River sediments were examined around urbanized areas and fragments of wood and coal were found. They were able to distinguish different types of carbon such as soot, coal, etc. Different types of carbon have

different partitioning and binding characteristics for PAHs, he explained. For example, the phenathrene partitioning coefficient for various types of carbon can be several orders of magnitude different than for natural organic carbon. The point is that basing all the assumptions on a single TOC value is a gross approximation of what is really happening in the environment. Two methods have been developed and evaluated and take into account the bioavailability of PAHs. One method is to measure the concentration of dissolved PAHs in sediment porewater, which was previously an almost impossible task. But now they can measure pictograms of PAHs in very small samples. The second method is super critical fluid extraction, which measures the rapid release of PAHs from sediments. The data results from these methods have been used in EPA's existing narcosis model and the new methods appear to be working. He covered the porewater method in more detail.

Mr. Kreitinger then presented data from their case studies as a graph depicting the relationship between concentration (as toxic units) and dose response, showing correlation. They found in their study that alkylated PAHs, not the parent compounds, are the greatest contributing factor to toxicity of porewater. About 50-94% of the toxicity could be attributed to the alkylated PAHs. Also found in the study were that the majority of PAH toxicity was associated with pitch particles, similar to Mr. Benson's PCB chocolate chips. Their intent is to push the science into the regulatory framework. They plan to generate the case study data, standardize the analytical methods, and get the information out to support regulatory guidance. They have been working closely with the State of New York's Department of Environmental Conservation, and have received interest from New Jersey and the Interstate Technology and Regulatory Council (ITRC). They have also received involvement from industry. In summary, total PAH does not predict toxicity and cannot generate a dose-response curve. Porewater analysis does seem to be able to support toxicity predictions. Mr. Kreitinger encouraged Ecology and EPA Region 10 to get involved.

Slides

PP9.1	PAH Bioavailability and Toxicity at MGP and Aluminum Industry Sites
PP9.2	Survey to Characterize PAH Toxicity and Bioavailability at MGP and Al Smelter Sites
PP9.3	No Apparent Relationship Between [PAH] and Toxicity
PP9.4	The TEC and PEC Do Not Predict Toxicity at MGP and Aluminum Smelter Sites

PP9.5 Predicting Sediment Toxicity

PP9.6 Approaches for Assessing Bioavailability

PP9.7 Survey of Hudson River Sediments Demonstrated Presence of Natural and Anthropogenic Carbon

PP9.8 Range in Organic Carbon – Water Partitioning (Koc) of Phenanthrene

PP9.9 Two Chemical Methods Have Been Developed and Evaluated

PP9.10 Applying Site Specific Measures of Chemical Availability to Reduce Uncertainty

PP9.11 Ultra Low Level Analysis of Sediment Pore Water

PP9.12 Detection Limits for Representative PAHs

PP9.13 SPME Fiber Injection into GC/MS

PP9.14 We Now Have a Method that Allows Rapid Determination of Sample Specific Koc Values

PP9.15 Case Studies to Assess Tools for Predict Bioavailability

PP9.16 Toxicity Can Be Predicted by Measuring Dissolved [PAH] in Pore Water

PP9.17 Probit Analysis of EPA

PP9.18 Alkylated PAHs Dominate the Toxicity of Pyrogenic PAH Sources

PP9.19 Alkylated PAHs Dominate the Narcotic Potential of Even Pyrogenic Sources

PP9.20 Sediment Contaminant Bioavailability Alliance

PP9.21 Sediment Contaminant Bioavailability Alliance (continued)

PP9.22 Summary

Questions/Comments

Comment: Jack Word was surprised that there was no toxicity at 1-5 toxic units.

Response: Mr. Kreitinger attributed that to the hydrocarbon narcosis model, which includes some built-in assumptions.

Question: Erika Hoffman, EPA, wondered if there had been any similar studies done in the marine environment and what bioassays were used.

Response: Mr. Kreitinger answered that there will be a St. Lawrence River case study and that bioassays depend on the favorite organism of the location.

Comment: Erika Hoffman, EPA, commented on the coal-PAH focus the presentation and mentioned that Puget Sound is a mix of petroleum and coal-related marine sites. She asked whether the findings would be relevant to a marine petroleum-source site.

Response: Mr. Kreitinger explained that it was more the "type" of carbon, not the source. In an urban environment you would find soot carbon. His answer was "yes," it is relevant in urban environments. And, the PAHs from petroleum that would be driving toxicity would probably be the alkylated PAHs.

Question: Erika Hoffman, EPA, also commented on the contribution of alkylated versus parent PAHs to toxicity, and asked whether Toxicity Identification Evaluations or TIEs had been run?

Response: No, he answered, only the narcosis model was used. But other folks were working on that part of the equation.

Comment: Teresa Michelson commented that PAHs, as they are currently measured, are not that useful. Bulk petroleum was once thought to be irrelevant but she found recently that those sediment quality values may be more reliable than PAHs values. The remainder of what is in the sediment is important. For instance, she's seen toxicity with bulk petroleum, but with none of the sixteen PAHs.

Response: Mr. Kreitinger responded that if you look at the distribution of alkylated PAHs versus parent PAHs with bulk petroleum, 99% would be alkylated.

Comment: Ms. Michelson expressed concern that while they may have a great model for PAHs, it may be missing other important data.

Response: Mr. Kreitinger responded that major petroleum sites evaluated with sediment porewater analysis did not find TPH or alkates, but alkylated PAHs.

Comment: Richard Jack, King County, expressed concern about limiting toxicity data to *Hylella azteca*. He sees more of a relationship with toxicity and anoxic conditions that results in "asphyxiation before poisoning." If benthic indwelling organisms were included, he could more easily accept the connections and conclusions.

Response: Mr. Kreitinger explained that it was only limited due to resources that they picked many sediments but few endpoints. They selected *Hylella azteca* because they thought it was very sensitive, but they would like to have included more organisms. He reminded the audience that this study was only including freshwater data and that they needed to evaluate marine data.

10. The Cleanup Level Derivation for Gasworks Park (Ann Fitzpatrick, RETEC).

Kathryn DeJesus began the presentation, stepping in for Pete Adolphson, by explaining that this site was originally with the EPA, but then transferred to Ecology, collaborating The RETEC Group, Inc., Puget Sound Energy, City of Seattle, Floyd|Snider, WR Consulting, Inc., ARI, Inc., and Nautilus Environmental, LLC.

The upland remedy was complete and sources to sediment have been controlled and they are now entering the RI/FS phase. ***Ann Fitzpatrick*** gave an update on the RI/FS progress and said that the FS objectives were to identify a cleanup level and identify areas where it would be applied. She emphasized that the focus of the presentation was on the process and the questions asked during the study design, not the results. ***Ms. Eckman*** presented a summary of chemistry and bioassay data and spatial and temporal trends at the site. She then presented the five steps they took to derive a cleanup level, and covered the key questions asked to determine the study design. First, they identified correlation among parameters to reduce the set of parameters to about fifteen. Second, they used cluster analysis to identify spatial correlation in PAHs and bioassay results to create a subset of sample locations. Third, they evaluated which parameters had the most bioassay variability with stepwise regression. PAH was identified as the dominant variable and had the most predictive power of toxicity for *H. azteca* and *C. tentans* survival, but had no predictive power for either *C. tentans* growth or Microtox®, so those endpoints were not used in determining the cleanup level. Fourth, they identified levels at which adverse biological effects occur. She presented the no effects concentration (NOEC) and low effects concentration (LOEC) for five bioassay endpoints and said they used a concentration-response curve to verify those levels. Once the influence of metals was removed, total PAH (TPAH) was found to be a strong indicator variable for biological response. TPAH effects concentrations were consistent with emerging data regarding PAH-binding carbon. Finally, a site-specific cleanup screening level (SCSL) for TPAH and a site-specific sediment quality level (SSQL) were derived

specifically for Gas Works sediments. A site boundary was delineated by bioassay passes/failures and, although Microtox was not used in the cleanup level derivation, it was used for boundary delineation. The toxicity effects-based site boundary was refined where interference from other parameters was present. In closing, Ms. Fitzpatrick made a special note on behalf of Pete Adolphson that the toxicity values derived were only applicable to this site.

Slides

PP10.1 Site-Specific Cleanup Level Determination Process
PP10.2 Acknowledgements
PP10.3 The Gas Works Park Sediment Area
PP10.4 Study Objectives
PP10.5 Site Chemistry Trends
PP10.6 2002 Sediment Toxicity Results
PP10.7 Site-Wide Toxicity Results
PP10.8 A 2005 Collaborative Approach
PP10.9 Key Questions
PP10.10 Which Parameters are Important?
PP10.11 Groups and Outliers?
PP10.12 Which Variables Best Explain Toxicity?
PP10.13 Chemicals Explaining Toxicity?
PP10.14 Levels at Which Toxicity Observed?
PP10.15 Findings
PP10.16 Findings (continued)
PP10.17 Thank you!
PP10.18 Reserve Slide: Bioassay Sampling Events
PP10.19 Reserve Slide: Stepwise Regression Results
PP10.20 Reserve Slide: Clusters and Outliers?

BREAK

PUBLIC ISSUE PAPERS

11. A Call for Renewal of the Dredged Material Management Program (Eric Johnson, Washington Public Ports Association).

Eric Johnson began by explaining that the title appearing on the agenda was actually the first line of his comment letter and a more appropriate title was "A Call for Renewal of the Dredged Material Management Program." He presented his conclusions first and said DMMP was successfully created from a crisis, where a judge issued an injunction against an open-water disposal site, garnering policy attention from high levels. All four agencies came together in cooperation, to develop solutions and contribute resources for policy and technical needs. Over the years, the trend has been diminishing resources, increased workloads, and staff turnover. He emphasized that his presentation was not intended to point fingers, but was to encourage, in a cooperative spirit, reinvigoration of the program. The world recession is over, Mr. Johnson said. Increased cargo is expected and marine expansion projects are needed. Interesting issues facing this region are that rail capacity is running out and non-container cargo is being squeezed out of Sea-Tac to places like Olympia and Everett. The issues of concern he sees are diminished director-level participation, increasingly complex regulatory decisions and overlapping laws, a lack of adequate policy forum causing individual projects to become policy forums, and a troubling trend towards less transparent decision-making. SMARM was once a forum for high level policy, but has become more technical, leading to 'projects as forums' for regional policy debates. Mr. Johnson suggested solutions such as a multi-agency director-level renewal of commitments to the program, an assessment of the resources needed by the DMMP, and a return to making policy-level decisions in predictable, transparent forums with broad input. In closing, he emphasized that his suggestions were being presented in the spirit of support and cooperation.

Slides

PP11.1 A Call for Renewal of the Dredged Material Management Program

PP11.2 Overview

PP11.3 History

PP11.4 Trends

PP11.5 Issues of Concern

PP11.6 Solutions

PP11.7 Questions?

Questions/Comments

Question: Allan Chartrand asked whether the PSI could kick-start policy development and bring in new resources and a new level of commitment.

Response: Eric Johnson doubted that PSI would get down to that level and DMMP doesn't fit with the objectives of PSI, but perhaps it could be included in the governance model.

Comment: Erika Hoffman, EPA, appreciated and agreed with many elements of the presentation, but as a clarification to the regulatory community, she wanted to add that they once had resources for broad policy development made at a slower pace with open forums as recently as 5 years ago. She disagreed that policy development was occurring solely within specific projects, but agreed that issues do get raised by projects. A quick decision is often needed by DMMP regarding site-specific issues, but presented and evaluated by open forum later. For certain projects and chemicals that are controversial, policy and programmatic decisions are difficult due to lack of resources.

Question: Brad Helland, Ecology, wanted to know which policy decisions required director level input. He commented that the lack of involvement from higher levels is more importantly about resources, not policy.

Response: Eric Johnson responded by saying that director level needs to familiarize with the DMMP program and assess resources as a start. Once they're past the resource issue, they can work on getting a collective consensus on policy level issues such as bioaccumulation, ESA, and DMMP and cleanup law interaction. In closing, Mr. Johnson expressed appreciation for all of the work done by DMMP agencies and recognized the difficulty of the past 12 months with staff turnover. He emphasized his appreciation for Dave Kendall's hard work over the last 20 years as the "center of gravity" for the dredging world.

12. Dredging Residuals Analysis (Clay Patmont, Anchor Environmental).

Clay Patmont gave an update on the residuals issue and the national attention recently given to the topic, which will include a lot of discussion of the Pacific Northwest. EPA guidance acknowledges that the concept of residuals is not well understood, though it may be one of the most significant factors of whether a site may be dredged or not. Mr. Patmont stated his primary

objective at SMARM was to get more information and extend a plea for data for statistical conclusions to be drawn from mass-balance calculations. He explained the physical characteristics of both undisturbed sediment (cohesive, can be dredged) and generated residuals (only approximately 1.5 cm thick, difficult to dredge, and often with a dry weight concentration equal to the prism concentration), both left over after dredging. He presented case studies from many sites that indicate sloughing with mechanical and hydraulic dredging, and approximately 2-9% of the mass of the contaminant ending up in the residual. Data reveal that a controlling factor seems to be the magnitude of the chemical exceedance and the softness or dry density of the sediments (with softer sediments creating higher residuals). Datasets available will include Hylebos Waterway; Grasse River, NY; and Duwamish Diagonal, especially useful for long term change observation in residuals. An impetus for gathering data by June is the National Academy of Science dredging technical review. In conclusion, residuals happen. They only have case histories but they need a model for prediction and planning. Feasibility study, design, and construction phases need to have ongoing evaluations of residuals.

Slides

PP12.1 Dredging Residual Analysis

PP12.2 Outline

PP12.3 Conceptual Illustration of Environmental Dredging and Processes

PP12.4 Dredge Residual Definitions

PP12.5 Conceptual Illustration of Dredging Residuals

PP12.6 Dredge Residual Definitions, cont.

PP12.7 Generated Sediment Residuals Defined

PP12.8 Primary Sources of Generated Residuals

PP12.9 Hydroacoustic Signature of Turbidity Plume During Dredging

PP12.10 Generated Residual Characteristics

PP12.11 Pre- and Post-Dredge Sampling Data

PP12.12 Suggested Approach to Characterize Generated Dredge Residuals

PP12.13 Generated Dredge Residual Data

PP12.14 Case Study: Fox River OU-1 (2005)

PP12.15 Generated Residual Case Studies

PP12.16 Generated Residuals versus Dredge Prism Dry Density

PP12.17 Generated Residuals: Probable Controlling Factors

PP12.18 Upcoming Reports

PP12.19 Summary

Questions/Comments

Question: John Wakeman, Seattle Corps, asked if there was discussion regarding a protocol to measure residuals at their recent conference. He mentioned seeing other residual protocols online and wondered if there were too many ways of looking at the problem.

Response: Mr. Patmont responded that Puget Sound was the largest contingent at the conference and he thought the Puget Sound Ambient Monitoring Program (PSAMP) protocol would be a starting point and foundation.

Question: Erika Hoffman, EPA, asked if dredging can be contained or modified to reduce residuals.

Response: Mr. Patmont said that it was a group consensus that there is no correlation with silt curtains or rate of dredging and residual concentrations. For instance, Fox River had a lot of planning, oversight, and control but was still left with 5-9% of mass after very careful dredging.

Question: Richard Jack, King County, asked if it made a difference with stiff clay or hard-pan.

Response: Mr. Patmont said it did have a small effect but did not change the outcome much.

Wayne Wagner wrapped up by instructing attendants to submit comments by June 5th and announced a break while the panel discussed and summarized the meeting.

Break

SUMMARY

Dave Kendall summarized the highlights of the meeting:

- The need to implement a regional prerogative to address differences in RSET and DMMP processes, policies, and approaches.
- SEDQUAL data qualifiers need to be reevaluated in consultation with laboratories, and the concern regarding the availability of a stand-alone application needs to be addressed.
- DMMP needs renewal at the director level with a focus on providing resources that match increasing workloads and policy development needs.

Meeting was Adjourned

ATTACHMENT 1: SUMMARY OF PUBLIC ISSUES

AND AGENCY RESPONSES

SMARM PUBLIC ISSUES
AND DMMP/SMS AGENCY RESPONSES.

1. The WPPA (Eric Johnson) questions the relevancy of the regional Sediment Evaluation Framework (SEF) to the highly successful Dredged Material Management Program (DMMP). He also questioned how the SEF would interface with State/Federal Cleanup Programs.

Response: The SEF provides a regional sediment evaluation process that is very similar to the existing DMMP process. The changes proposed in the SEF are primarily on a technical level. The SEF does not abrogate any agency authorities. The interface with state and federal cleanup programs is explained in the SEF, but in general, the Framework allows a comprehensive approach to sediment projects and provides a useful resource. Consistency between the SEF and CERCLA may not always be achievable or desirable.

2. Several concerns were expressed on the migration of SEDQUAL to the EIM internet-based platform.
    a. Concerns were expressed for the large number of data qualifier codes and associated quantitation limits definitions being considered, and the suggestion was made that laboratory practitioners should be consulted on the value of the selected qualifier codes, the intent being to reduce the number significantly.

Response: Ecology would like to clarify that qualifying sediment data for entry into the new system does not require using all the data qualifiers presented, only those that are appropriate. The qualifiers presented at the SMARM are those that are consistent with the EIM database and, therefore, different qualifiers for incoming sediment data may have to be converted internally prior to entry into the system. Ecology would like to encourage the use of the basic qualifiers presented, which are currently used by EPA, when possible to streamline the process and reduce conversion error potential. Sediment data should continue to be qualified appropriately by laboratories according the approved sediment sampling and analysis plan under which sediment data are generated.

    b. Portland District (Mark Siipola) expressed its concern that the Regional Sediment Evaluation Team (RSET) had adopted SEDQUAL as the database platform for all regional sediment evaluation data, yet SEDQUAL is now being subsumed by EIM. Thousands of dollars are being spent to enter data into a stand alone SEDQUAL platform at Portland District. Mark is not convinced that the EIM internet-based SEDQUAL platform will work for the RSET dredging data.

Response: SEDQUAL is being updated consistent with EIM. It will retain all current functionality, with the main difference being that the data will be stored apart from the analytical tool component. Ecology's design team invited RSET and USACE, both Seattle and Portland Districts, to participate in the redevelopment project and has worked successfully with theses major SEDQUAL stakeholders to address all their concerns. Ecology's IT staff resolved the

overriding concern about the web based versus stand alone version of the tool by designing a component which will allow the download of large amounts of data for analysis by the user.

3. The WPPA (Eric Johnson) called for a DMMP renewal and Agency Director level attention to the currently inadequate resources/high workloads. He expressed concerns that current DMMP staffing levels are inadequate to provide sufficient policy development on emerging sediment quality issues like "dioxin". Eric was also concerned that the DMMP process was becoming less transparent, with more policy being developed during the course of project-specific deliberation, rather than through the annual review process.

Response: The DMMP agencies will convene the DMMP agency Directors as soon as possible to focus attention on the DMMP resource/workload issue. The DMMP agencies are preparing for Stakeholder Workshops to develop a dioxin regulatory decision-making framework that could be applied to non-dispersive sites in Puget Sound. They will also explore alternatives for regulating dioxin at dispersive sites. The Stakeholders Workshops will be moderated by Ecology, and will broadly reach out to all interested parties to participate and provide input to the DMMP agencies for consideration.

4. A post-SMARM comment letter (attached) from Mr. Tim Thompson (Science & Engineering for the Environment) underscored the concerns expressed by Eric Johnson regarding DMMP staffing shortfalls and increased workloads, and suggested contractors may be able to assist DMMP in addressing some workload deficiencies as a short term solution.

Response: The DMMP agencies thank Mr. Thompson for his long time support of the DMMP and for his letter and thoughtful recommendations. The DMMP agencies have also discussed using contracts to offset the staff reductions on a limited basis to address workloads issues. We will continue to review all available alternatives to address workload issues during this difficult period. Unfortunately, the human resource reductions also come at a time when several of the DMMP agencies are also experiencing very tight monetary budgets, and finding the funding for contractor support continues to be a challenge. However, we are pleased to report that Ecology has filled a new DMMP position (Dr. Laura Inouye), and DNR has recently filled the DNR DMMP staff position (Courtney Wasson) recently vacated by Mr. Peter Leon in September 2006. These two staff will certainly help to address ongoing workload issues.

SEE LLC
Science & Engineering for the Environment

July 11, 2006

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SENT VIA EMAIL

This letter is written to express concern, and recommend a solution for solving the staffing and resource problems currently facing the Dredged Disposal Management Program (DMMP). This letter is intended to serve as a comment letter to the recent Sediment Management Annual Review Meeting (SMARM). While I have addressed this letter to both the Corps and Ecology who co-signed the 2006 SMARM invitation letter, the subject is also relevant to the other two DMMP agencies; USEPA and the Department of Natural Resources.

For 18 years the DMMP agencies have successfully managed the characterization and disposal of dredged sediments. This effective management of dredged materials has been vital to the marine commerce in Puget Sound, and by extension, marine commerce is dependent upon a well-managed, efficient DMMP. What the dredging and regulated sediment community learned at the SMARM is that that the DMMP agencies are currently unable to provide sufficient review and oversight on sediment projects due to high workloads and diminished staff.

Changes in staffing and workload are apparent in review this, and previous year SMARM presentations. The full-time-equivalents at the four Agencies comprising the DMMP has gone from a high of 7 in 1995 to just over 5 currently. In that same period, the review workload has increased from 10 projects with a total volume of 1 M cubic yards (cy) in 1990, to 20 projects with over 3.5 M cy in 2006. The net result of staff loss and workload increase is a slowdown in review and approval for dredging projects.

In addition to losses of key Agency sediment staff through a combination of budget cuts, retirement or transfers to other programs, the DMMP is stretched further by the needs of other important regional programs. These include the Regional Sediment Evaluation Team, contaminated sediment reviews associated with both the MTCA and CERCLA programs, as well as the new Puget Sound Partnership initiative from Governor Christine Gregoire. Because many of the same agency staff are involved in these other initiatives and/or contaminated sediment projects, the review and cycle time on those projects is equally strained. These processes are expected to increase, placing further strain on the overall programs.

Clearly these problems need resolution, and the staffing needs of the DMMP over the long haul will be better served by permanent, dedicated staff at the DMMP agencies. A shorter-term

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solution is needed; hiring of external contracting support. There are several elements of the DMMP process that could be managed more efficiently by external contract help. These could include:

- Technical reviews of the SAPs and submitted testing reports
- Review of the submitted data for adherence to the PSEP QA/QC parameters
- Assist in the development of the SMARM
- Help develop the Commencement Bay NEPA/SEPA evaluation disposal site alternatives

The resources to hire contract support staff could come from an increase of 5 cents/cy of dredged material sent to the PSDDA disposal sites. While the over-all program costs have increased, overall the disposal costs have remained constant. A nickel increase per cubic yard appears to be a reasonable solution. The major disposal site customers should be canvassed for their opinion, as the economic burden is transferred to the cities, counties, and port authorities involved in dredging projects. I suspect that these same customers are already experiencing economic losses due to project delays caused by the DMMP staffing shortages and, provided that any increase was specifically earmarked to provide shorter review cycles by hiring review staff, the nickel increase is offset by savings from shorter review times on projects.

As a member of the scientific community working in the field of dredged and contaminated sediment management, it has been my pleasure to have been there at the birth of the PSDDA program with the Everett Navy Homeport, and to have continued to work with the DMMP on sediment projects to this date. Much of my work takes me to other parts of the country, where the programs here in Washington State are admired and emulated. The men and women who built and maintained this program over the years are to be commended, and have my own personal thanks for their dedicated effort.

Thank you for your consideration in this matter.

Sincerely,

Timothy Thompson
Senior Scientist
SEE, LLC

Cc: David Kendall, USACE
Peter Leone, WDNR
Doug Hotchkiss, Port of Seattle
Eric Johnson, Washington Public Port Association

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ATTACHMENT 2: AGENDA

2006 Sediment Management Annual Review Meeting

May 2, 2006
Federal Center South, Seattle
Galaxy Conference Room
Hosted by EPA, Region 10

Registration and Coffee **8:30-9:00**

Opening Remarks to SMARM 2006 (Michael Bogert, Regional Administrator, EPA Region 10) **9:00-9:15**

Agency Summary Reports **9:15-11:00**

- Corps (Summary of DMMP Testing Activities, TBD, Corps)
- DNR (Summary of DNR Disposal and Monitoring Activities, Peter Leon, DNR)
- Ecology (Summary of SMS Cleanup/Source Control Activities, Kathryn DeJesus, Ecology)
- EPA (Summary of Regional CERCLA Activities, Sheila Eckman, EPA)

BREAK **11:00-11:15**

Regional Sediment Evaluation Team (RSET) Update **11:15-12:15**

- Sediment Evaluation Framework Update
- Freshwater Guidelines Update
- Bioaccumulation Update

LUNCH (on your own) **12:15-1:15**

Puget Sound Initiative Update (John Dohrmann, PSAT) **1:15-1:30**

SEDQUAL Updates **1:30–2:15**

Really Cool Projects **2:15-3:00**

- Puget Sound Naval Shipyard (Ted Benson, Ecology)
- The Cleanup Level Derivation for Gasworks Park (Ann Fitzpatrick, RETEC)
- PAH bioavailability as measured through Fluid Extraction (Ann Fitzpatrick, RETEC)

BREAK **3:15-3:30**

Public Issue Papers **3:30-4:30**

Summary and Closing **4:30:4:45**

Deadline for written Comments on SMARM 2006: June 5, 2006

Draft March 30, 2006

ATTACHMENT 3: LIST OF ATTENDEES

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ATTACHMENT 4: POWERPOINT SLIDES FOR EACH SMARM SPEAKER

MEETING OBJECTIVES AND PURPOSE

- Obtain public input on proposed changes to the DMMP Management Plans through **Issue Papers** and **Clarification Papers.**
- Discuss disposal site management actions and changes.
- Summary of Ecology Cleanup Activities
- Summary of EPA Regional Cleanup Activities

0.3

MEETING OBJECTIVES AND PURPOSE (continued)

- Review recent past project testing activities, and Obtain public input on proposed changes to the DMMP.
- Presentation and discussion of Public Issue Papers.
- Comments and discussion on Status Reports of ongoing actions of DMMP and SMS Program.

0.4

Summary and Closing

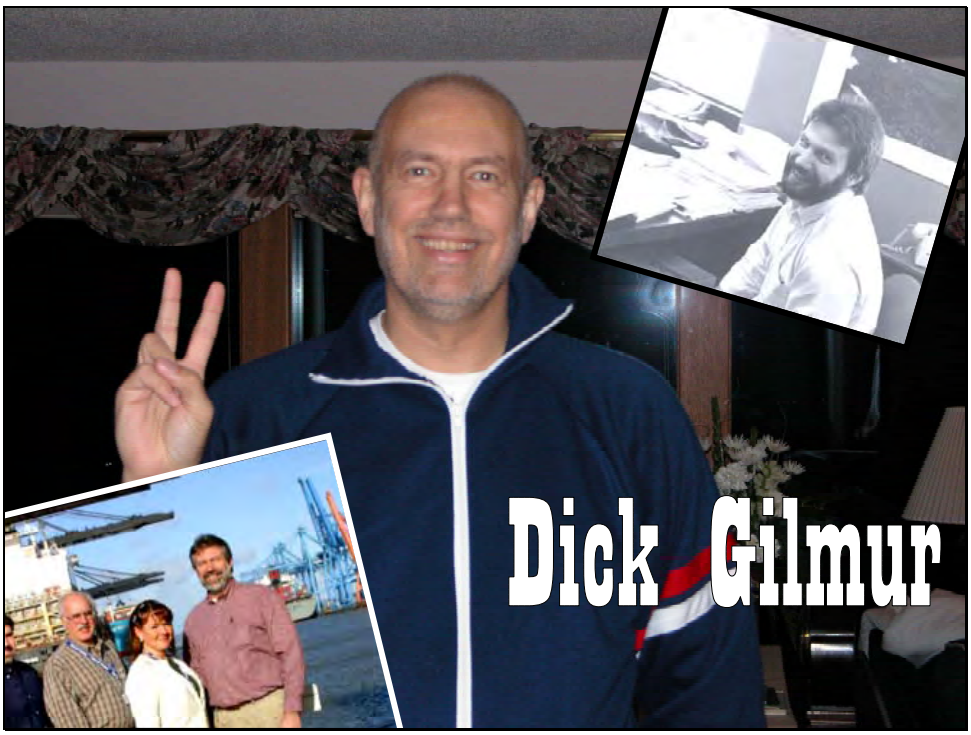
⌘ **Public Issues Summary**: Written comments may be submitted on the SMARM proceedings, but must be submitted to the DMMP agencies by **June 5, 2006** for consideration.

⌘ **SMS Issues Summary**: Written comments on SMS issues presented at SMARM may be submitted to SMS for consideration until **June 5, 2006**.

0.5

Anne Robinson

0.6



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SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING

May 2, 2006

Dredging Year 2006

DMMP Testing Activities Summary

1.1

After 22 years sediment/water quality problems persist, but Governor Gregoir's Puget Sound Initiative will build on the Puget Sound Plan to tackle this problem!


TIMES SPECIAL REPORT

JUNE 10, 1984

the

MPERILED SOUND

eautiful Puget Sound
clearly contaminated,
ut just how sick is it?

1.2

Where Are We Now

- We still lead the nation in interagency coordination on sediment issues
- However, DMMP resources are currently stretched to the breaking point.

1.3

The Big Picture

1. DMMP modifications since last SMARM
2. Dredging Year 2006 Testing & Evaluation
3. Future challenges

1.4

The Big Picture

1. DMMP Modifications and Reports since last SMARM
2. Dredging Year 2006 Testing & Evaluation
3. Future challenges

1.5

Modifications completed since the last SMARM…

- Clarification: Summary of the Site Use Authorization Requirements for WDNR
- Clarification: Sediment Larval Test Species recommended for DMMP

1.6

Unfinished DMMP Modifications…

- Issue Paper: SMARM Process: Reducing levels of Effort
- Clarification: Sediment Management Programs: Consistent Interpretation of Toxicity Test Results

1.7

DMMP Reports Completed

- 2005 Sediment Management Annual Review Summary Report completed and posted to DMMO website
- Biennial Report for Dredging Years 2004 and 2005 (testing activities and monitoring) completed and posted to DMMO website

1.8

The Big Picture

1. DMMP modifications since last SMARM
2. Dredging Year 2006 Testing & Evaluation
3. Future challenges

1.9

Dredging Year 2006
Characterizations

- June 16, 2005 – June 15, 2006
- 24 Projects underwent DMMP review
- 7 projects with testing: Suitability Determinations completed
- 9 projects without testing: DMMP tier-1 review suitability completed
- 5 Projects with ongoing testing

1.10

Dredging Year 2006
Characterizations (continued)

- 3 projects with upland disposal
- 3 Recency Extensions, 2 Volume Revisions
- Total Volume of projects undergoing DMMP review = 925,854 cy

1.11

Dredging Year 2006
Findings

- No unsuitable material for unconfined-open water disposal
- 1 project with bioassay testing (4 DMMUs)
- NO bioaccumulation testing conducted this year

1.12

Dredging Year 2006 Findings (continued)

- Three projects had recency extension approved without additional sampling/testing
- 4 projects evaluated for beneficial use suitability

1.13

Dredging Year 2006 Biological Testing Summary

- Only 4 DMMUs subject to biological testing
- Amphipod bioassay: Passed DMMP dispersive site guidelines
- Sediment bivalve larval bioassay: *Mytilus galloprovincialis*: Passed DMMP dispersive site guidelines
- Juvenile polychaete growth bioassay: Passed DMMP dispersive site guidelines

1.14

Dredging Year 2006 Projects

- Projects over 100,000 cy:
  - Point Roberts Marina (164,000 cy)
  - Olympia Harbor Joint Federal/Port Project (525,000 cy) testing ongoing for dioxin/furans
- Most projects under 50,000 cy (e.g., 22)
- 3 projects in MTCA cleanup areas
- Clean material in demand for beneficial uses

1.15

Project Updates

- Projects in areas with known/suspected dioxin/furan concerns currently receiving high attention from DMMP
  - Olympia Harbor Project (joint Corps / Port of Olympia)
  - MJB Properties Project, North Dock, barge channel 2, Anacortes
  - Port of Bellingham / I&J Waterway

1.16

Ongoing/Future Projects

- Port of Tacoma / Blair Waterway (future large exploratory project for outer portion of Waterway)
- Port of Seattle Terminal 30 (59,000 cy)
- Port of Seattle Terminal 91 (11,500 cy)
- Port of Seattle Shilshole Bay Marina (650 cy)
- Grays Harbor O&M (1.8 million cy)

1.17

Ongoing/Future Projects (continued)

- Quillayute O&M (100,000 cy)
- Keystone Harbor O&M (30,000 cy)
- Seattle Harbor O&M (100,000 cy)?
- Willapa Harbor O&M (30,000 cy)?
- Swinomish Channel O&M (60,000 cy)?

1.18

The Big Picture

1. DMMP modifications since last SMARM
2. Dredging Year 2006 Testing & Evaluation
3. Future challenges

1.19

Ongoing/emerging Issues

- Z samples characterizations of new surface in high concern areas
  - Port of Seattle/Terminal 103 (surface degraded)
  - Seattle Parks Department, South Lake Union
- Dioxin/Furans: establishing DMMP regulatory limits for interpretation
- Beneficial Uses Interagency Forum
- Resolving Regional Sediment Evaluation (RSET) technical/policy conflicts with DMMP/CSMP
- Finding New Resources to Manage the Workload!

1.20

For more DMMP information

http://www.nws.usace.army.mil/index.cfm

Click on “Civil Works” then “Dredged Material Management”

2005 Dredged Material Management Program Monitoring Program

Anderson/Ketron New Baseline Monitoring
Commencement Bay Physical Monitoring
Elliott Bay Contaminant Investigation

Peter Leon

Washington Dept. of Natural Resources

Region 10

Seattle District

2.1

Thank you

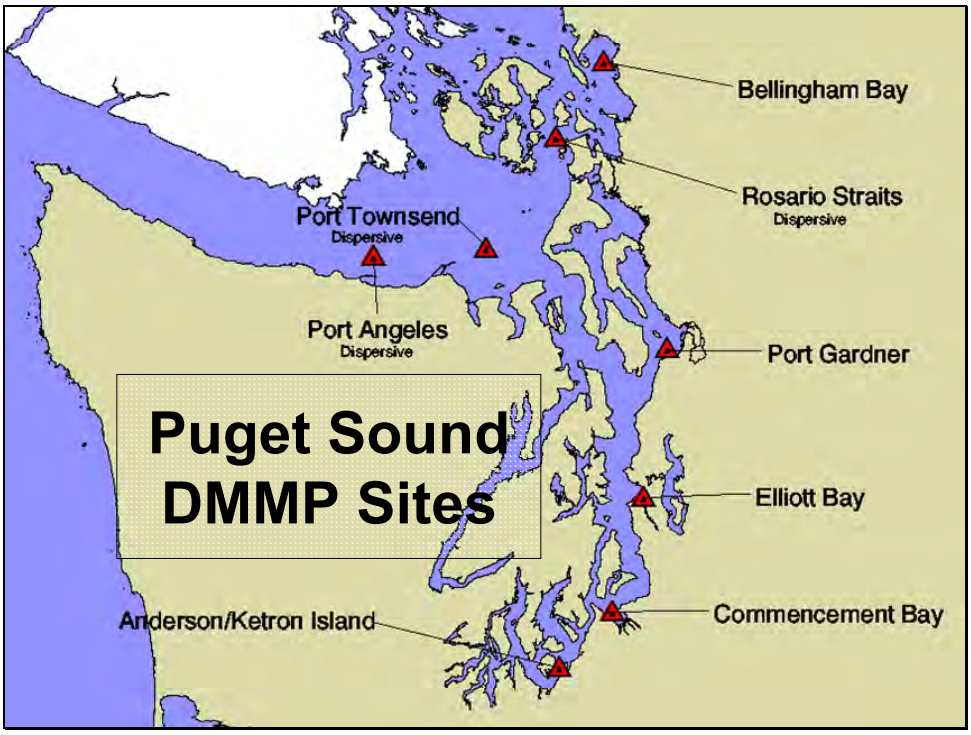
- John Nakayama, SAIC
- Charlie Eaton, R/V Kittiwake
- DMMP Agencies

2.2

Agenda

- Disposal Site Locations
- Monitoring Framework
- Anderson/Ketron New Baseline
  - Summary of Previous Conditions
  - 2005 Modifications
  - 2005 Results
  - 2005 Evaluations
- Commencement Bay Physical Monitoring
- Elliott Bay Contaminant Investigation
- Future Activities & Disposal Summary

2.3



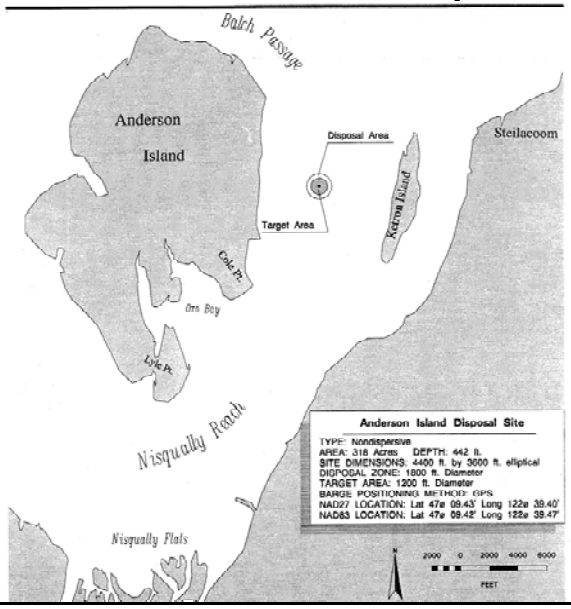
2.4

Monitoring Framework

1. Does dredged material remain on site?
   - Sediment Vertical Profiling System
   - Sediment Chemistry
2. Are biological effects conditions exceeded?
   - Sediment Chemistry
   - Sediment Bioassays
3. Are adverse effects to off-site biological resources observed?
   - Tissue Chemistry
   - Infaunal Community Structure

2.5

Anderson/Ketron Disposal Site



2.6

Baseline Monitoring Tools

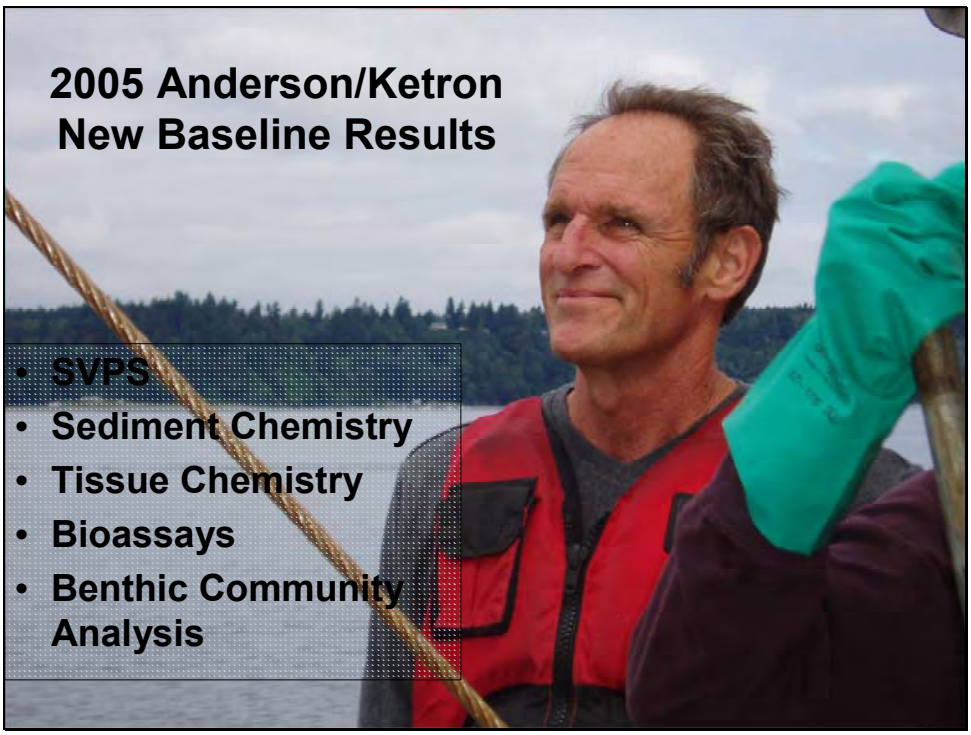
	SVPS	Sed. Chem.	Bioassays	Benthic Infauna	Tissue Chem.
Zone Station (Z)	✓	✓	✓		
Site Station (S)	✓	✓	✓		
Perimeter Station (P)	✓	✓			
Transect Station (T)	✓			✓	✓
Benchmark Station (B)		✓	✓	✓	✓
Cross Station (C)	✓				
Floating Station (F)	✓				
Reference Station (R)			✓		

2.7

2005 Anderson/Ketron New Baseline: Modifications

- **Tissue Chemistry**
  - **Target organisms (Compsomyax and Molpadia) scarce**
  - **Triplicate tissue collected only at AKT01 and AKB03**
- **Benthic Sample Collection**
  - **Sandy sediments at AKB01**
  - **New benchmark station identified: AKB07**
- **Benchmark Chemistry Analysis conducted**
  - **New Baseline for Anderson/Ketron**

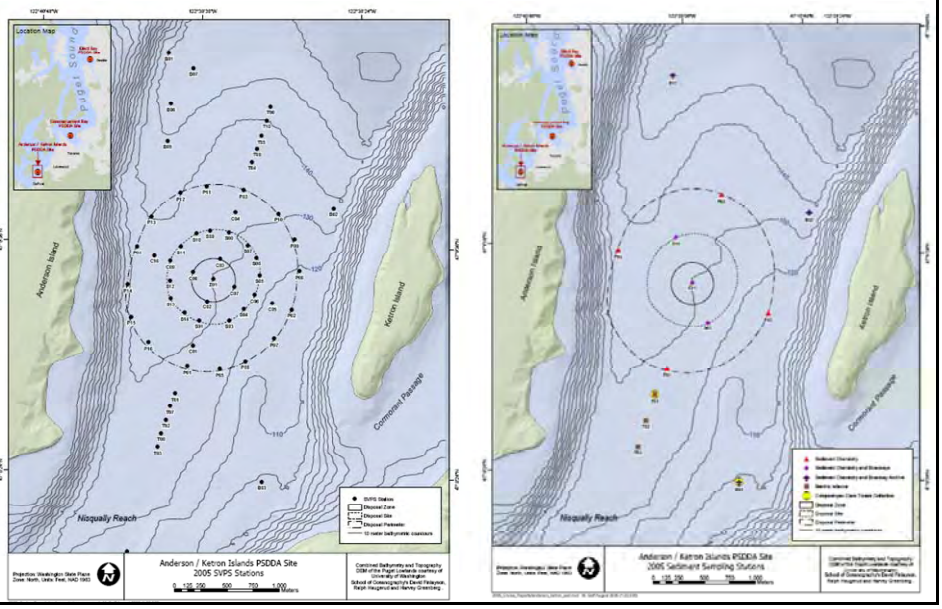
2.8



2.9

2005 Anderson/Ketron New Baseline Results:

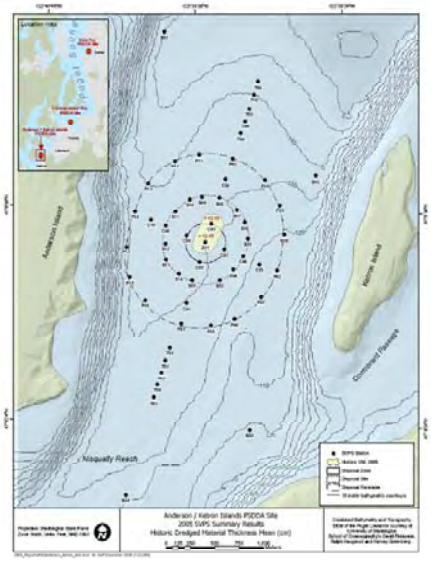
Sampling Locations



2.10

2005 Anderson/Ketron New Baseline Results:

SVPS – Dredged Material Distribution



- Images collected at 57 stations
- Recent dredged material observed at 2 onsite stations
- Ambient sediment observed at remaining stations

2.11

2005 Anderson/Ketron New Baseline Results:

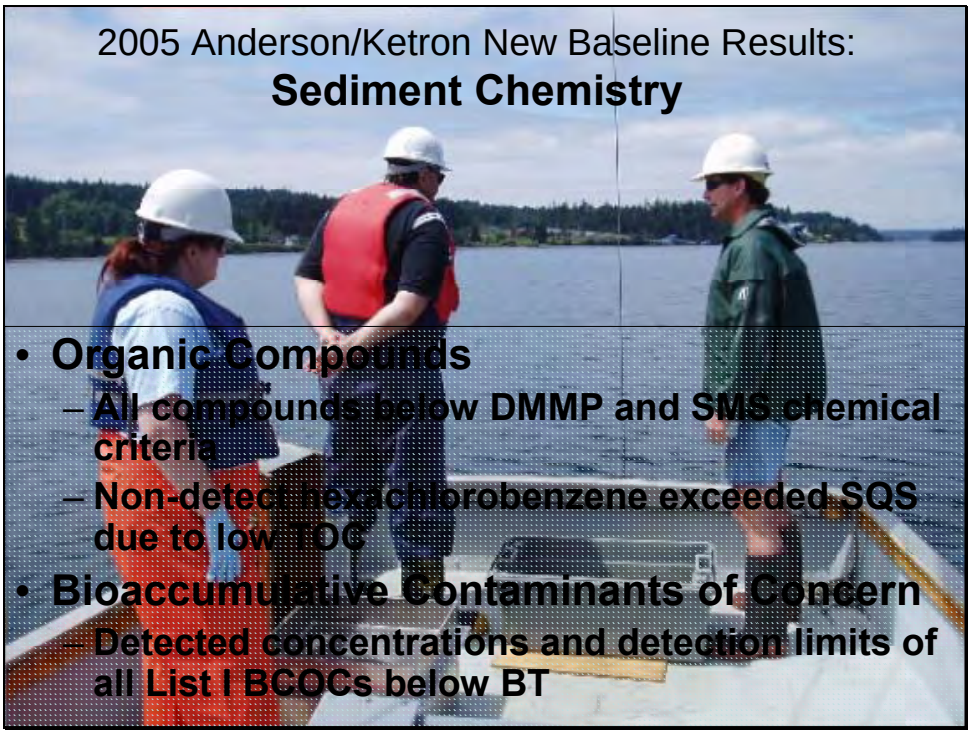
SVPS Analysis

- Relatively deep apparent RPD reflect active biogenic sediment mixing
- Stage III communities at all stations
- Relatively high OSI valutes (+5.67 to +10.32) throughout disposal site

2.12


2005 Anderson/Ketron New Baseline Results:
Sediment Chemistry
• Conventionals
– Generally consistent among stations types (see report for specifics)
• Metals
– All stations below DMMP SLs and SQS criteria
– 2005 concentrations lower than 1989 baseline

2.13


2005 Anderson/Ketron New Baseline Results:
Sediment Chemistry
• Organic Compounds
– All compounds below DMMP and SMS chemical criteria
– Non-detect hexachlorobenzene exceeded SQS due to low TOC
• Bioaccumulative Contaminants of Concern
– Detected concentrations and detection limits of all List I BCOCs below BT

2.14

2005 Anderson/Ketron New Baseline Results: Sediment Chemistry

- Field Variability
  - Relative standard deviation (RSD) between replicates acceptable (<50%) at majority of sampling locations
  - Highest and most frequent RSD values observed for percent gravel

2.15

2005 Anderson/Ketron New Baseline Results: Tissue Chemistry

- 2005 tissue chemistry results all within 1989 derived guideline values
  - BCOC List I metals < TTL
    - Arsenic undetected
  - List I & II HPAH, halogenated compounds, phenols, pesticides, butyltins, and hexavalent chromium < TTL (undetected)

2.16

2005 Anderson/Ketron New Baseline Results: Bioassays

- All stations passed bioassay guidelines
- 10-day acute amphipod (Eohaustorius estuarius)
  - All samples pass
- Sediment larval (Mytilus galloprovincialis)
  - All samples pass
  - 2-hit failure at AKZ01
- 20-day Neanthes mean growth
  - All samples pass, although…

2.17

2005 Anderson/Ketron New Baseline Results: Bioassays

- **All samples pass** 20-day Neanthes mean growth test, although…
  - Reference CR-23W failed performance standards
  - Negative control (100% survival) applied as conservative alternative for test interpretation
  - Unusually high mortality for AKS10 triggers retest
  - No mortality for AKS10 retest

2.18

2005 Anderson/Ketron New Baseline Results:

Benthic Community Analysis

- **1.0 mm fraction from top 10 cm analyzed at Transect Stations**
  - **Arthropods decrease at all stations**
  - **Molluscs increased at AKT01 and AKT02**
  - **Annelids increased at AKT02 and AKT03**
- **Analysis of remaining Transect Station fractions and Benchmark Stations pending.**

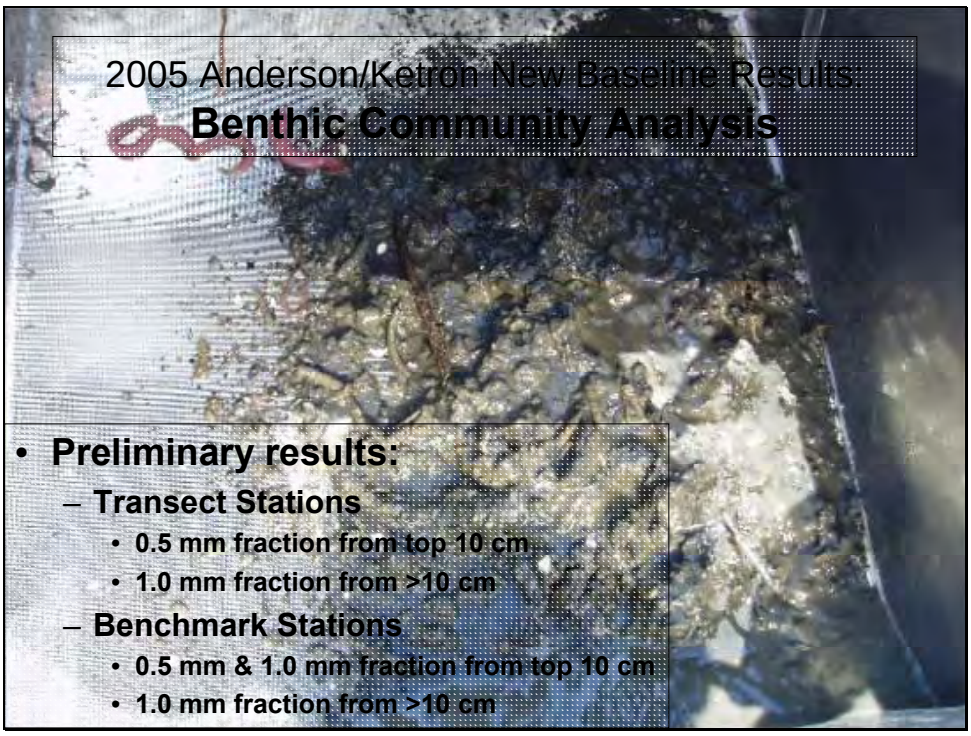
2.19

2005 Anderson/Ketron New Baseline Results:

Benthic Community Analysis

- Differences between 1989 and 2005 results caused by:
  - Change in sampling method (10 cm fraction)
  - Timing of seasonal die-off of adults and recruitment of juveniles
  - Area-wide trends

2.20



2005 Anderson/Ketron New Baseline Results
Benthic Community Analysis

- **Preliminary results:**
  - **Transect Stations**
    - **0.5 mm fraction from top 10 cm**
    - **1.0 mm fraction from >10 cm**
  - **Benchmark Stations**
    - **0.5 mm & 1.0 mm fraction from top 10 cm**
    - **1.0 mm fraction from >10 cm**

2.21

2005 Anderson/Ketron New Baseline Evaluation:
Does Dredged Material Remain On site?

- **Hypothesis 1: Dredged material remains within the disposal site boundary.**
  - **Accepted: SVPS results**
- **Hypothesis 2: Chemical concentrations at offsite stations do not measurably increase over time due to dredged material disposal.**
  - **Accepted: based on comparison of perimeter chemistry to SQS criteria.**

2.22

2005 Anderson/Ketron New Baseline Evaluation:
Has DM disposal caused biological effects conditions to be exceeded?

- Hypothesis 3: On-site chemical concentrations do not exceed Site Cond. II guidelines.
  - **Accepted: no ML exceedances**
- Hypothesis 4: On-site toxicity does not exceed Site Cond. II guidelines.
  - **Accepted: bioassays pass interpretive criteria**

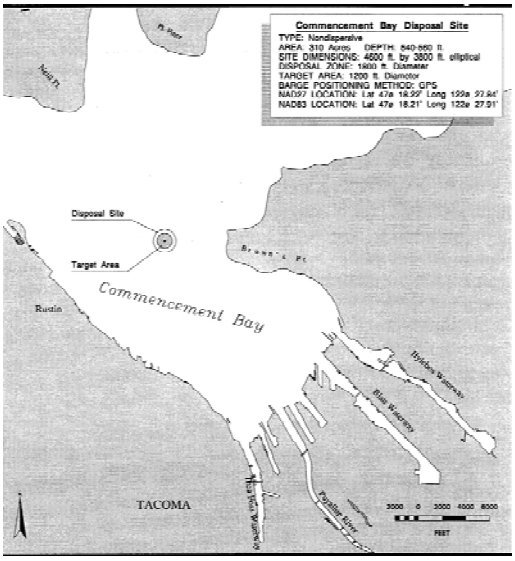
2.23

2005 Anderson/Ketron New Baseline Evaluation:
Has DM disposal caused unacceptable adverse effects to biological resources offsite?

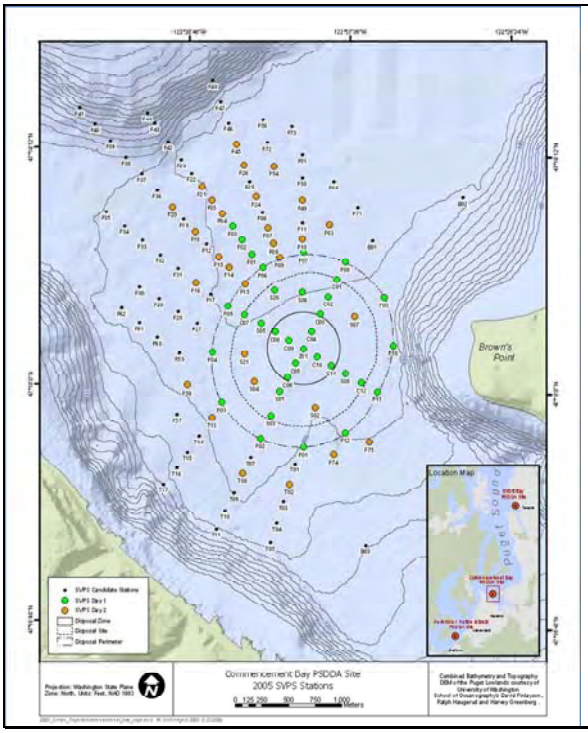
- Hypothesis 5: Contaminant concentrations in tissues do not increase down current from disposal site.
  - **Accepted: tissue concentrations < 1989 derived guidelines**
- Hypothesis 6: No significant decrease in benthic infaunal species abundance.
  - **Tentatively Accepted: pending analysis of archived benchmark and transect samples**

2.24

Commencement Bay



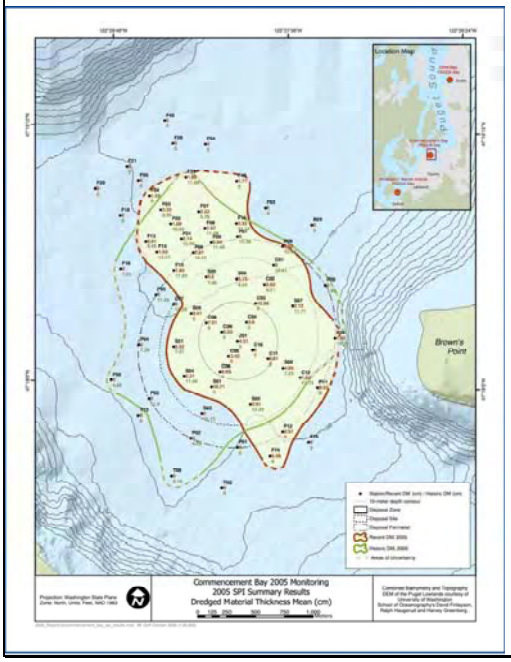
2.25



2005
Commencement Bay
Physical Monitoring:
Sampling Locations

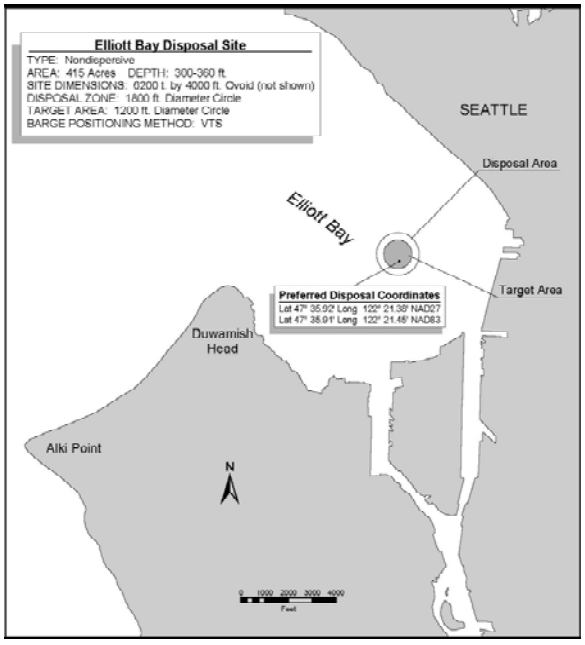
2.26

2005 Commencement Bay Physical Monitoring: **SVPS Analysis**



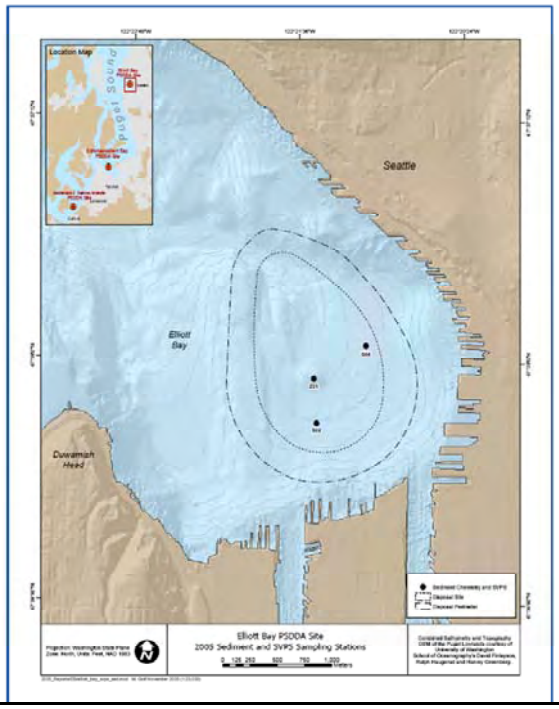
- Relatively deep apparent RPD reflect active biogenic sediment mixing
- Stage III communities at all stations except in immediate proximity to disposal zone
- Relatively high OSI values (+4.3 to +11.0) throughout disposal site

2.27



Elliott Bay Disposal Site

2.28



2005 Elliott Bay Contaminant Study: **Sampling Locations**

2.29

2005 Elliott Bay Contaminant Study: Target COCs

- **0-10 cm Sample**
  - Mercury
  - Bis-2-ethylhexyl phthalate
  - Chlorinated benzenes
  - PCBs
  - Dioxins and Furans

- **0-2 cm Sample**
  - Mercury
  - Bis-2-ethylhexyl phthalate
  - Chlorinated benzenes
  - PCBs
  - Dioxins and Furans
  - Pesticides
  - TBT
  - Zinc

2.30

2005 Elliott Bay Results: SVPS

- Images collected at 3 on-site stations
  - Recent dredged material observed at EBZ01 and EBS02
- Apparent RPD is relatively deep: 2.87 cm (EBZ01) – 4.15 cm (EBS04)
- Stage III communities at all stations
- OSI values: EBS04 (+11) > EBS02 (+8.3) > EBZ01 (+8)

2.31

2005 Elliott Bay Results: Sediment Chemistry

0 – 10 cm

- Total PCB exceeds DMMP SL at EBS02 and EBS04
- Results trigger analysis of top 2 cm.

0 – 2 cm

- Total PCB slightly exceeds DMMP SL at EBS02
- Total PCB concentrations lower than 0 – 10 cm fraction.

2.32

Future Activities: Summer 2006
DNR Disposal Volumes: DY2005

- Tiered-full monitoring event planned for Port Gardner disposal site

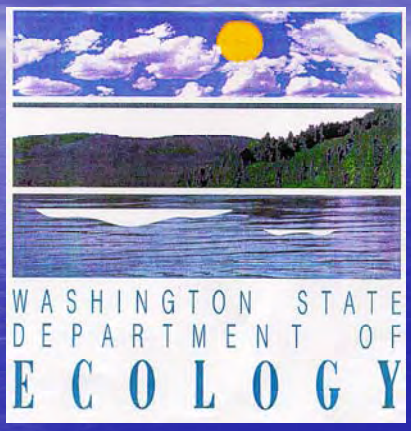
- Commencement Bay: ~770,000 cys
- Elliott Bay: ~3,800 cys
- Port Gardner: ~570,000 cys
- Rosario Straits: ~150,000 cys
- Anderson/Ketron, Bellingham Bay, Port Angeles, Port Townsend: 0 cys

2.33

Thank You!

2.34

Sediment Management
in the Toxics Cleanup Program



Kathryn DeJesus
Aquatic Lands Cleanup Unit

3.1

Chchch...changes
in the Toxics Cleanup Program

- *WHAT --*
  - New Responsibilities
- *WHY --*
  - Puget Sound Initiative
- *HOW --*
  - Restructuring
  - Broader Support

3.2

Staff Changes:

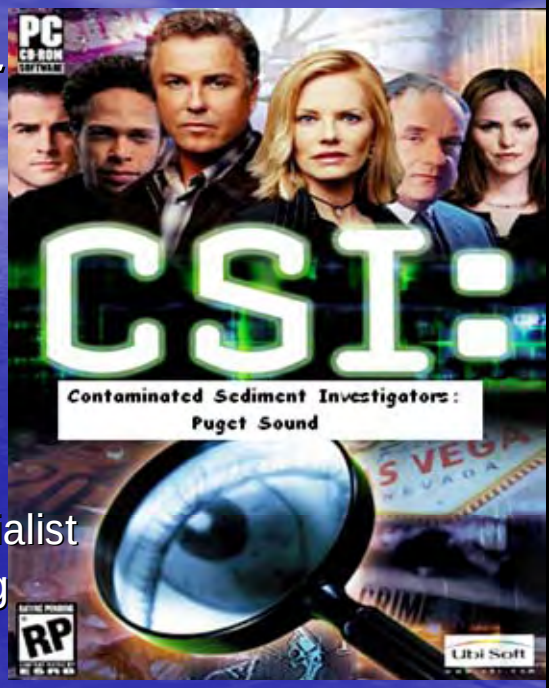
Lost two HQ ☹
senior staff

Gained two ☺
great HQ newbies

- Stacie Singleton
- Chance Asher

ERO Sediment Specialist

- Brendan Dowling

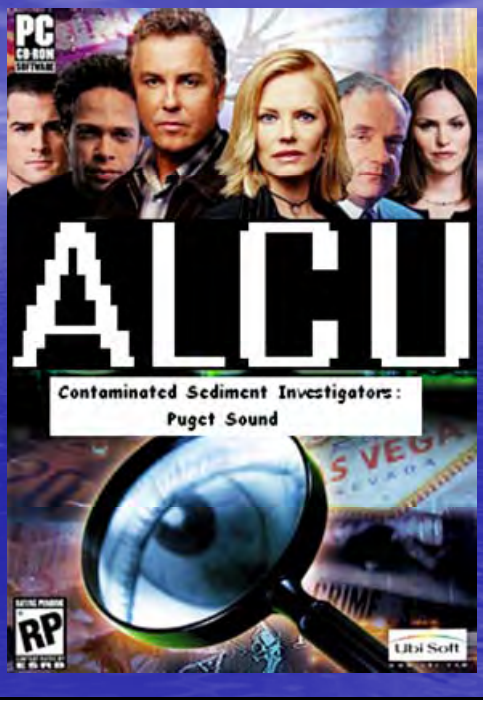


3.3

The "WHAT" = *"Aquatic Lands Cleanup Unit"*

in the
Land and Aquatic
Cleanup Section

of the
Toxics Cleanup
Program



3.4

Toxic Cleanup Program HQ

Land & Aquatic Cleanup Section – Nord

- Land Cleanup Unit
  - PSI upland components, fed fac, UST
- Aquatic Land Cleanup Unit
  - PSI aquatic land components, source control, sediment technical guidance

Information & Policy Section – Bradley

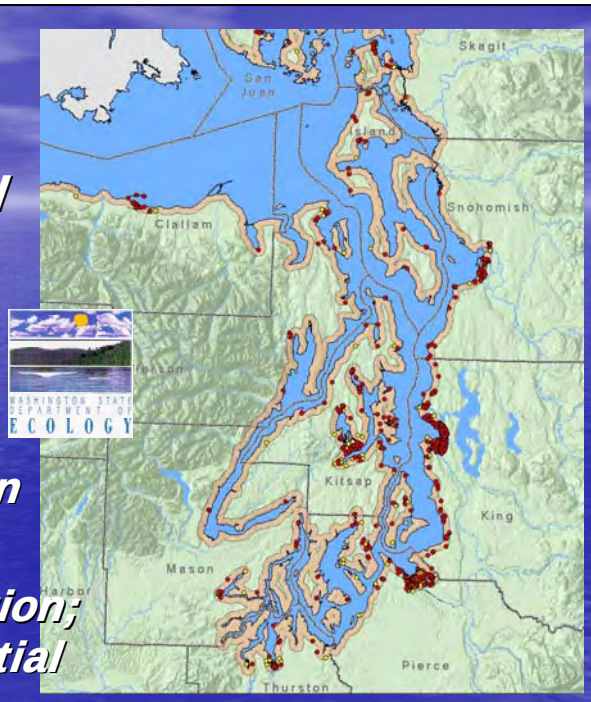
- Policy and Technical Support Unit
- Information Communications Unit

3.5

The "WHY" = *Puget Sound Initiative*

TCP's ROLE:
Cleanup contamination

Eliminate recontamination; reduce potential



3.6

The "HOW" = MTCA Increases

- *Upland and Aquatic Land Cleanup Components*
  - Upland sites w/n ½ mile of shoreline; orphaned/abandoned
  - Impacted embayments previously given less attention [natural habitat, valuable resources]
- *Coordination with DNR* - State Owned Aquatic Land
- *WQP Coordination* – On permitting, avoid recontamination

3.7

The Other "HOW" = Broader Agency Support

DMMP Support

- Additional FT Position in SEA Program w/ sediment expertise

- TCP Coordination on issues

3.8

The Other "HOW"
=
Broader Program Support

RSET & SMS Rule Support

TCP Policy and Technical Support Unit
- Staff dedicated to RSET work
- SMS care & feeding

SEDQUAL System

TCP Information Communications Unit
- Redevelopment project

3.9

SEDQUAL Redevelopment

- Updated Web-based Format
- Maintain Analytical Capabilities
- Interagency Design Team
- Agency Consistency

-- More later from project leader, Noel Marshall

3.10

Transition to "Enviroqual"

- EIM's capacity built to accommodate all sediment data types
- Functional bridges between SEDQUAL & EIM
- Data migration to EIM
- EIM data format eventually required
- Training sessions planned

--More later from project leader, Noel Marshall

3.11

Data Migration Project

- Data Qualifiers *will be converted* to:

  B, B1, G, K, L, T, J, N, U, UJ, REJ, JG, JL, JK, JT, JTG, JTL, JTK, NJ, NJT, NU, NUJ, UJG, UJL, UJK

- SEDQUAL Project *changed to* EIM Study Type
- SEDQUAL Agency and Program *changed to* EIM Lead Organization and Program

3.12

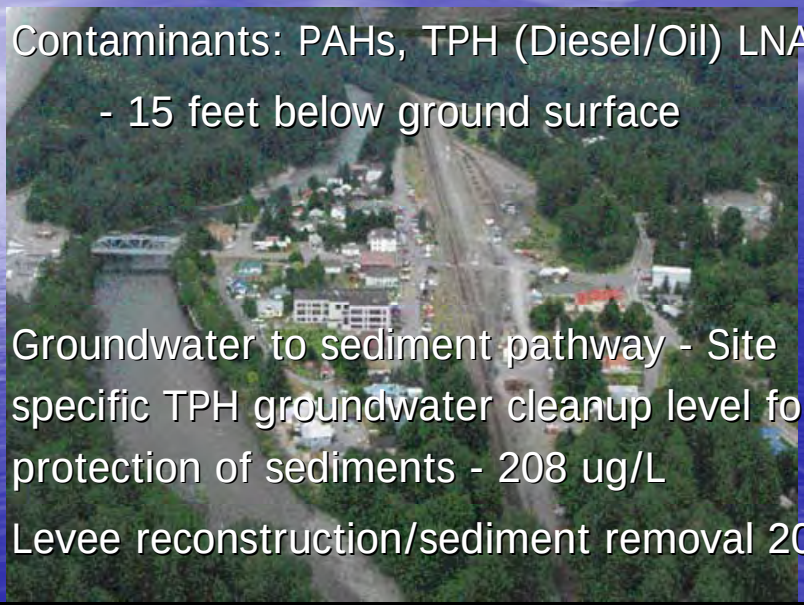
some... State Lead Sediment Sites

- Gas Works Park, Lake Union
- Bellingham Bay Demonstration Pilot Project
- Skykomish River

3.13

Skykomish River – BN/SF

- Contaminants: PAHs, TPH (Diesel/Oil) LNAPL - 15 feet below ground surface



- Groundwater to sediment pathway - Site specific TPH groundwater cleanup level for protection of sediments - 208 ug/L
- Levee reconstruction/sediment removal 2006

3.14

THAT'S ENOUGH...

I'M EXHAUSTED...

3.15

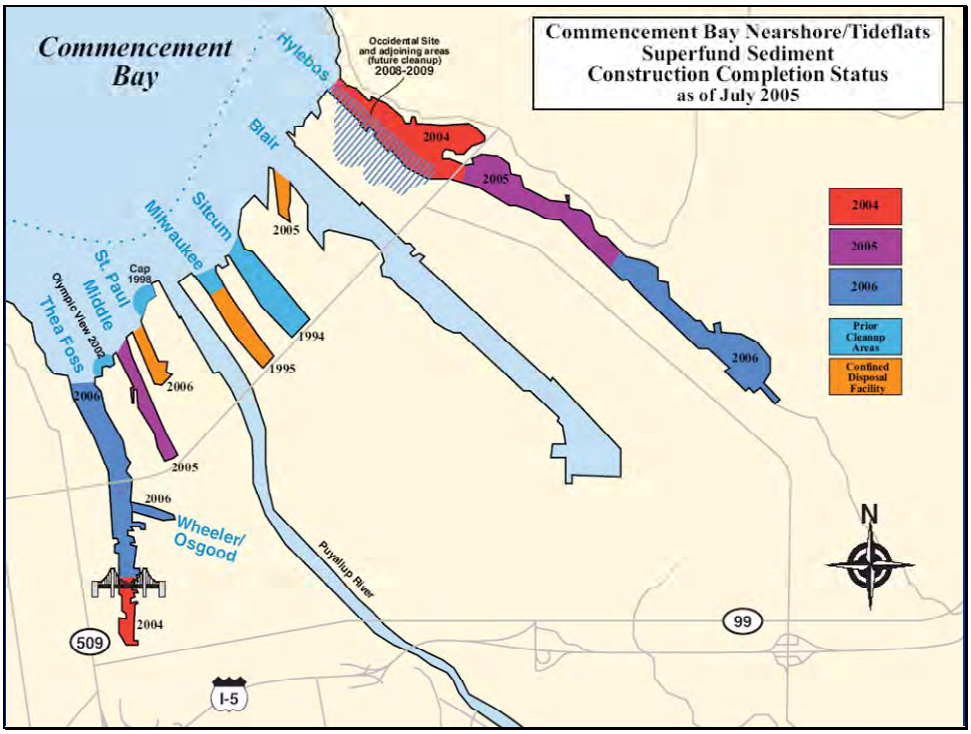
EPA Region 10 Superfund Puget Sound Sediment Cleanup Update

Sediment Management Annual Review Meeting

May 2006

Sheila Eckman, EPA

4.1



4.2

Hylebos Waterway

- 80+ acres
- Being completed in segments – Head of Hylebos complete in 2006. Mouth of Hylebos nearly complete.
- 1,061,000 cy dredged, 10.2 acres capped, 16.1 acres monitored natural recovery, 7 acres habitat mitigation.

4.3

Use of fixed arm excavator

4.4

Underpier dredging (above)
Cap placement (right)

4.5

Occidental

- Hylebos waterway
- RCRA Corrective Action facility
- Highly contaminated source material beneath sediments
- Comprehensive uplands/sediment investigation continues in 2006
- Joint EPA/Ecology CERCLA/RCRA oversight of Occidental

4.6

Thea Foss Waterway

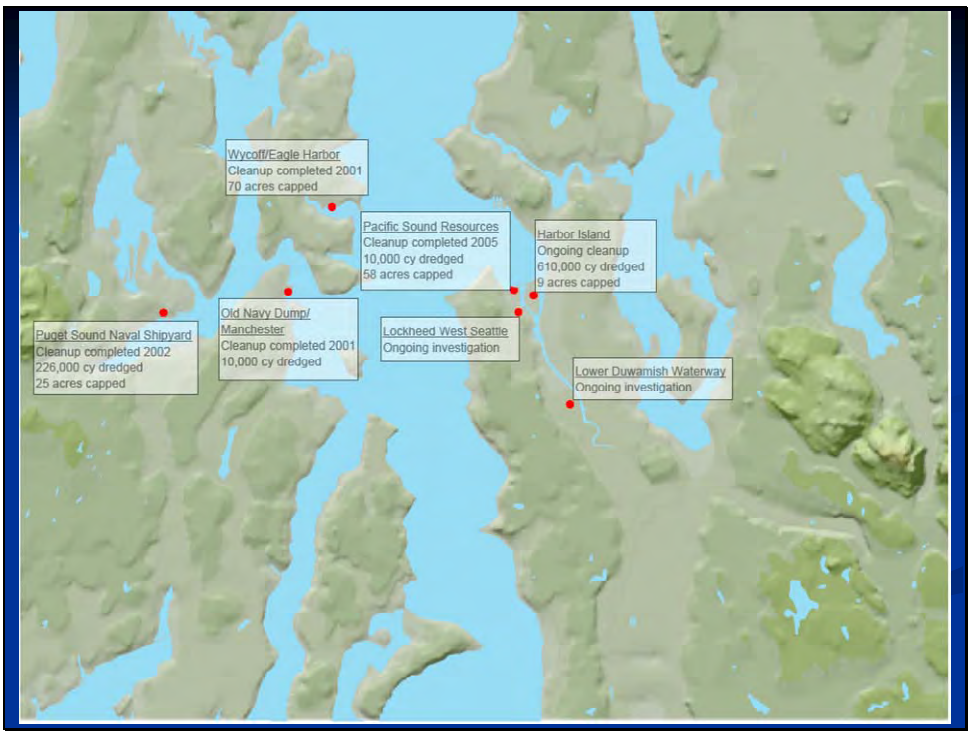
- 2005-06 highlights: Cleanup completed!
- 71 acres.
- 528,500 cubic yards dredged, 30 acres capped, 21 acres monitored natural recovery, 13 acres habitat mitigation.

4.7

Commencement Bay 2006-2007

- Complete investigation at Occidental facility.
- Finish cleanup work in Head of Hylebos.
- Continued source control work.
- Continued monitoring, including planning for bay-wide fish tissue monitoring.

4.8



4.9

East Waterway - Harbor Island

- Beginning focused RI/FS to complete cleanup.
- 2004-05 removal action: 20 acres, 260,000 cubic yards dredged. Sand layer placed on 14 acres.

4.10

Todd Shipyard

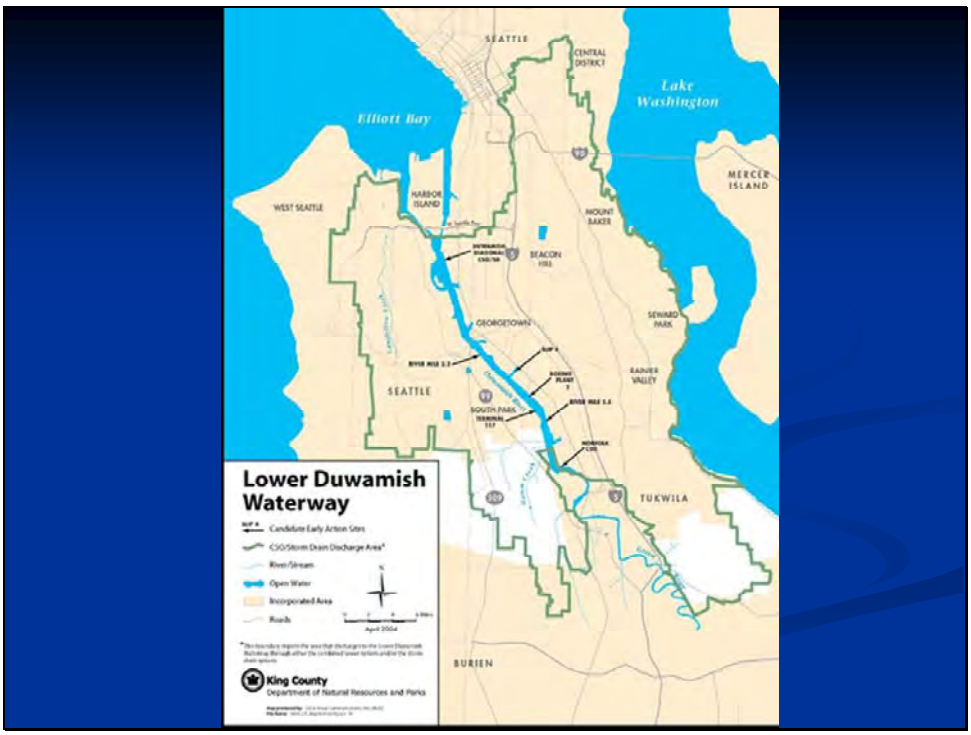
- 2005-06 highlights: Cleanup complete!
- 40 acres total.
- 219,697 cubic yards dredged.
- 5 acres capped (under pier).
- 2650 pilings removed.
- 3 acres habitat mitigation.
- All remediation completed while shipyard operational.

4.11

4.12

4.13

4.14



4.15

Lower Duwamish Waterway

- RI/FS Phase 2 data collection.
- Source control continues.
- Final RI/FS expected early 2008.
- Three early actions underway.

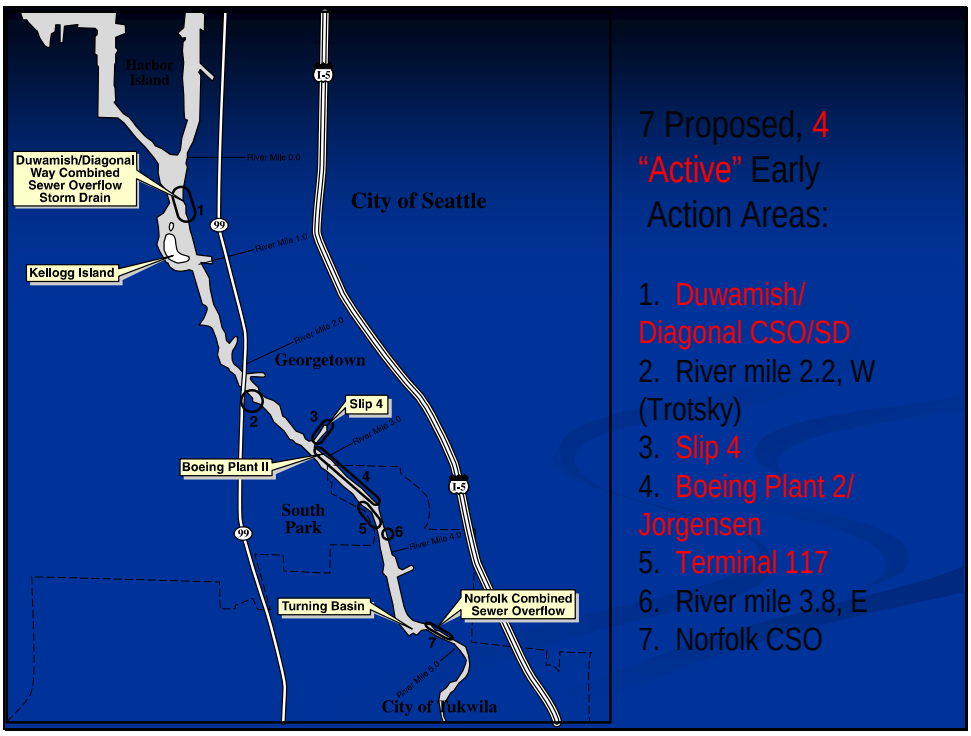
4.16

Phase 2 Sampling Summary

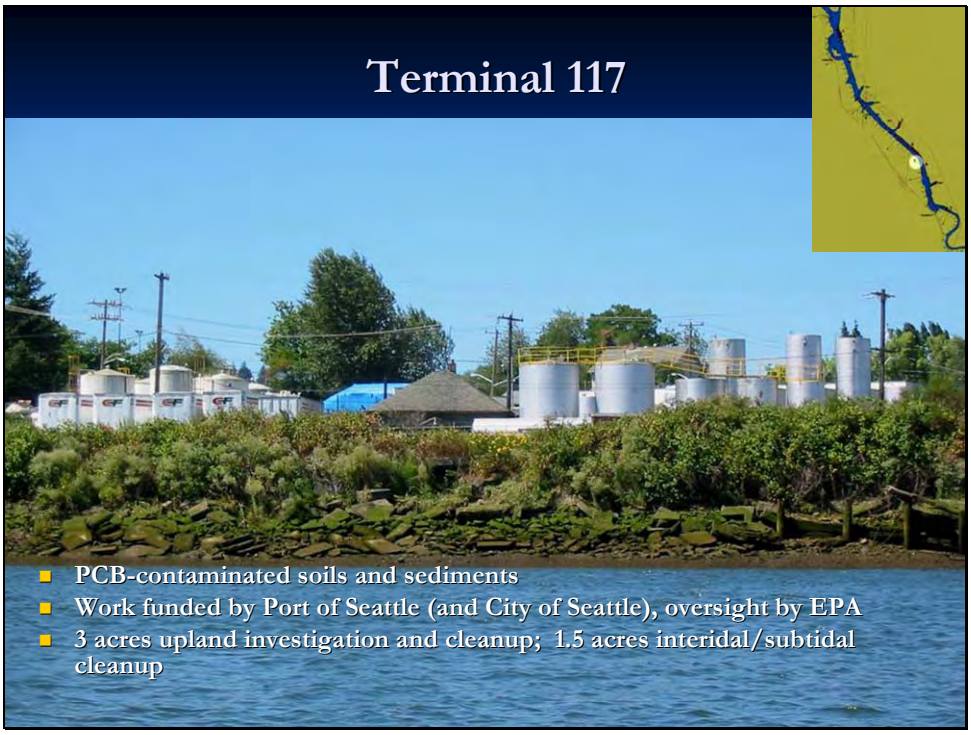
- 156 surface sediment grab samples
- 108 fish and crab tissue composites (2004)
- 51 fish and crab tissue composites (2005)
- 29 juvenile salmon composites (2003)
- 20 benthic invertebrate and associated sediment samples
- 14 clam and associated sediment samples
- 82 seeps surveyed, 16 sampled
- 32 porewater samples
- 14 geochronology cores
- Sedflume analysis of 17 cores
- 56 subsurface cores (Feb 2006)

4.17

4.18


Harbor Island
I-5
Duwamish/Diagonal Way Combined Sewer Overflow Storm Drain
River Mile 0.0
City of Seattle
99
River Mile 1.0
Kellogg Island
River Mile 2.0
Georgetown
Slip 4
Boeing Plant II
River Mile 3.0
South Park
River Mile 4.0
Turning Basin
Norfolk Combined Sewer Overflow
River Mile 5.0
City of Tukwila
7 Proposed, 4 "Active" Early Action Areas:
1. Duwamish/ Diagonal CSO/SD
2. River mile 2.2, W (Trotsky)
3. Slip 4
4. Boeing Plant 2/ Jorgensen
5. Terminal 117
6. River mile 3.8, E
7. Norfolk CSO

4.19


Terminal 117
PCB-contaminated soils and sediments
Work funded by Port of Seattle (and City of Seattle), oversight by EPA
3 acres upland investigation and cleanup; 1.5 acres interidal/subtidal cleanup

4.20

T-117 Early Action

- 2006 – Upland removal of contaminants in soil.
- 2007 – Sediment and bank area remediation.
- Proposed removal of approximately 13,000 cy of sediments and bank area, backfilling, capping

4.21

Slip 4

- Proposed cleanup plan released in 2006.
- 4 acres.
- Proposed plan includes dredging 14,000 cubic yards and capping.
- Cleanup decision Spring 2006, projected completion 2007.
- Source control efforts ongoing.

4.22

4.23

Boeing Plant 2

Cleanup expected 2008

- Work funded by Boeing and overseen by EPA RCRA program
- Major contaminant of concern: PCBs

4.24

Lockheed West

- West Seattle Site.
- Uplands remediation in conjunction with container terminal development – Department of Ecology.
- Sediments will be Superfund cleanup.
- Completing investigation – 2006-2007.

4.25

Other Sediment Projects

- Portland Harbor - RI/FS continues, two early action sites ongoing. Contact: Chip Humphrey (503)326-2678
- McCormick & Baxter – Construction complete, including sediment capping - use of organo-clay and articulated concrete blocks. Contact: Nancy Harney (206)553-6635

4.26

EPA Superfund Cleanup Progress in Puget Sound to Date

- 728 acres of contaminated sediment cleanup.
- 3.8 million cubic yards of contaminated sediment removed.
- 11,315+ pilings removed.
- 28,260 tons of debris removed.
- 223 acres capped.
- 22 acres of enhanced natural recovery.
- 77+ acres of habitat mitigation.

4.27

EPA Puget Sound Priority

- Puget Sound has been designated a national priority area by EPA.
- EPA Region 10 is developing a Puget Sound Toxics Strategy.
- The overall goal for cleanup of contaminated sediments is to clean up an additional 300 acres between 2006 and 2008.

4.28

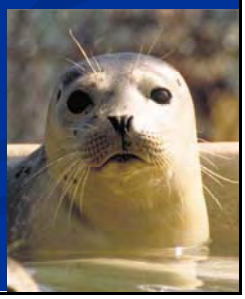
National Update

- Final "Contaminated Sediment Remediation Guidance for Hazardous Waste Sites" released December 2005. Available at www.epa.gov/superfund/resources/sediment/pdfs/guidance.pdf
- National Academy of Science review of sediment dredging at Superfund sites. http://www8.nationalacademies.org/cp/projectview.aspx?key=347

4.29

EPA Contacts

- Sheila Eckman, Unit Manager, 206-553-0455
- Hylebos, Occidental - Jonathan Williams, 206-553-1369
- Thea Foss - Piper Peterson Lee, 206-553-4951
- Middle Waterway, McCormick and Baxter - Nancy Harney, 206-553-6635
- East Waterway, T-117- Ravi Sanga, 206-553-4092
- Lockheed, Todd, Lockheed West - Lynda Priddy, 206-553-1987
- PSR - Wally Reid, 206-553-1728
- Duwamish RI/FS - Allison Hiltner, 206-553-2140
- Slip 4 - Karen Keeley, 206-553-2141
- Portland Harbor – Chip Humphrey, 503-326-2678



4.30

RSET/SEF UPDATE

Sediment Management Annual Review Meeting

May 2, 2006

5.1

"Before I begin, I'd just like to make it known that I didn't volunteer to do this presentation."

5.2

General Consensus

- **Developing a regional DMEF for the Northwest was an extremely worthwhile process even though there are a number of policy and technical challenges to resolve**
- **An improved and comprehensive process is necessary to make consistent and accurate management decisions**
- **Need sustained management support**

5.3

How will The SEF Help

- **Regulatory -** provide consistent guidance for addressing sediment and dredge material characterization
- **Public -** sampling, testing, and analysis strategies that can reduce uncertainties about the actions a regulator may require of you. Reducing uncertainties can help with project scheduling, financial planning, and project management decisions.

5.4

RSET Philosophy

- The RSET relies on technical/policy subcommittees (which are open) to make recommendations for DMEF/SEF revision.
- Relies on consensus developed at "Use of Sediment Quality Guidelines and Related Tools for the Assessment of Contaminated Sediments" SETAC Pellston Workshop held in August, 2002.

5.5

SEF Philosophy

- **Tiered testing approach to evaluating sediments**
- **Comprehensive sampling and testing methods to adequately characterize sediment**
- **Site-specific flexibility based on geographic and watershed issues**
- **Consistent evaluation procedures to serve multiple agency objectives**
- **A mechanism to update the manual**

5.6

What have we accomplished in draft SEF?

- Initiated communication and coordination among regulatory agencies on sediment issues
- Established technical subcommittees
- Prepared set of RSET Technical Issue and White Papers.
- Began compilation and update of freshwater and marine sediment interpretive guidelines and screening levels

5.7

What have we accomplished in draft SEF?

- Define risk-based framework for both dredging and site investigation projects
- Addressed chemical analyte issues (PCBs, TPH, modern pesticides, updated detection limits and methods)
- Identified regional sediment database
- Framework for addressing bioaccumulation under RSET

5.8

SEF Review Comments

- Public Meeting held at Jantzen Beach, September 2005
- Public comment period through 30 November 2005
- Wide range of comments, from editorial changes to major policies
- We got 704 comments from a wide range of reviewers
  - State and federal agencies
  - Ports
  - Environmental consultants

5.9

5.10

Key Issues

- Freshwater Guidelines
- Bioaccumulation
- Process timelines
- Impacts to DMMP
- ESA issues
- Coordination with state and federal clean-up programs

5.11

Comment Review

- Policy Committee Meeting, June 2006
- Chapter revisions underway
- Categorized comments
  - Some easily addressed
  - Others require substantial work/research
- Policy and technical decisions

5.12

Next Steps

- Complete chapter revisions
- FW guidelines and bioaccumulation
- Policy Committee and Steering Committee Meetings
- Reconcile DMMP/SEF technical differences
- Interim implementation, September 2006

5.13

5.14

Freshwater Screening Values

- **History**
  - One of the original objectives established for RSET
  - Lack of Freshwater Screening Values in previous regional dredging manuals
  - Existing Columbia River DMEF SLs are based on Marine/Estuarine Values (PSDDA)
  - Existing State regulatory guidance:
    - DEQ's Freshwater Sediment SLVs (2001)
    - WDOE's Freshwater SQVs (2002, 2003)

5.15

Freshwater Screening Values

- **Strategy for Draft SEF**
  - Ecology and DEQ held preliminary discussions on Freshwater Sediment Quality Values
  - Issues include reliability, efficiency, and sensitivity of proposed values
- Freshwater Sediment Quality Values presented in Draft SEF as "Strawman"

5.16

Freshwater Screening Values

- Comments Received on Freshwater SLs:
  - Methodology for Screening Value Derivation (FPM, AET, Logistic Regression)
  - Lack of Chronic Endpoints in Database
  - Protection of ESA Species
  - Procedures for Updating Screening Values
  - Procedures for Addressing Chemical Mixtures
  - Inclusion of New or Additional Freshwater Sediment Data (Portland Harbor, Bunker Hill)

5.17

Freshwater Screening Values

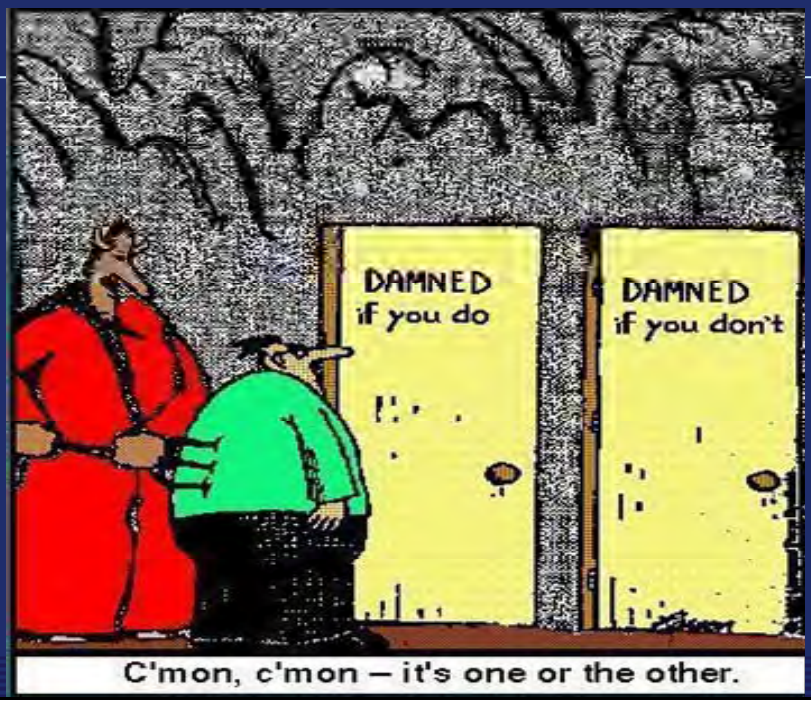
- **Path Forward**
  - Reconvene Sediment Quality Guidelines Subcommittee
  - Attempt to reconcile programmatic needs of Ecology and DEQ
  - Present results in “Interim Implementation” Draft

5.18

Freshwater Screening Values

- **Challenges:**
  - Timing of availability of additional freshwater sediment data
  - Evaluation and inclusion of chronic bioassay data into Freshwater Sediment Screening Value development
  - Reconcile needs of DMMP, Ecology, ODEQ, and IDEQ into consensus Freshwater Sediment Screening Values

5.19



5.20

Bioaccumulation Framework

- **History**
  - Previously a Tier III evaluation
  - Many existing BTs based on bioassay data rather than bioaccumulative pathways
  - Recent DMMP updates for several key chemicals – PCBs, TBT, dioxins
  - BCOC list recently updated by DMMP agencies
  - BTs not yet available for most of the BCOCs, and pathway/endpoint evaluations may be incomplete for some existing BTs

5.21

Bioaccumulation Framework

- **Strategy for Draft SEF**
  - Establish "reason to believe" based on elevation in watershed tissues and in project/site sediments
  - Establish TTLs for three pathways:
    - Protection of human health
    - Protection of wildlife
    - Protection of fish and invertebrates
  - Subsequently establish Sediment BTs
- Draft SEF presents overall framework – both interim (prior to TTLs/BTs) and final
- Draft SEF contains recommended equations and methodologies for each pathway

5.22

Bioaccumulation Framework

- Comments Received on Freshwater SLs:
  - Practicality of analyzing for BCOC List A
  - How to address bioaccumulation impacts during dredging
  - Definitions of key terms – “elevation above reference” and “regional areas”
  - Concerns that proposed process will not screen out areas/chemicals
  - Issues related to small project exemptions
  - Proposed modifications to interim screening

5.23

Bioaccumulation Framework

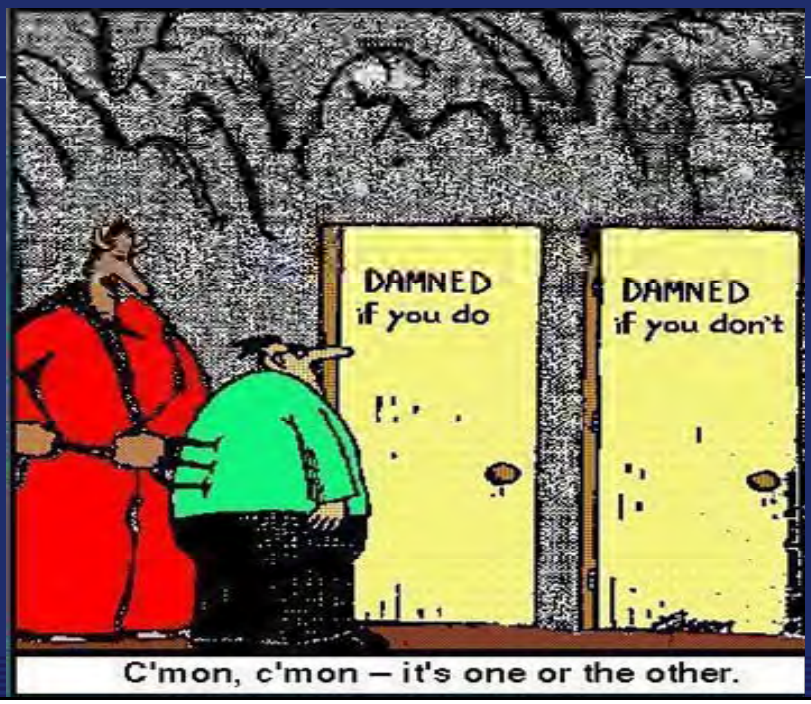
- Comments Received on Freshwater SLs:
  - Regional vs. localized impacts – policy issues
  - Endpoints to include in TTL development
  - Ensuring protection of T&E species
  - Emerging chemicals
  - Testing issues (forwarded to committee)
  - Statistical issues related to calculation of TRVs and BSAFs
  - Ground-truthing reasonableness of final TTLs

5.24

Bioaccumulation Framework

- **Challenges**
  - Major policy issues – contradictory positions
  - Timing of regional projects that will provide key input parameters
  - TRV calculations – resource constraints
  - Implementability issues – dry runs?
  - Sediment BT approach not yet defined

5.25



5.26

Where Do We Go From Here

- Continue work on bioaccumulation framework
- Develop Target Tissue Levels (TTLs)
- Continuous review and refinement (as necessary) sediment screening levels
- Adaptive management
  - Example: new chemicals like PBDEs
- How to institutionalize adaptive management

5.27

Where Do We Go From Here (someday)

- Reference site evaluation process
- Freshwater bioaccumulation test species
- Evaluate use of 10-day versus longer term FW bioassays
- Review and refine (as necessary) biological interpretive criteria

5.28

Portland Beta Test

- **Will sound very familiar to DMMP**
- **Monthly meeting to review projects**
- **Commitment to review timelines**
- **Project tracking**
- **Involvement of NMFS and FWS**
- **Conflict resolution**

5.29

5.30

Puget Sound Initiative

- Announced by Governor Gregoire December 2005
- Supplemental Funding. (Received $51.7 million, $21.9 to clean up contaminated sites)
- Legislation addressing fuel transfers and on-site sewage systems.
- Partnership appointed, given five charges and short deadline. (October 2006)

6.1

Puget Sound Partnership

- *Chris Gregoire (Jay Manning)*
- *Billy Frank, Jr.*
- *Bill Ruckelshaus*
- Sam Anderson
- Sherry Appleton
- Michael Bogert
- Jim Darling
- Norm Dicks
- Luke Esser
- Fred Jarrett
- Kathy Fletcher
- Patty Lent
- Colin Moseley
- Phil Rockefeller
- Ron Sims
- Mike Shelby
- Mark Emmert, Ph.D.
- Bill Taylor

6.2

Charges to the Partnership

- 2020 AGENDA- Key actions to recover the Sound by the year 2020.
- PUBLIC INVOLVEMENT - Engage citizens, governments, the business and conservation communities, and others.
- ORGANIZATIONAL STRUCTURE - Recommend the best organizational structures and approaches.
- FUNDING - Review funding sources and set spending priorities
- SCIENCE - Recommend how scientific knowledge should be organized and applied.

6.3

Issues

- freshwater quantity
- habitat protection and restoration
- species and food-web
- contamination from toxics and nutrients/pathogens
- stormwater

6.4

May 15 Forum at UW

Scientists, Managers, Interested Parties

- Refine understanding of the problems facing the Puget Sound ecosystem
- Develop possible goals and objectives, as well as measures
- Identify key questions for Partnership to consider.

6.5

Six General Public Forums in May

- May 10 Everett
- May 11 Port Townsend
- May 15 Seattle
- May 16 Shelton
- May 17 Bellingham
- May 18 Tacoma

6.6

6.7

SEDQUAL Redevelopment

Noel Marshall
Project Manager
nmar461@ecy.wa.gov

7.1

Overview

- Vision
- Why the change
- What will change
- Benefit gained
- What has been done so far
- Next Steps
- Conclusion

7.2

Redevelopment Vision

- Provide one location and one format for all environmental data submitted to Ecology
- Keep existing SEDQUAL functionality intact
- Leverage SEDQUAL analysis tools for use with upland data

7.3

Why the change

- Sediment and upland environmental data is now managed in two different information systems with different data submittal formats
- Ecology's direction is to integrate systems and reduce duplication
- Current SEDQUAL application getting difficult to maintain, Microsoft discontinuing support of VB 6.0

7.4

What will change

- Data Format
- User Interface
- One location for sediment and upland data
- GIS Component internet based
- Data will have to be input into EIM to be analyzed

7.5

Benefit gained

- No installation, no CDs
- Everyone views the same data
- Ecology maintains one major environmental data system
- TCP can concentrate on improving and expanding sediment and upland analysis tools
- Maintenance costs will be reduced

7.6

What has been done so far

- EIM has been augmented to accommodate all sediment data types currently housed in SEDQUAL
- All Surveys and Stations have been loaded into production EIM with result data to follow shortly
- Design Team has been formed to prioritize work and ensure the resulting product is a fully operating, consistent system

7.7

What has been done so far

- Work has been started to modify the EIM GIS component to meet the more regional needs of SEDQUAL's user base
- Sierra Systems has just been hired to architect the redeveloped Assessment Tools

7.8

Next Steps

- Finish the migration of SEDQUAL data to EIM
- Phase I of the redevelopment project will be deployed this Fall
- All sediment data will be submitted in EIM format when TCP sediments staff agree that the new system meets their needs
- Phase II scoping and design will begin

7.9

Conclusions

- SEDQUAL is not going away, just the name and the look
- One stop shopping for Ecology environmental data
- No installation needed, analysis tools will be open to the public
- Upland as well as sediment data can be compared against regulatory criteria

7.10

Questions?

Contact Information:

Noel Marshall
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Toxics Cleanup Program
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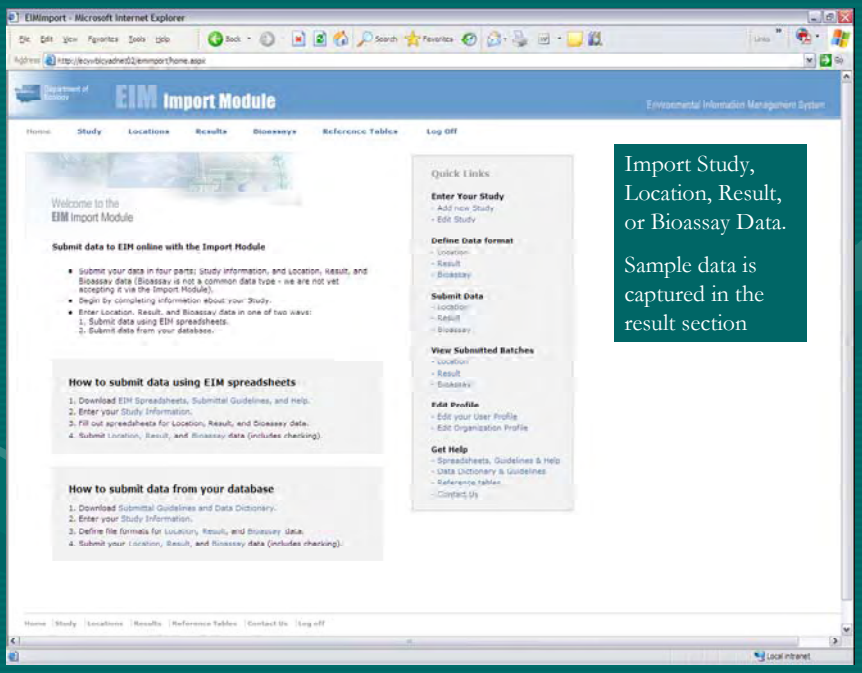
(360) 407-6923

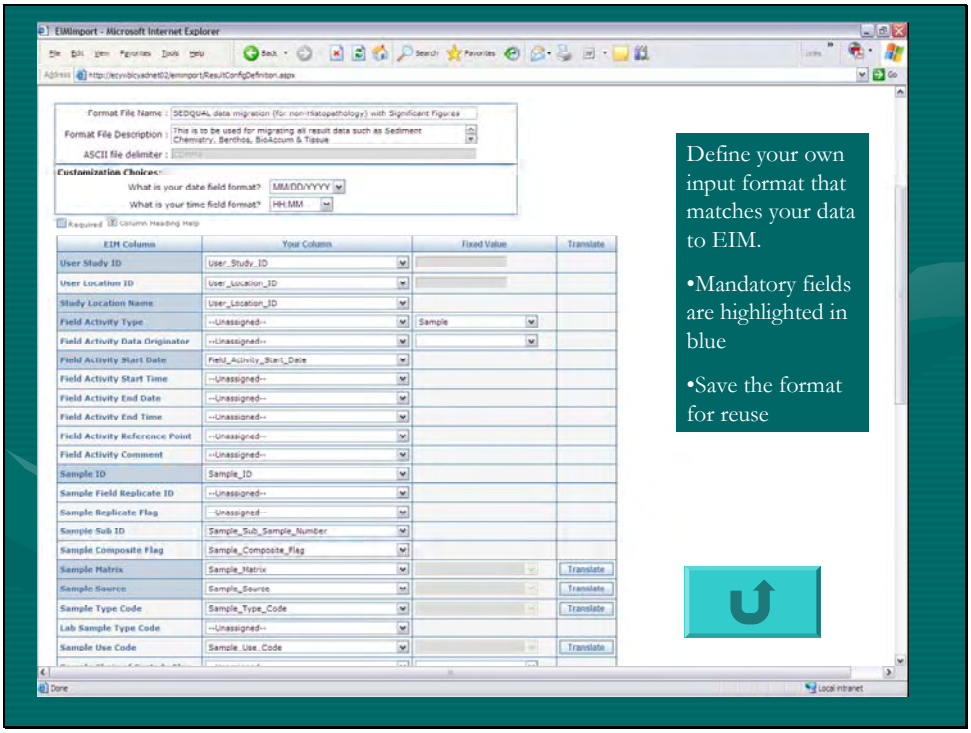
7.11



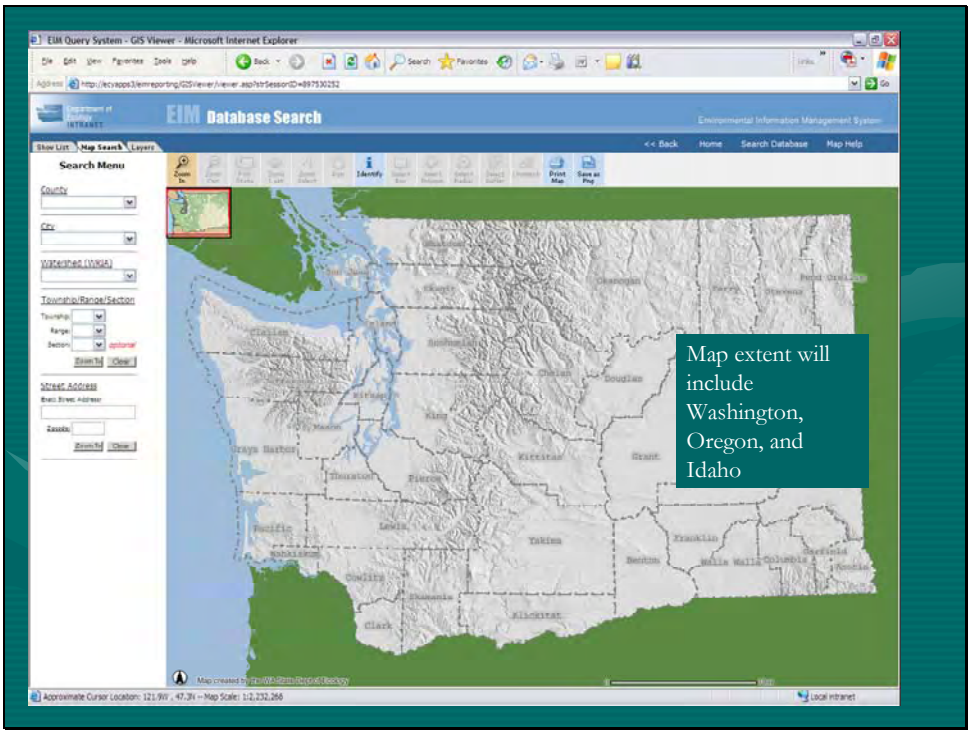
Import Study, Location, Result, or Bioassay Data.

Sample data is captured in the result section

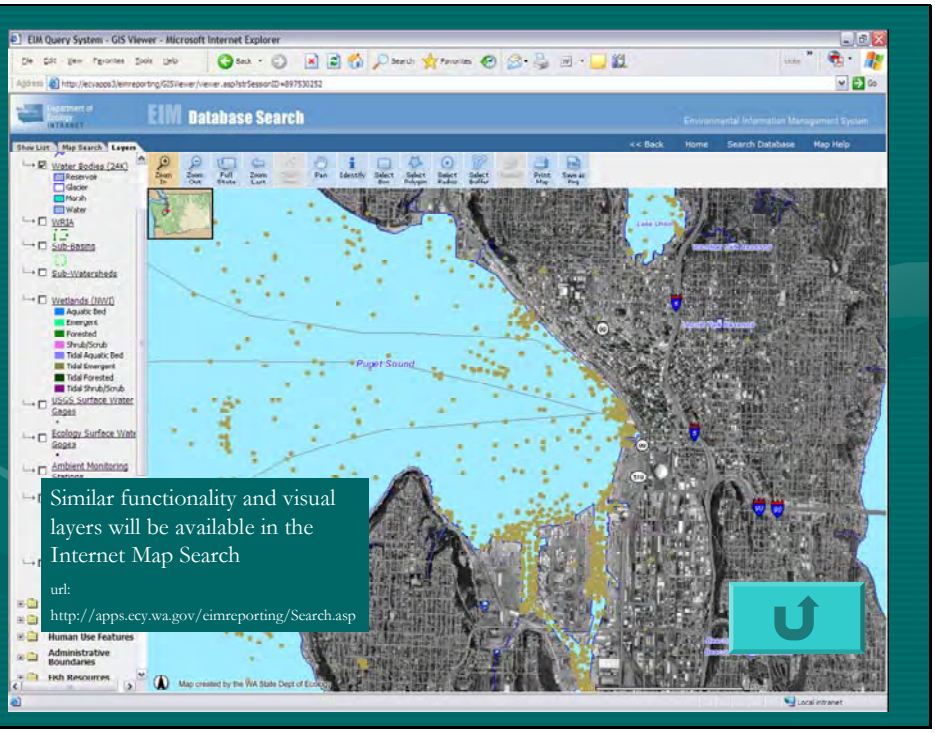
7.12


EIMImport - Microsoft Internet Explorer
Format File Name :
Format File Description :
ASCII file delimiter :
Customization Choices:
What is your date field format?
What is your time field format?
EIM Column
Your Column
Fixed Value
Translate
User Study ID
User Location ID
Study Location Name
Field Activity Type
Field Activity Data Originator
Field Activity Start Date
Field Activity Start Time
Field Activity End Date
Field Activity End Time
Field Activity Reference Point
Field Activity Comment
Sample ID
Sample Field Replicate ID
Sample Replicate Flag
Sample Sub ID
Sample Composite Flag
Sample Matrix
Sample Source
Sample Type Code
Lab Sample Type Code
Sample Use Code
Define your own input format that matches your data to EIM.
•Mandatory fields are highlighted in blue
•Save the format for reuse

7.13


EIM Query System - GIS Viewer - Microsoft Internet Explorer
EIM Database Search
Search Menu
County
City
Watershed (WRIA)
Township/Range/Section
Street Address
Map extent will include Washington, Oregon, and Idaho

7.14



7.15

SEDQUAL Redevelopment Statement of Intent

Sedqual is definitely not going away, just the name and familiar look. It is currently being redeveloped by Ecology into a more modern, web-based application called the Northwest Environmental Assessment Tool (NEAT). Many Sedqual users are concerned about this change, but can rest assured that the new tool will maintain all of Sedqual's current capabilities. Ecology's Toxics Cleanup Program (TCP) staff must maintain this system as our analytical tool for research and regulatory purposes. For this reason and in order to continue to provide this valuable tool to the public, our sediment staff are actively participating on the redevelopment design team to ensure that our needs are met as the project progresses.

Driving this change is the agency's goal to maintain one database, EIM, as the repository for all environmental data. To this end, EIM is being augmented concurrently to accommodate all sediment data types currently housed in Sedqual, including chemistry, bioassay, benthic abundance, and tissue data. We have built bridges between the two systems, now functional, which enable us to import and export data between the two systems. All sediment data from Sedqual will ultimately be migrated into EIM, from which it can be queried and analyzed using the Assessment Tool. The NEAT graphic interface will have a new look, as well, and mirror that of the current EIM system while maintaining all the functionality of the old Sedqual tool. Once the new system is fully functional, all environmental data will be required to be submitted in EIM format to the agency, including sediment data.

Additionally driving this change is the need to modernize the old system into a more user-friendly web-based format. This effort is currently underway via a multi-agency redevelopment design team led by Ecology's Toxics Cleanup Program, Information Communication Unit. Again, TCP sediments staff play a key role on that team and are fully involved in this project to ensure the resulting product is a fully operating, consistent system.

There will be training sessions offered beginning this fall to educate system users on the new, improved tool. So, don't be alarmed. What you've heard rumblings about comes from the uncertainty around change. Bottom line is that Sedqual is not going away, just the name and look.

Kathryn DeJesus
Aquatic Lands Cleanup Unit Manager
Toxics Cleanup Program
Department of Ecology
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Olympia, WA 98504-7600
(360) 407-7242

7.16

Puget Sound Naval Shipyard

Cleanup Status Report

8.1

Our New Unit Title

• Kathryn DeJesus has earlier today spoken about changes in our structure and duties

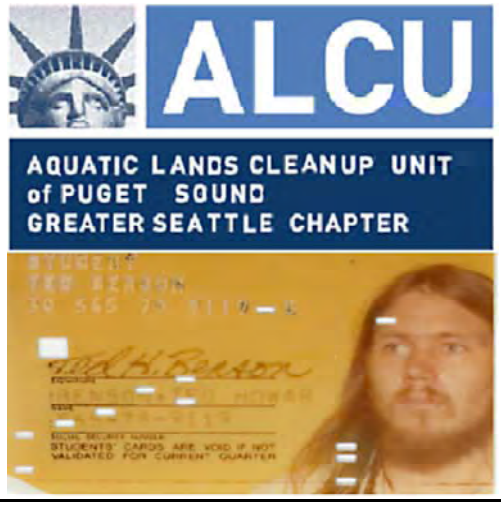
• We were the “SMU (Sediment Management Unit)”

• We’re now the “ALCU (Aquatic Lands Cleanup Unit)”

8.2

I Embrace These Changes!

- I am now a proud “card-carrying member” of the ALCU



8.3

Previous Presentations at SMARM

- Daring, innovative studies and programs
- In-depth analysis of analytical statistical procedures
- Application of Sediment Management to real-life situations

8.4

Statistical Analysis

- As the Dredged Material coordinator for the Department of Natural Resources, I contracted for the development of a statistical procedure for tracking chemical trends that incorporated non-detects.

- Due to the non-availability of the statistical expert, I had to present the new procedure.

8.5

Statistics (cont.)

- So, I gave a 20-minute presentation on a subject that I did not understand.

- I must have done a good job, as there were no questions when I finished.

- Many people still mention this presentation, often speaking in hushed tones about it when I am present.

8.6

An Innovative Program

8.7

The Findings:

- Most Dredge Abuse comes from…

Pier Pressure!

8.8

A New Mathematical Proof

- *Given that:* Knowledge is power.
  And that: Time is money.
  Plus the definition: Power is work/time.
  Therefore: Knowledge = work/money

Or, alternatively: Money = work/knowledge

Thus: As money increases, and work stays constant, knowledge decreases.

Or: The more you make, the less you know.

8.9

Back to My Subject

- The Puget Sound Naval Shipyard, Operable Unit B (Sediments)

But first, another short digression …

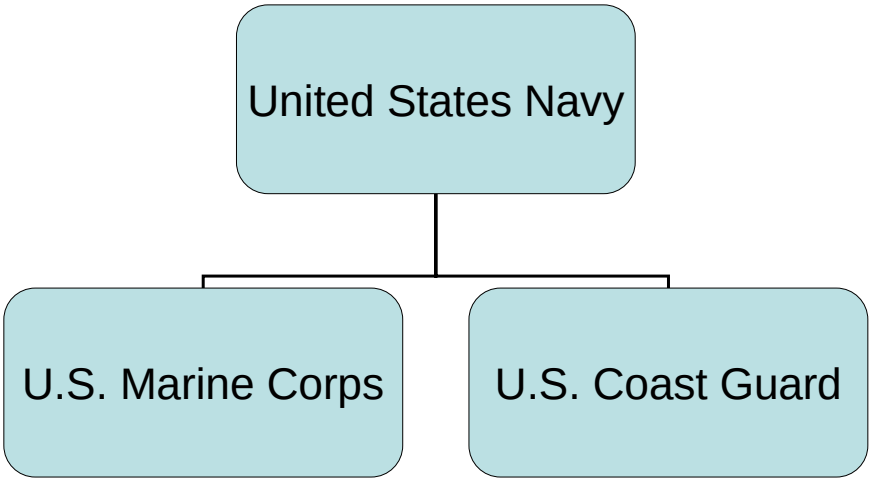
8.10

My Relationship With the Navy

- 1969 – Being of draft age, I enlisted in the United States Coast Guard.

8.11

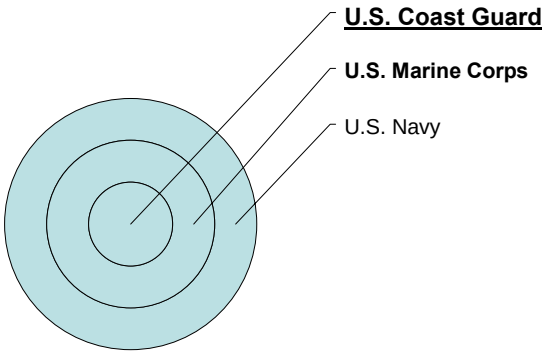
Command Structure of Naval Forces (Navy Viewpoint)



8.12

Actual Command Structure

As I learned in OCS: “The Coast Guard is that hard nucleus about which the Navy forms during times of war.”



8.13

What Does This Have To Do With The Puget Sound Naval Shipyard?

- There is a very similar command structure.

8.14

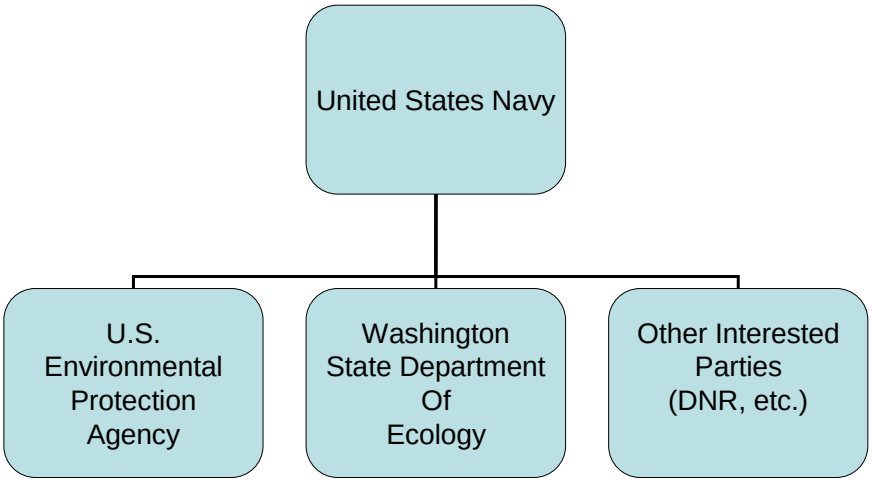
CERCLA Lead Agency
per the NCP

- Lead agency means “the agency that provides the RPM to plan and implement response actions under the NCP”
- Where the release is on, or the sole source of the release is from, any facility or vessel under the DOD or DOE, then that agency will be the lead agency.
- The lead agency will consult with the support agency, if one exists, throughout the response process.

How Does That Apply to the Puget Sound Naval Shipyard (OU-B)?

- CERCLA § 120 (f): “The Administrator shall afford to relevant State and local officials the opportunity to participate in the planning and selection of the remedial action, including but not limited to the review of all applicable data as it becomes available and the development of studies, reports, and action plans.”

PSNS Superfund Response Structure



8.17

Where We Are Now

- 2002: Combined navigational and cleanup dredging, with disposal of unsuitable material in a Confined Aquatic Disposal facility (pit-CAD).

- 2003: Discovery of “slosh” from CAD onto State-owned Aquatic Lands.

- 2004: Enhanced natural recovery (thin layer) onto “slosh” area.

8.18

Where We Are Now (cont.)

- 2003: First round of post-Remedial Action monitoring.
- 2005: Second round of post-RA monitoring.
- 2007: Five-year review (anticipated to be started this summer, 2006).

8.19

Remedial Action and Monitoring Results

As Per the Record of Decision:

- The primary objective is the MCUL of 3 mg/kg OC. The current AWA concentration of PCBs in sediments within OU B is approximately 7.8 mg/kg OC.
  - Immediately following cleanup and as a result of active remediation, the area-weighted average concentration of PCBs in sediment within OU B will decrease to approximately 4.1 mg/kg OC.
    - Natural recovery modeling predicts that the MCUL of 3 mg/kg OC can be achieved within the 10-year timeframe.

8.20

First Round of Monitoring

- 2003: Report finalized as of February ’06.
  - –CAD pit material consolidated, and cover is intact.
  - –ENR on SOAL: Sediment profiling shows evidence of considerable benthic re-colonization.
- PCB Area-Weighted Average
  - 11 mg/kg OC (higher column)
  - 9.6 mg/kg OC (lower column)
  - PCB analysis protocol changed, adding complexity to a confusing issue

8.21

Second Round of Monitoring

- 2005: Report in process of finalization, but presently still in draft format.
  - (DRAFT) Results: PCB AWA for OU-B
    - Higher column is 11 mg/kg OC
    - Lower column is 9.4 mg/kg OC
    - A “Data Variability Study” resulted from comparison of analysis results from two different laboratories.

8.22

Is Recovery Occurring?

- It does not appear so, at this time (my opinion)
- Discussions are continuing

8.23

A Technical Discussion

- Stochastic Clumping and Heterogeneity
  - Variability within a sample
  - My approach …

Well, it uses analogy.

8.24

Analogies

- Analogy [Lat. *analogia* , Gk. < *analogus*, proportionate.] 1. Correspondence in some respects between otherwise dissimilar things.

• As used by my calculus professor, “This is just like that, only different.”

• Much of learning is by analogy. Today, let’s look at chocolate chip cookies.

8.25

The Chocolate Chip Cookie Analogy

8.26

Sediment and Chocolate Chip Cookies

•Start with a basic matrix, flour or sand.

•Add other materials and mix.

•The resulting mixture will differ depending on the form and amount of other materials that are added.

- Chocolate chip cookies have chips of chocolate.

•It is put forth for your consideration that PCBs in sediments can exhibit “chippiness.”

8.27

8.28

PCBs - Organic Carbon Normalized

Grid Cell	500-1	13	Grid Cell	500-10	9.7	Grid Cell	500-57	9.9	
	Lab A	15		Lab A	8.6		Lab A	9.9	
		11			5.4			21	
		9.7			4.9			**96**	
	Avg.	12		Avg.	7.2		Avg.	34	
	Lab B	**28**		Lab B	8.1		Lab B	14	
		17			5.4			24	
		13			9.8			10	
		10			19			12	
	Avg.	17		Avg.	11		Avg.	15	
	Total Avg.	15		Total Avg.	8.9		Total Avg.	25	{Avg = 14.4 w/o 99}

8.29

Where Do The Chips Come From?

- My personal opinion:

Paint chips

Some marine paints were as much as 30% PCBs by weight

Approximately 20% of chipped paint was lost to the environment

Micrographic analysis of sediments may substantiate this hypothesis

8.30

How “Chocolately” Is Your Cookie?

- Each composited grab sample has sub-samples that are analyzed.
- These sub-samples may or may not have “chips.”

So, should we analyze the whole cookie?
And, if so, how?

Many analyses (make the statisticians happy)

My suggestion:

8.31

Eat the entire cookie!

8.32

Analyze the entire sample!

- How can this best be achieved?
  - Mill the sediments (ball mill or rod mill)
    - Grind it all to the same size powder (micro-meter diameter particles)
  - Now a homogenized sample
    - Extract and analyze

Should be more representative of Area-Weighted Average

8.33

Conclusions

- Portions of PSNS cleanup seem to be working well!
- We do not yet have a complete understanding of why portions of cleanup did not work as anticipated
- Suggest discussion of how to address “chippiness” of samples

– E-mail: tben461@ecy.wa.gov

8.34

Next Year's Presentation

- Cleanup at the Puget Sound Naval Shipyard:

"How It's Almost Exactly Not Like a Taco"

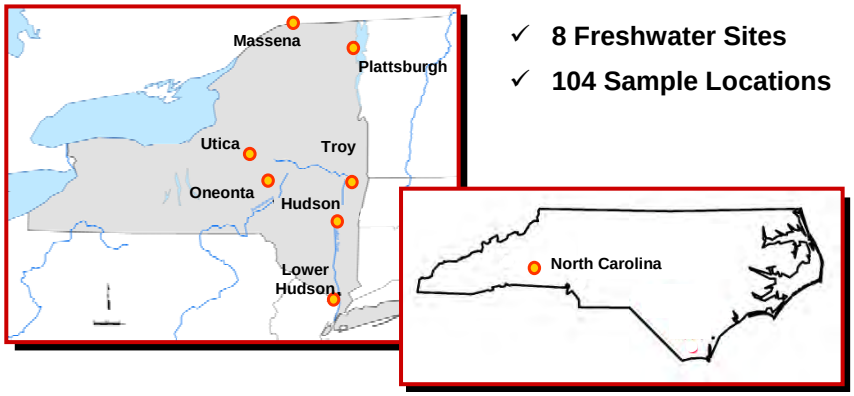
PAH Bioavailability and Toxicity at MGP and Aluminum Industry Sites

Joe Kreitinger
The RETEC Group

RETEC

9.1

Survey To Characterize PAH Toxicity and Bioavailability at MGP and Al Smelter Sites

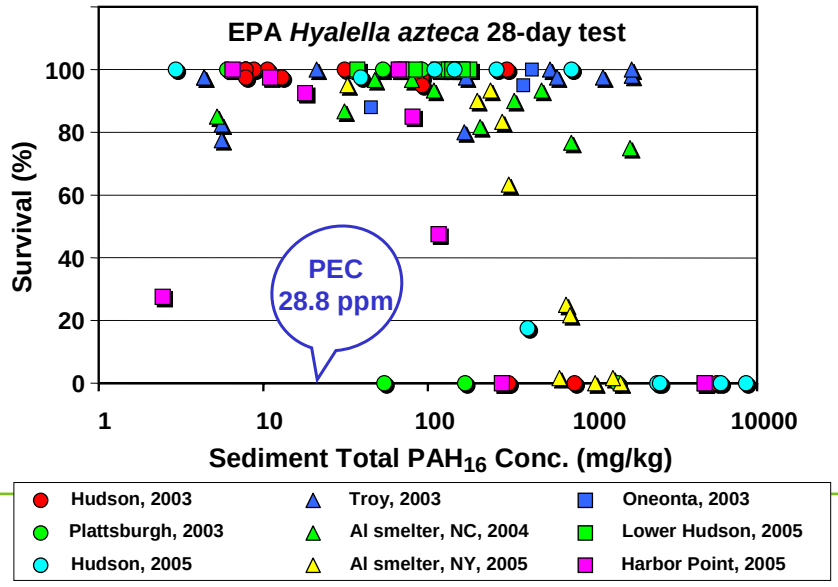


- ✓ **8 Freshwater Sites**
- ✓ **104 Sample Locations**

RETEC

9.2

No Apparent Relationship Between [PAH] and Toxicity



9.3

The TEC and PEC do not Predict Toxicity at MGP & Aluminum Smelter Sites

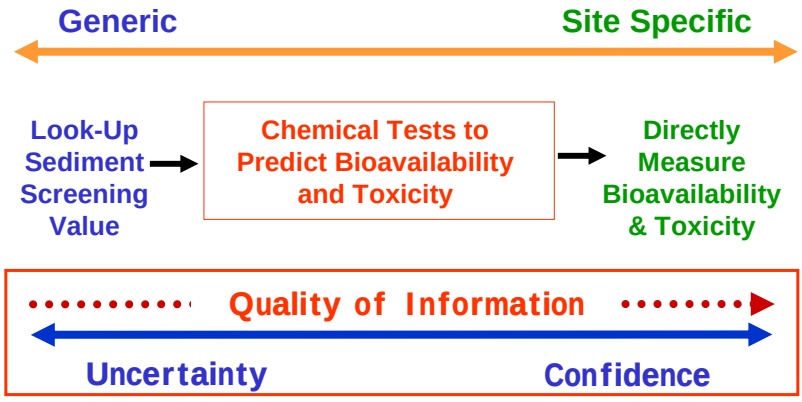
PAH Bioavailability Assessment Database (n = 79)

Total PAH_{13} Concentration		
Threshold Effects Conc	Uncertain	Probable Effects Conc
≤ 1.6 mg/kg	1.6 < X < 22.8 mg/kg	≥ 22.8 mg/kg
Incidence of Toxicity		
0% (0 of 2)	14% (1 of 7)	33% (23 of 70)

RETEC

9.4

Predicting Sediment Toxicity



RETEC

9.5

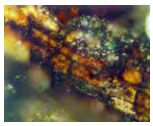
Approaches for Assessing Bioavailability

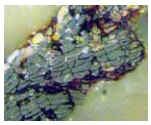
- ***Characterize carbon-types and assign carbon-specific partitioning coefficients***
- **Determine sediment pore water chemical concentrations**
- **Use direct measurements of chemical release to predict bioavailability**
- **Directly measure uptake and toxicity to organisms directly**

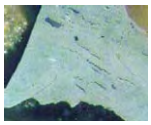
RETEC

9.6

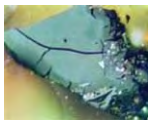
Survey of Hudson River Sediments Demonstrated Presence of Natural and Anthropogenic Carbon


wood


lignite

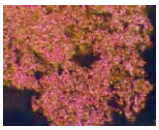

bituminous coal


anthracite coal

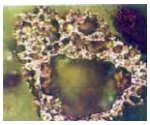

oxidized coal


charcoal


coke


soot carbon


coal tar pitch

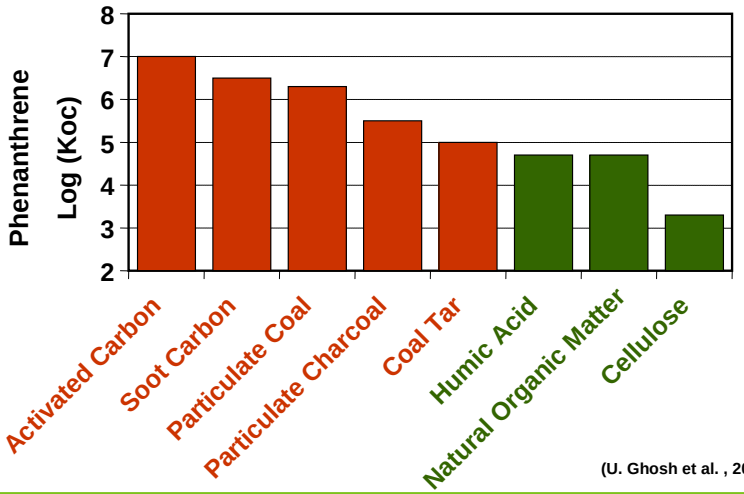

cenosphere

PAH binding (Koc) is very different for different types of carbon

(U. Ghosh et al. , 2003)

9.7

Range in Organic Carbon–Water Partitioning (Koc) of Phenanthrene



(U. Ghosh et al. , 2003)

9.8

Two Chemical Methods have been Developed and Evaluated

- **Ultra Low Level Analysis of Sediment Pore Water**
  - Laboratory extracted "pore water" from sediment samples
  - Solid phase micro extraction (SPME)
  - Measures the actual dissolved concentration of PAHs in sample water
- **Supercritical Fluid Extraction (SFE)**
  - Measures the release of PAHs from sediment samples
  - Liquid CO_2, 200 atmos, 50°C
  - Release rates correlate to water desorption

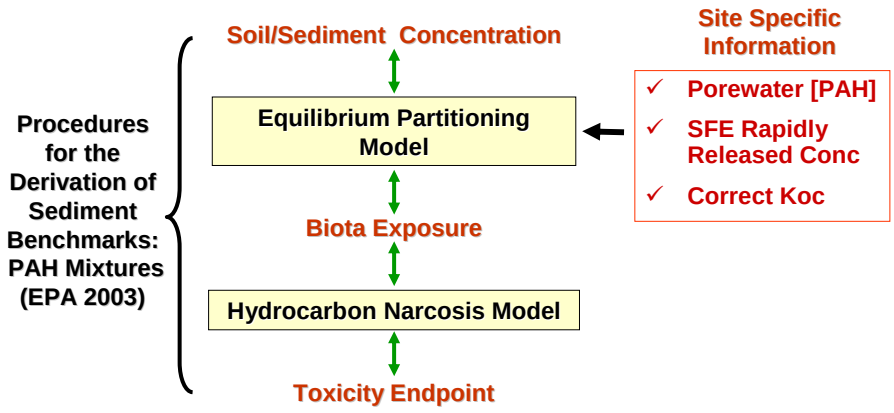
Do these measurements correlate to bioavailability?

RETEC

9.9

Applying Site Specific Measures Of Chemical Availability To Reduce Uncertainty

EPA EqP/Hydrocarbon Narcosis Model



RETEC

9.10

Ultra Low Level Analysis of Sediment Pore Water

- ✓ **Solid phase microextraction (SPME) sorbent microfiber**
- ✓ **Accurate! Eliminates colloid & DOC interference**
- ✓ **Rapid ~ 30 minutes**
- ✓ **Small sample size**
  - **~ 20 ml of sediment**
  - **~1.5 ml of pore water**
- ✓ **Very low detection limit**
  - **~ pg/mL (ppt)**

(Hawthorne et al., 2005b)

RETEC

9.11

Detection limits for representative PAHs

	EPA 8270 EQL 1 liter water	SPME 1.5 ml water
Naphthalene (2-ring)	10 µg/l	0.5 µg/l
Phenanthrene (3-ring)	10	0.2
Chrysene (4-ring)	10	0.01
Benzo(a)pyrene (5-ring)	10	0.005
Benzo(g,h,i)perylene (6-ring)	10	0.002

Why is SPME so much more sensitive for larger PAHs?
All molecules collected by SPME are transferred to the GC
For 8270 only ca. 0.1% are injected

(Hawthorne et al. , 2005b)

RETEC

9.12

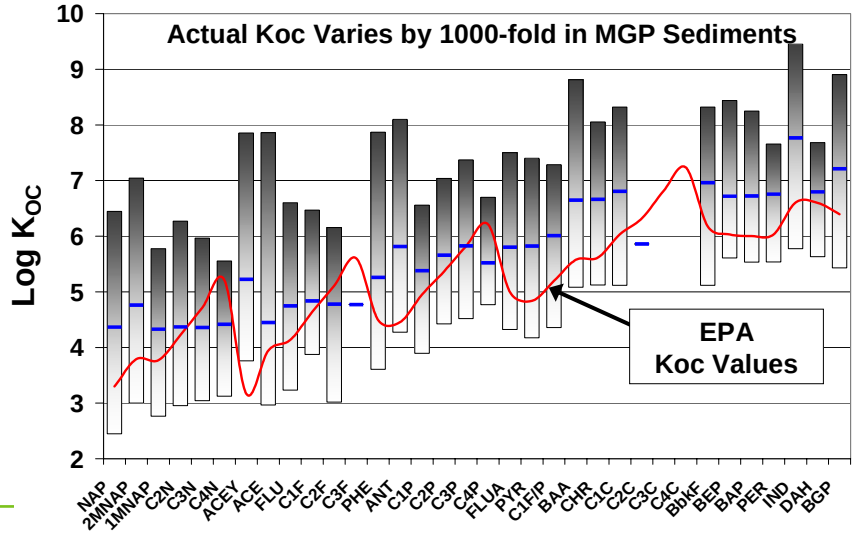
SPME Fiber Injection into GC/MS

Conventional EPA water analysis methods would require liter(s) of sediment pore water to achieve similar sensitivity

RETEC

9.13

We Now Have a Method That Allows Rapid Determination of Sample Specific Koc Values



RETEC

9.14

Case Studies to Assess Tools for Predict Bioavailability

Hyalella azteca
28-day chronic toxicity

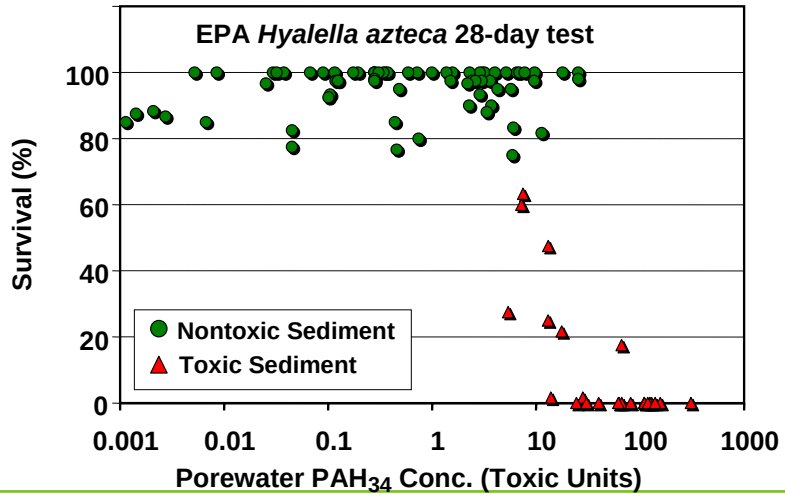
Chironomus tentans
10-day acute toxicity

Cooperative Research and Development Agreement (CRADA)
U.S. Army Corps of Engineers
Center for Contaminated Sediments

RETEC

9.15

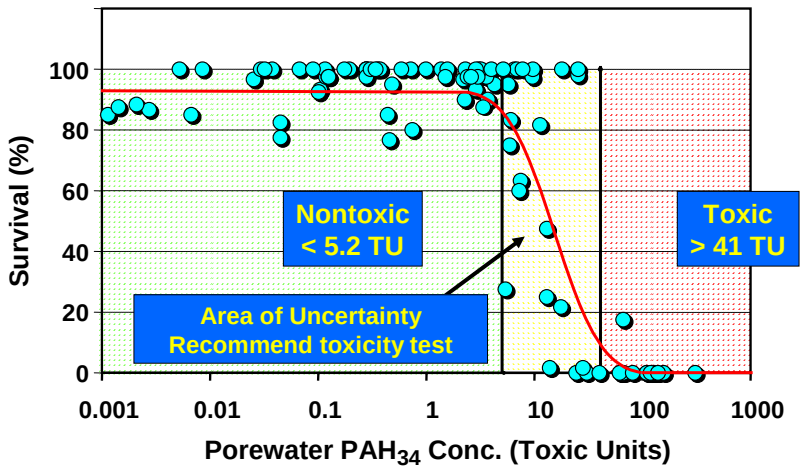
Toxicity can be Predicted by Measuring Dissolved [PAH] in Pore Water



RETEC

9.16

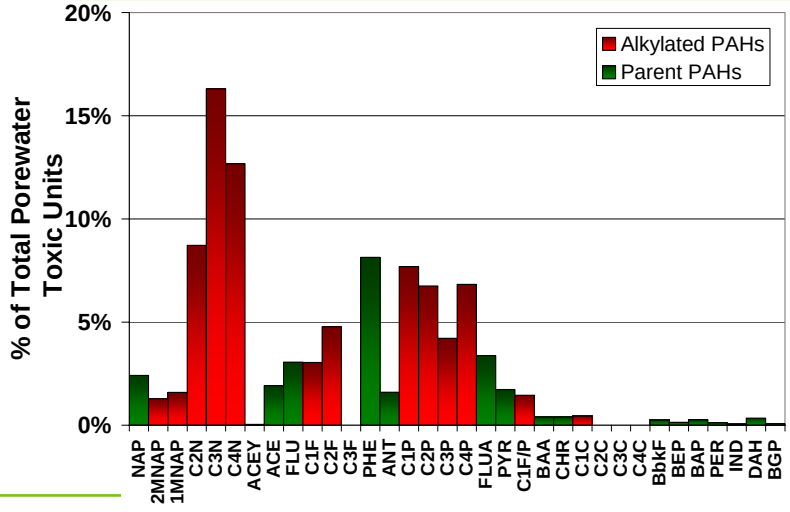
Probit Analysis of EPA *H. azteca* 28-day Tests



RETEC

9.17

Alkylated PAHs Dominate the Toxicity of Pyrogenic PAH Sources



RETEC

9.18

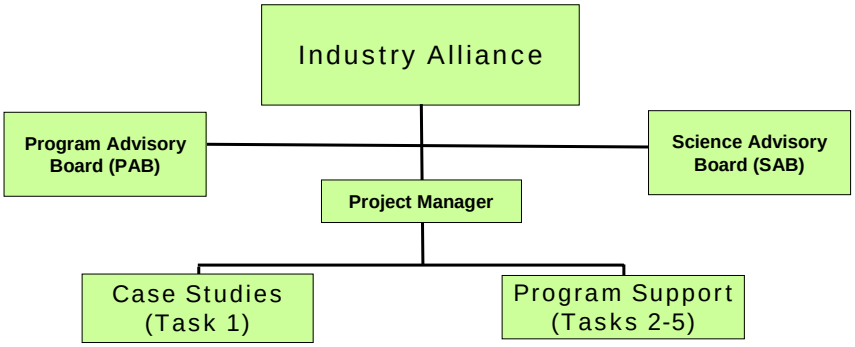
Alkylated PAHs Dominate the Narcotic Potential of Even Pyrogenic Sources

	% Alkylated PAHs	
	Sediment [PAH]	Porewater Toxic Units
	(n=97) MGP Sediments	
Average	55	75
Minimum	38	56
Maximum	78	94

RETEC

9.19

Sediment Contaminant Bioavailability Alliance



- ✓ Utility Industry
- ✓ Aluminum Industry
- ✓ Steel Industry?
- ✓ Others .....?

2. Analytical Methods
3. Technology Transfer
4. Regulatory Guidance Support
5. Alliance Communication & Coordination

RETEC

9.20

Sediment Contaminant Bioavailability Alliance

Current Members

ALCOA

Niagara Mohawk
A National Grid Company

Northeast Gas Association

US Army Corps of Engineers

Interested Parties

USS

DUPONT

bp

DOW

ExxonMobil

RETEC

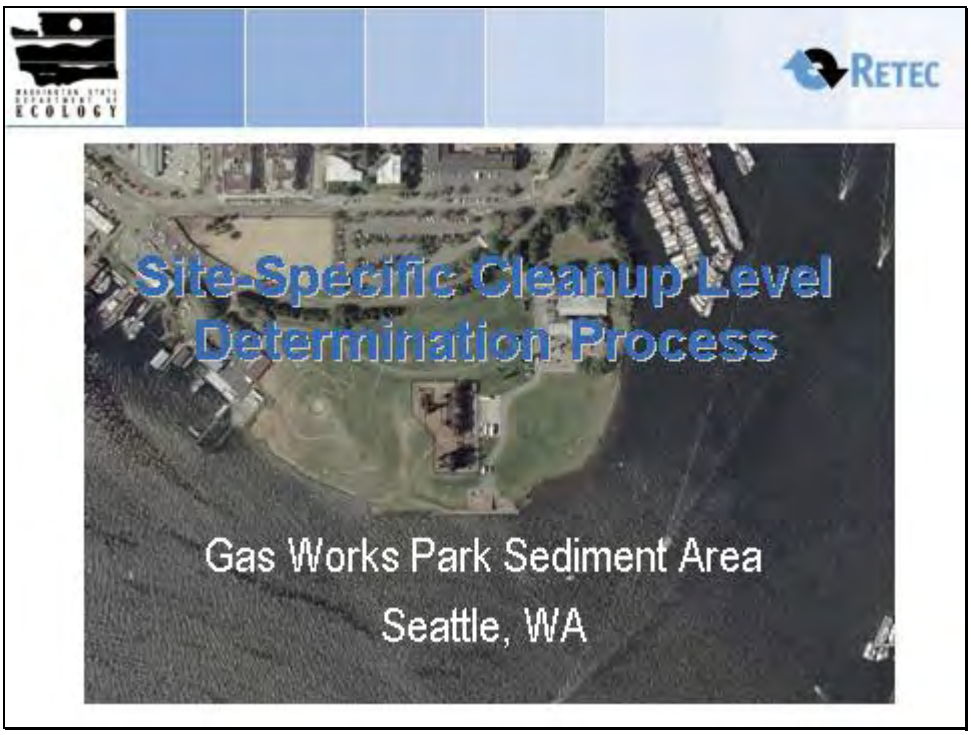
9.21

Summary

- **Total PAH_{16} does not predict toxicity**
- **Porewater [PAH_{34}] can predict toxicity**
  - **< 5 TU_{34} nontoxic to *H. azteca***
  - **> 40 TU_{34} toxic to *H. azteca***
- **Toxicity testing makes sense for sediments >5 and <40 TU_{34}**
- **Need State/Federal participation in SCBA Program**

RETEC

9.22



10.1

Acknowledgements

A collaborative process with:

- Washington State Department of Ecology
- The RETEC Group, Inc.
- Puget Sound Energy
- City of Seattle
- Floyd|Snider
- WR Consulting, Inc.
- ARI, Inc. and Nautilus Environmental, LLC

10.2

The Gas Works Park Sediment Area

Area of Investigation

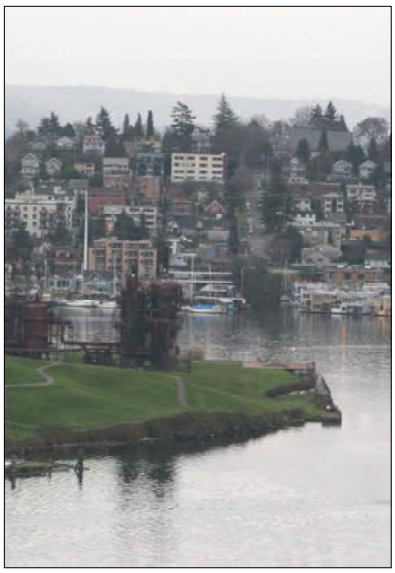
RETEC

10.3

Study Objectives

1) Develop a site-specific sediment cleanup level for chemicals associated with historical uplands operations.

2) Identify the area where the level will be applied.



RETEC

10.4

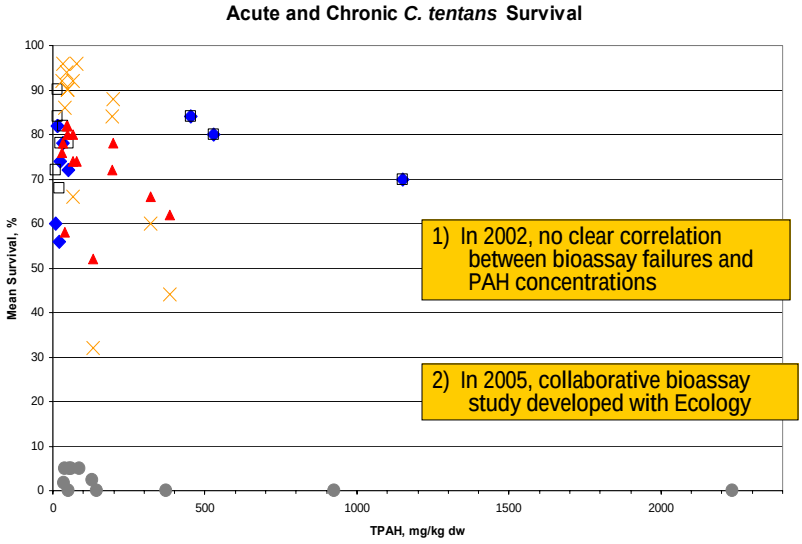
Site Chemistry Trends

- PAHs are the primary chemicals of concern in the eastern area (up to 4,800 mg/kg dw); PAHs and metals intermingle in the western area.
- Steep PAH concentration gradients between 200 and 1,000 ft offshore of Gas Works Park.
- Total solids tend to be low (range 9-40%) in bioassay samples.
- Total organic carbon (TOC) tend to be higher than often encountered in Washington freshwater lakes (range 7-98%).
- Time trend data collected between 1995 and 2005 show some evidence of natural recovery in offshore areas.

RETEC

10.5

2002 Sediment Toxicity Results



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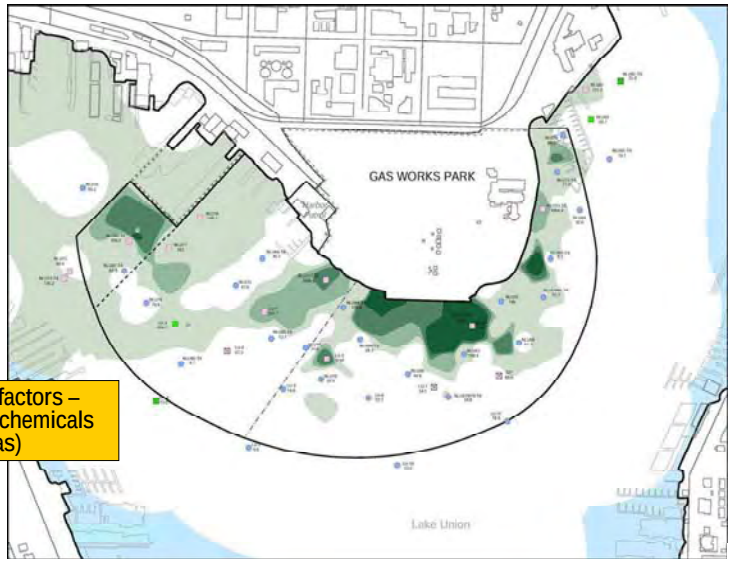
10.6

Site-wide Toxicity Results
(2000 – 2005)

= Pass

= Fail



3) Confounding factors – commingled chemicals (in some areas)

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10.7

A 2005 Collaborative Approach

for developing a site-specific sediment cleanup level for total PAH:

1) Initial Exploration –
   - Check distribution of data (normality)
   - Dataset reduction to principal site parameters (Pearson's correlation)
2) Spatial separation of samples affected principally by total PAH versus metals (hierarchical cluster analysis)
3) Determination of site parameters accounting for bioassay variability (stepwise regression)
4) Derivation of site-specific total PAH cleanup levels using ranking (i.e. LOEC/NOEC) and concentration-response curves
5) Other tools / confidence analysis

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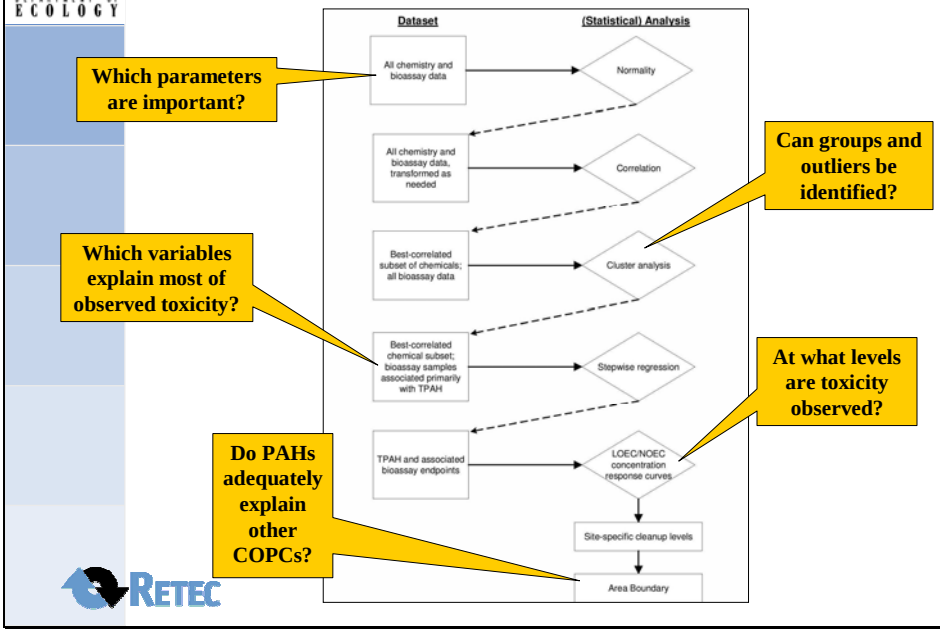
10.8

Key Questions



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10.9

Which Parameters are Important?

Normality and Correlation Results

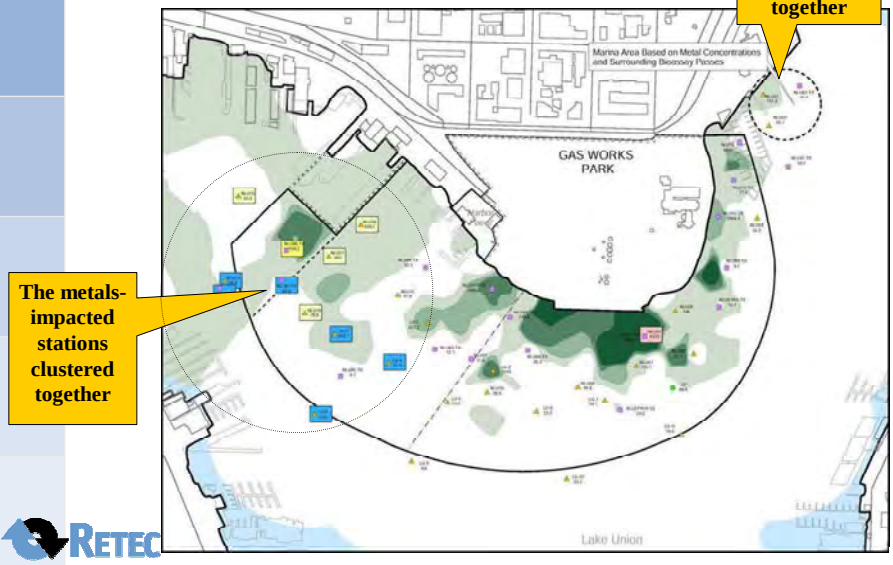
- Transformations as needed.
- TPAH correlated significantly with all other uplands-related organics, therefore it was retained to represent organics in subsequent analyses.
- All metals correlated with each other; those with lake-wide influences and concentrations below background were excluded.
- Sulfide, ammonia, and percent fines were retained.

RETEC

10.10

Groups and Outliers?

Cluster Analysis Results



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10.11

Which Variables Best Explain Toxicity?

Stepwise Regression Results

Dataset	Stepwise Regression	*H. azteca* 10-day Survival	*C. tentans* 20-day Survival	*C. tentans* 20-day Growth	Microtox® Luminescence
GWSA	Variance Explained by TPAH	63%	82%	NA	NA
	Total Variance Explained by Model	71%	86%	73%	24%
	Strength of Relationship	0.84	0.93	0.86	0.49

RETEC

10.12

Chemicals Explaining Toxicity?

Stepwise Regression Results

- Total PAH concentration had the most predictive power of toxicity for both *H. azteca* and *C. tentans* survival.
  - It accounted for 63% and 82% of the observed variance, respectively
  - Strong relationship (0.84 to 0.895)
  - Minimal influence from fines and other conventionals
- Total PAH had no predictive power for either *C. tentans* growth or Microtox®.
- The relationship improved with GWSA only data.

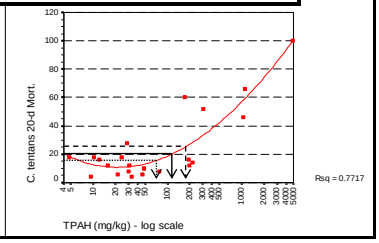
RETEC

10.13

Levels at which Toxicity Observed?

Ranking Results of PAH Effect Concentrations

GWSA bioassay endpoint	Sample Size	At what TPAH concentrations (mg/kg dw) do adverse biological effects occur?	
		NOEC	LOEC
H. azteca 10-day mortality	49	1150	170
C. tentans 20-day mortality	38	219	170
C. tentans 20-day growth	37	301	1064
C. tentans 10-day mortality	17	>1150	>383
H. azteca 28-day mortality	10	529	1150
The Second Lowest NOEC		301	
The Lowest NOEC		219	
The Lowest LOEC			170



RETEC

10.14

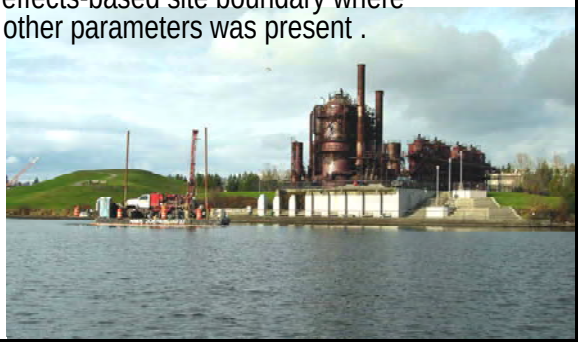
Findings

- Once the influence of metals was removed, total PAH emerged as a strong indicator variable for biological response, particularly for *H. azteca* and *C. tentans* survival.
- Total PAH effects concentrations for the GWSA were higher than FWSLVs; but consistent with emerging data for sites with high levels of anthropogenic carbon where PAHs are tightly bound.
- A site-specific cleanup screening level (SCSL) of 290 mg/kg TPAH and a site-specific sediment quality level (SSQL) of 170 mg/kg were derived specifically for GWSA sediments.

10.15

Findings

- A site boundary was delineated by bioassay passes/failures.
- Microtox was not used in the cleanup level derivation (not correlated to TPAH) but was used for boundary delineation.
- The SSQS, SCSL, and other lines of evidence were used to refine the toxicity effects-based site boundary where interference from other parameters was present .



10.16

Thank you!

RETEC

10.17

Reserve Slide
Bioassay Sampling Events

- 2000 — King County (1 station)
  - *H. azteca* 10-day survival
  - *C. tentans* 10-day survival and growth
  - Microtox®
- 2002 — RETEC and Department of Ecology (25 stations)
  - *H. azteca* 10-day and 28-day survival, 28-day growth
  - *C. tentans* 10-day and 20-day survival and growth
  - Microtox®
- 2005 — RETEC (18 stations)
  - *H. azteca* 10-day survival
  - *C. tentans* 10-day survival and growth
  - Microtox®

RETEC

10.18

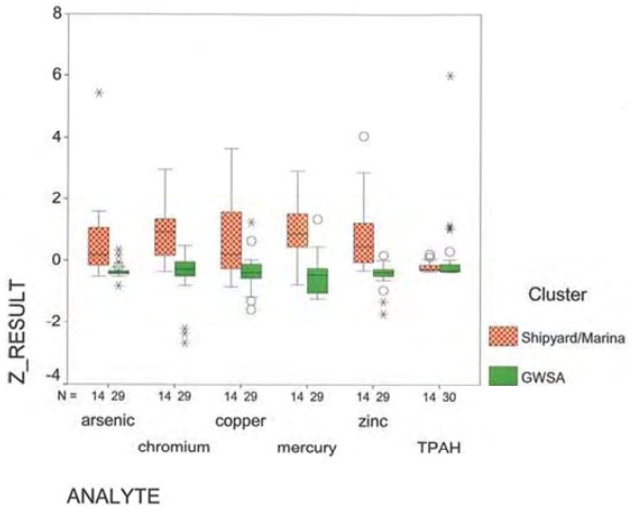
Reserve Slide

Stepwise Regression Results

Dataset	Stepwise Regression	*H. azteca* 10-day Survival	*C. tentans* 20-day Survival	*C. tentans* 20-day Growth	Microtox® Luminescence
Phases 2 and 3 Combined	Model	TPAH (61%) % Fines (4%) Mercury (4%)	TPAH (54%) Mercury (14%) Copper (7%)	TPAH (33%) Arsenic (15%) Chromium (10%)	Copper (18%) Mercury (12%)
	Total Variance Explained	69%	75%	58%	30%
	Strength of Relationship	0.831	0.867	0.764	0.550
GWSA TPAH Cluster, Phases 2 and 3 Combined	Model	TPAH (63%) arsenic (8%)	TPAH (82%) mercury (4%)	chromium (50%) zinc (23%)	chromium (24%)
	Total Variance Explained	71%	86%	73%	24%
	Strength of Relationship	0.841	0.929	0.856	0.490

10.19

Clusters and Outliers?



10.20

A Call for Renewal of the Dredged Material Management Program

Eric D. Johnson, Assistant Director
Washington Public Ports Association
May 2, 2006
Sediment Management Annual Review Meeting

11.1

Overview

- The Dredged Material Management Program (DMMP) was a state-of-the-art national model of technical standards and agency cooperation
- The DMMP is losing its effectiveness due to diminishing resources, staff turnover and possibly other reasons as well

11.2

History

The DMMP was successfully created because:

- A crisis focused policy attention on the issue at high levels
- All four agencies cooperated to develop solutions
- Adequate resources were allocated for policy and technical needs.

11.3

Trends

The DMMP has experienced:

- Increasing workloads
- Staff turnover
- Decreasing resources

Port districts are experiencing:

- Increased cargo volume projections (the global recession is over)
- Need for significant marine terminal expansion/improvement projects to meet this demand
- Shift in non-containerized cargo away from Seattle & Tacoma

11.4

Issues of Concern

- Diminished director-level participation in DMMP
- Increasingly complex regulatory decisions and overlapping laws
- Lack of adequate policy forum is causing individual projects to become policy forums
- There is a troubling trend towards less transparent decision-making

11.5

Solutions

- A multi-agency, director-level renewal of commitments to the program
- An assessment of the resources needed by the DMMP, with a goal of making them adequate
- A return to making policy-level decision in predictable transparent forums with broad input

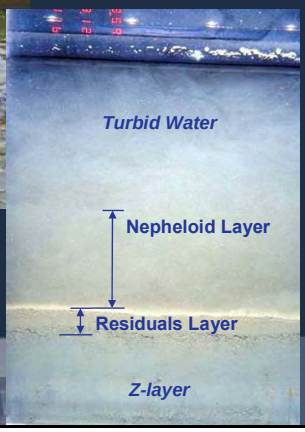
11.6

Questions?

Contact information:

Eric D. Johnson
943-0760
ericj@washingtonports.org

Dredging Residual Analyses



Public Issue Presentation to Sediment Management Annual Review Meeting

Seattle, WA

Clay Patmont

May, 2006

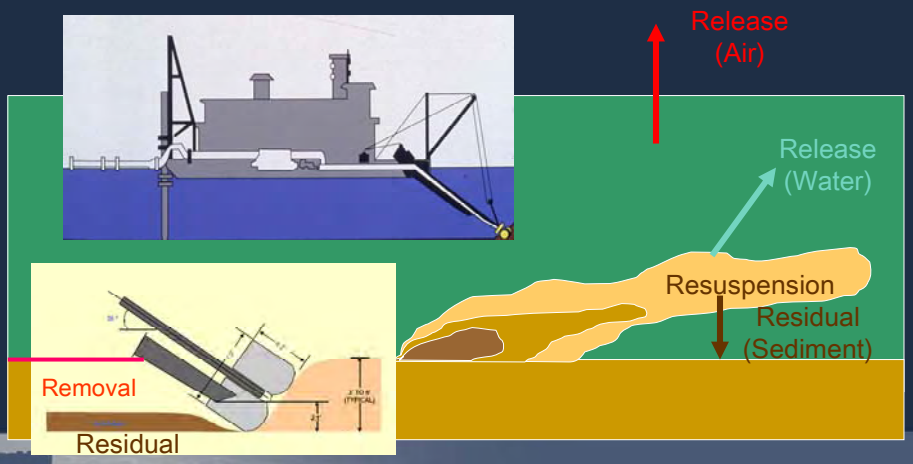
12.1

Outline

- EPA's December 2005 *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*
- Recent residuals Workshop discussions
  - EPA, Corps, academic, and consultant reps
- Dredge residual definitions
- Mass balance analysis
- Case study data (12 dredging projects)
- Preliminary summary of results
- Upcoming data and reports
- Plea for additional data

12.2

Conceptual Illustration of Environmental Dredging and Processes



12.3

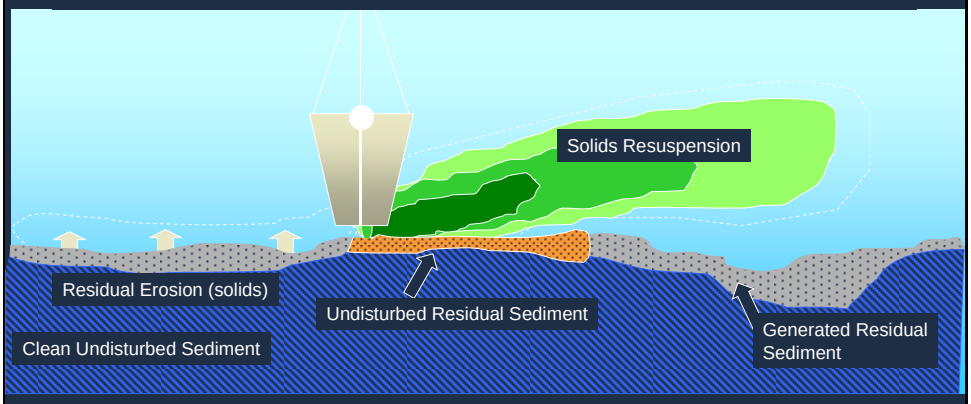
Dredge Residual Definitions

Mass and concentration of contaminated sediment remaining in the vicinity of the dredge area

1. Undisturbed residuals – contaminated sediments uncovered as a result of dredging
   - Incomplete sediment characterization or design
   - Engineering limitations (e.g., bedrock & side slopes)
2. Generated residuals – contaminated sediment dislodged but not removed by dredging
   - "Fallback", sloughing, and resettling
   - Focus of this discussion

12.4

Conceptual Illustration of Dredging Residuals



12.5

Dredge Residual Definitions, cont'd

Potential risks and management approaches vary depending on the type of residuals

1. Undisturbed residuals – depending on site conditions and engineering limitations, can be present in thin or thick layers, but at densities equivalent to *in situ* conditions
2. Generated residuals – typically thin layers (1 to 10 cm), with lower densities compared to *in situ* sediment

12.6

Generated Sediment Residuals Defined

Dislodged contaminated sediments that either:

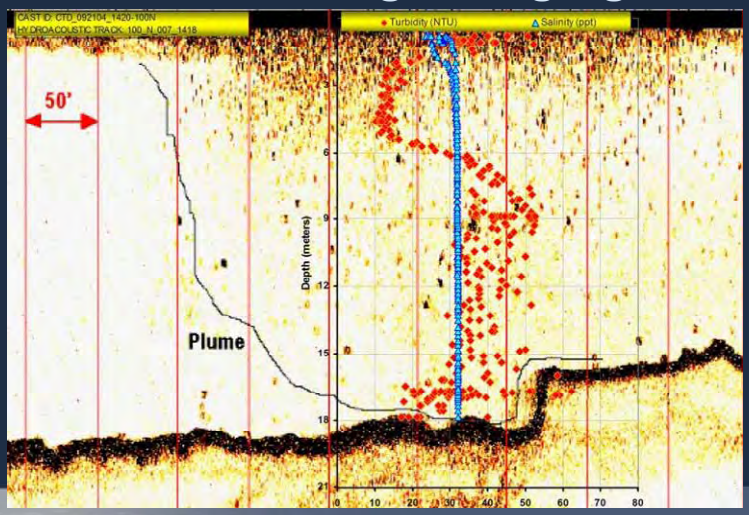
- Remain within the dredge prism after dredging; or
- Have been spread to non-cleanup areas as a result of dredging

12.7

Primary Sources of Generated Residuals

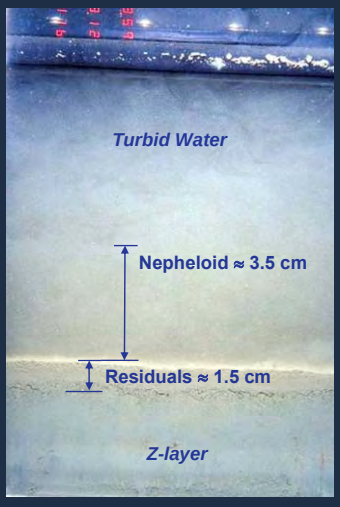
12.8

Hydroacoustic Signature of Turbidity Plume During Dredging



12.9

Generated Residual Characteristics



Typical physical properties

- Fine-grained
- Unconsolidated
- High moisture content
- Surface layer may be comprised of fluid mud or "fluff" layer

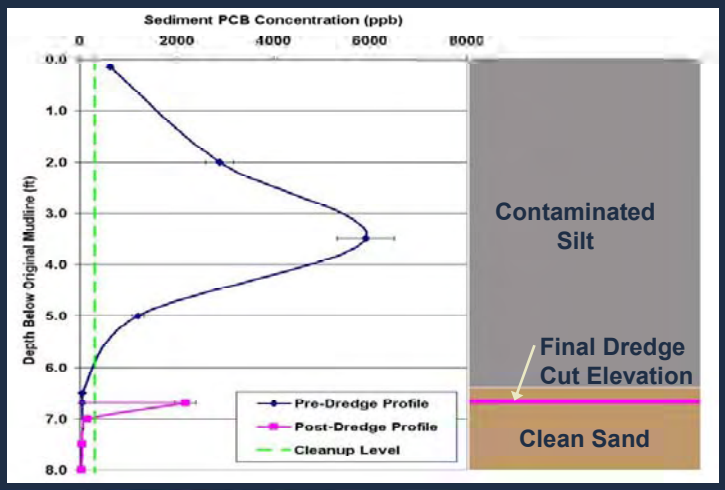
Typical chemical properties

- Constituent concentrations in the residual layer (dry weight basis) typically equal the depth averaged dredge prism concentration

12.10

Pre- and Post-Dredge Sampling Data

Hylebos Waterway Middle – PCB Deposit



12.11

Suggested Approach to Characterize Generated Dredge Residuals

- Detailed pre & post-dredge characterization data
  - Dredge prism chemistry
  - Base (“Z”) layer chemistry
  - Surface chemistry (incl. adjacent areas)
  - Core profiling (visual and/or chemical analysis)
- Post-dredge sampling after achieving design depths
- Statistical requirements/sample size
- Mass-balance calculations
  - Supporting total solids & specific gravity measurements

12.12

Generated Dredge Residual Data

12 projects with sufficient data for mass balance calculations:

- 2 Fox River Pilot Projects, WI (Deposit N and SMU 56/57)
- Lavaca Bay Pilot Project, TX
- New Bedford Harbor Pilot Project, MA
- Reynolds Aluminum, NY
- 2 Hylebos Waterway Projects, WA (Mouth & Middle)
- Middle Waterway, WA
- Duwamish/Diagonal, WA
- Todd Shipyards, WA
- 2 Fox River OU 1 Projects, WI (Subarea A and C/D2S)

12.13

Case Study: Fox River OU 1 (2005)
Residual Mass Balance Calculations

Parameter	Sediment Sampling Zone	Subarea A (mean +/- std. err.)	Subarea C/D2S (mean +/- std. err.)
Avg. Dredge Depth (feet)	-	0.88 +/- 0.05	0.95 +/- 0.06
Number of PCB Analyses	Dredge Prism	206	44
	Target Dredge Depth (Z-Layer)	107	24
	Post-Dredge Surface Grab (10 cm)	271	60
Avg. Total PCBs (ppm)	Dredge Prism	15 +/- 1.8	8.5 +/- 1.9
	Target Dredge Depth (Z-Layer)	0.16 +/- 0.02	0.23 +/- 0.04
	Post-Dredge Surface Grab (10 cm)	2.7 +/- 0.3	1.1 +/- 0.1
Calculated Residuals	**Avg. Thickness (cm)**	**1.7 +/- 0.4**	**1.1 +/- 0.3**
	% of Dredge PCB Mass	**8.7% +/- 2.0%**	**4.5% +/- 1.6%**

12.14

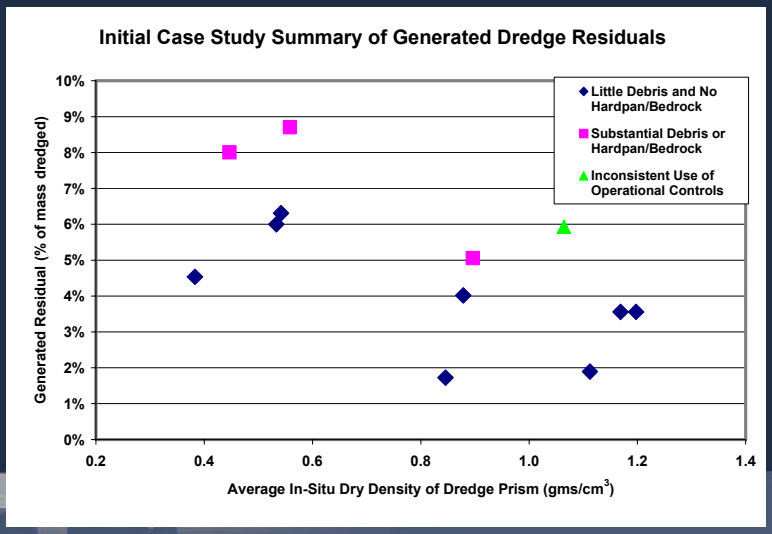
Generated Residual Case Studies

Site	Dredge Volume (cy)	Date	Equipment Type	Generated Residual Mass (%)[1]
Fox River Deposit N	8,200	1998/ 99	8" Cutterhead	~8
Fox River 56/57 Pilot	31,000	1999	10" Horizontal Auger	6
Lavaca Bay Pilot	10,000	1999	14" Cutterhead	4
New Bedford Harbor	2,300	2000	4.5 cy Horiz. Profile Grab	6
Reynolds Aluminum	63,000	2001	5.5 cy Cable Arm™	4
Duwamish/Diagonal	70,000	2003/ 04	12 cy Clamshell	~6
Middle Waterway	90,000	2003/ 04	6-12-16 cy Clamshell	4
Hylebos Wtwy. Mouth	390,000	2003/ 04	20 cy Clamshell	2
Hylebos Wtwy. Middle	200,000	2004	20 cy Clamshell	5
Todd Shipyards	120,000	2004/ 05	Cable Arm™/Clamshell	2
Fox River OU 1A	54,000	2005	8" Cutterhead	9
Fox River OU 1C/D2S	17,000	2005	8" Cutterhead	5

[1] Calculated as the ratio of the generated residual mass to the total dredged sediment mass

12.15

Generated Residuals versus Dredge Prism Dry Density



12.16

Generated Residuals:

Probable Controlling Factors

- Site characteristics
  - Geotechnical properties (e.g., total solids and potential for fluidized mud)
  - Sediment type, debris & underlying geology
  - Slopes
- Dredging operations and BMPs
- Magnitude of chemical exceedance determines level of concern

12.17

Upcoming Reports

- Further data pending
  - Additional residual data sets will be available in 2006
    - Hylebos Waterway Head, WA
    - Grasse River, NY
    - Duwamish/Diagonal, WA (year 2 monitoring)
  - ANY OTHER DATA???
- Peer-reviewed papers pending
  - Agency reports and journal articles
  - 2006 & 2007 targets for publications
  - Multiple authors

12.18

Summary

- Residuals happen
  - Developing database of 12+ case studies
  - 2 to 9% generated residual mass – several controlling factors
    - Predictive capabilities improving
  - Undisturbed residuals can provide an additional complication
  - Dredging residuals can result in continued or increased risk
- Plan accordingly
  - Develop realistic estimates of dredge residuals for remedy selection
  - For dredging remedy, plan and design for residuals (e.g., thin cover)
  - Post-dredge sampling data to refine contingency measures