SEDIMENT MANAGEMENT
ANNUAL REVIEW MEETING MINUTES

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LIST OF ACRONYMS

AED	Atomic Emission Detector
AET	Apparent Effects Thresholds
ARCS	Assessment/Remediation of Contaminated Sediments
ASTM	American Society for Testing and Materials
CAD	Confined Aquatic Disposal
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSMP	Cooperative Sediment Management Program
CSL	Cleanup Screening Level
DAIS	Dredged Analysis Information System
DDT	Dichlorodiphenyltrichloroethane
DEQ	Department of Environmental Quality
DMMO	Dredged Material Management Office
DMMP	Dredged Material Management Progam
DMMU	Dredged Material Management Units
DNR	Washington State Department of Natural Resources
DQO	Data Quality Objective
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
ENR	Enhanced Natural Recovery
EPA	U.S. Environmental Protection Agency
GC/MS	Gas chromatograph/mass spectrometry
GC/ECD	Gas chromatograph/electron capture device
GH/WBDDA	Grays Harbor/Willapa Bay Dredged Disposal Analysis
GIS	Geographic Information System
GLNPO	Great Lakes National Program Office
GPC	Gel Permeation Chromatography
HPLC	High Performance Liquid Chromatography
HR	High Resolution
LAET	Lowest Apparent Effects Thresholds
ML	Maximum Level
MSDE	Microsoft® Data Engine
MTCA	Model Toxics Control Act
MUDS	Multi-User Confined Disposal Site
NAD	North American Datum
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRDA	Natural Resource Damage Assessment
OC	Organic Carbon
O&M	Operations and Maintenance

LIST OF ACRONYMS (continued)

P450 RGS	P450 Reporter Gene System
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PDF	Portable Document Format
PE	Performance Evaluation
PIANC	International Navigation Association (formerly Permanent International Association of Navigation Congresses)
ppb	parts per billion
PSAMP	Puget Sound Ambient Monitoring Program
PSDDA	Puget Sound Dredged Disposal Analysis
PSEP	Puget Sound Estuary Program
PSNS	Puget Sound Naval Shipyard
QA	Quality Assurance
QC	Quality Control
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
SAIC	Science Applications International Corporation
SAPA	Sampling and Analysis Plan Appendix
SEDQUAL	Ecology's Sediment Quality Database
SL	Screening Level
SMARM	Sediment Management Annual Review Meeting
SMS	Sediment Management Standards
SQG	Sediment Quality Guideline
SQL	Structured Query Language
SQS	Sediment Quality Standards
TBT	Tributyltin
TEQ	Toxic Equivalency Quotient
TIC	Tentatively Identified Compounds
TMDL	Total Maximum Daily Load
UCL	Upper Confidence Limit
UK	United Kingdom
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VTS	Vessel Tracking Service
WQP	Water Quality Protection
WRDA	Water Resources Development Act

SMARM MINUTES

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING MINUTES

The Cooperative Sediment Management Program (CSMP) held its annual review of dredging/disposal and sediment management issues on May 10, 2000. This Sediment Management Annual Review Meeting (SMARM) was hosted by the Washington Department of Natural Resources and held in the Galaxy Conference Room of the U. S. Army Corps of Engineers' Federal Center South location in Seattle, Washington. The SMARM encompassed both the Dredged Material Management Program (DMMP) annual review meeting and the Washington State Department of Ecology's Sediment Management Standards (SMS) annual review process. The DMMP is an interagency cooperative program for dredged material management that began with the Puget Sound Dredged Disposal Analysis Program (PSDDA) and has expanded to other regions of Washington State. The DMMP agencies include the U.S. Army Corps of Engineers (USACE), Seattle District; U.S. Environmental Protection Agency (EPA), Region 10; the Washington Department of Natural Resources (DNR); and Ecology. The meeting agenda is provided as Attachment 1, and Attachment 2 is the list of attendees.

MORNING SESSION

Introduction and Overview

1. Diane Parks, Deputy Chief, Operations Division, USACE, Seattle District welcomed everyone to the 12th annual review meeting, and introduced Maria Victoria Peeler, Division Manager of Aquatic Resources Division, Department of Natural Resources, who gave the opening remarks. The panel of agency representatives included Diane Parks (moderator for meeting) and David Kendall, USACE; John Malek, EPA; Maria Victoria Peeler and Ted Benson, DNR; and Tom Gries and James Pendowski, Ecology.

Ovrhd 1-1. Sediment Management Program Annual Review Meeting
Ovrhd 1-2. 2000 SMARM
Ovrhd 1-3. Meeting Objectives and Purpose
Ovrhd 1-4. Dredged Material Management Program Overview
Ovrhd 1-5. Selected Projects and Policies Overview/Discussion
Ovrhd 1-6. Agency/Program Status Reports
Ovrhd 1-7. Public Issue Papers
Ovrhd 1-8. Public Issue Papers (continued)

2. Maria Victoria Peeler welcomed everyone and apologized that Commissioner Belcher could not attend. Ms. Peeler discussed how the PSDDA program, now in its 12th year, has become a routine process, and how it has been an important breakthrough in the handling and managing of sediments. She discussed how the program was created by a great deal of energy, synergy, innovation and persistence. The program has outlived many administrations and is

recognized by its commitment to use science to analyze and resolve a multitude of problems that result from the management of marine sediments. The everyday problems created by the management of marine sediments affect the manner in which dredging and disposal is conducted. She urged everyone to take a hard look at how the program is working and what new and innovative things could be done to reverse the present trend of habitat degradation.

Ms. Peeler talked about how dredged material is now fairly inexpensively disposed of, and how the PSDDA sites have been functioning as a consistent and predictable system for disposal. Because the disposal sites are monitored over an extended period of time, the quality of the sediment is known, including whether it has been maintained or improved. From the chemical perspective, it can be shown that the program is working. Ms. Peeler asked that everyone start asking questions about what will be done in terms of the physical impacts from the disposal sites.

Ms. Peeler praised the PSDDA system as an exemplary working example of a cooperative interagency program, which draws its strengths not from the individual agencies, but from the authority of the group of agencies combined. She noted that it is a very powerful system that has been maintained for many years, and that it is worthwhile to continue the program, and to continue putting energy into it. The success of the program does create some problems, however, such as how to keep the program revitalized, how to keep from falling into a rut, and how to grasp the opportunities to rethink the program's approaches to operations and maintenance. Ms. Peeler also urged everyone to begin thinking in terms of the program's impacts, both in a temporal and a spatial sense.

Ms. Peeler discussed how in the Columbia River, there have been a lot of hard questions asked, and there has been a great deal of concern that operational maintenance dredging will further degrade the habitat for certain fish species. There is concern that no amount of mitigation will be able to maintain the habitat system that is currently there. These are questions that the program needs to address to ensure that they have the most environmentally protective options available, while still maintaining commerce, navigation, public access, and recreation in these areas. The new technologies and solutions that are needed to deal with these problems may be within the program's grasp, but may not have been considered because the tendency is to follow standard dredging and disposal options. Ms. Peeler urged everyone to push themselves further to look at other ways to improve the process. She also mentioned that the program needs to determine whether or not it makes sense to continue to support worldwide shipping systems which are requiring deeper and deeper draft vessels.

Other problems that the program is now facing include the introduction of invasive species, how to export the success of the Dredged Material Management Program (DMMP) to other programs, and the continuing problem of disposal of material that is unsuitable for PSDDA disposal. Another problem Ms. Peeler identified is how to fairly apportion the cost of repairing damaged areas. The program has been working on these problems and is making progress on them. The program needs to determine how to tackle all of these problems while maintaining environmental protection. Ms. Peeler encouraged everyone to embrace the precautionary principle, to review past decisions to determine if the science and policies involved are still accurate, and to take the

time to remain current in our respective fields. She concluded by wishing everyone luck in the meeting and in the coming year.

3. Ms. Parks commented on the great amount of energy running through the program. She mentioned she was looking forward to the meeting as everyone tries to figure out how to keep that focus and energy, and how to keep the program going strong. Ms. Parks then discussed the meeting objectives and the purpose of the SMARM. The meeting was designed to obtain public input on proposed changes to the DMMP management plans presented in issue and clarification papers, to discuss disposal site management actions and changes, present public issues papers, and to receive comments and discuss the status of ongoing actions of DMMP and SMS groups. She summarized the meeting agenda which included DMMP and SMS group overviews, DMMP and CSMP issue papers and status reports, public issue papers, selected project and policy overviews, a panel discussion, and an opportunity to comment on clarification papers and status reports not presented at the SMARM. She indicated that all written comments on the SMARM proceedings must be submitted to the DMMP agencies by May 31, 2000 for consideration, and that written comments should be submitted for the SMS annual review by June 30, 2000.

4. Stephanie Stirling, USACE, provided an overview of the DMMP's activities during the past year. She noted that the 1998-1999 Biennial Report was issued this year. A total of 29 projects are included in the report. The largest of these projects were the Grays Harbor O&M and Blair waterway deepening projects. She added that the larger the project, the less the per unit cost. Next, Ms. Stirling reviewed the accomplishments of the DMMP in the last year. These accomplishments included activities of the Bioaccumulation Workgroup, an update to the DAIS database system, updated User's Manuals, a *Leptocheirus* study, and activities associated with the Lower Columbia River Dredged Material Evaluation Framework.

Ms. Stirling discussed the Bioaccumulation Workgroup's meetings occurring in 1999, which focused on revising the bioaccumulative chemicals of concern list. She also talked about the current activities of the Workgroup, the next steps that will be taken for the bioaccumulative chemicals of concern list, and upcoming topics for the workgroup. Ms. Stirling then talked about the DAIS update. David Fox and Glen Salts (USACE) created the new Windows version of DAIS, which was set in VisualBasic. The updated version simplified the QA/QC data that is entered into the database. At the time of the SMARM meeting, it was in beta-testing mode, and the new version was expected to be released soon. Ms. Stirling suggested visiting the DMMO website to determine when that would occur. With regard to the updated user's manuals, Ms. Stirling noted that Lauran Cole-Warner (USACE) worked diligently to update the PSDDA User's Manual, which was updated in February, and is now accessible from the DMMO website as a PDF file. She mentioned a few of the updates that have been included in the new version, including endangered species concerns. She then called everyone's attention to a special public notice on Biological Assessment and Biological Evaluation requirements for dredging projects which was available in the back of the room. Ms. Stirling also mentioned that the Grays Harbor/Willapa Bay Dredged Material Users Manual was in the process of being revised and updated for posting on the DMMO website, and discussed some revisions that will be made. She then described the *Leptocheirus* study that was being performed by Battelle Marine Sciences in Sequim. The objectives of the study were to look at the chronic toxicity of TBT, to develop a

dose-response curve for the bioaccumulation of TBT, and to compare the TBT sensitivity of *Leptocheirus* with other bioassays. She also described the two phases of the study. Ms. Stirling then discussed the Lower Columbia River Dredged Material Evaluation Framework. It has been implemented for a variety of projects, and the team has been planning updates to keep the framework current with both the PSDDA and Grays Harbor/Willapa Bay user's manuals. She then provided an update on the MUDS activities for the past year. In the past year, the study shifted its focus to look at treatment options as well as disposal options. She mentioned the International Navigation Association (formerly Permanent International Association of Navigation Congresses [PIANC]) and DNR workshops that had recently taken place. She then discussed the status of the MUDS project, and mentioned that a programmatic EIS was issued last fall. The next steps for the project include studying management options, developing a site selection process, evaluating treatment technologies, and developing a public participation strategy. SAIC has been contracted to perform these next steps. Lastly, Ms. Stirling mentioned the proposed DMMP changes which include minor changes to the bioaccumulation protocol, revised phthalate guidelines, and a clarification on the use of Maximum Levels (MLs) in the DMMP. The papers relating to these topics were not presented at the meeting, but are available on the DMMO website.

Ovrhd 2-1. DMMP Program Overview
Ovrhd 2-2. 1998-1999 Biennial Report
Ovrhd 2-3. Program Accomplishments
Ovrhd 2-4. Bioaccumulation Workgroup
Ovrhd 2-5. DAIS Update
Ovrhd 2-6. User's Manuals
Ovrhd 2-7. *Leptocheirus* Study
Ovrhd 2-8. Lower Columbia River Dredged Material Evaluation Framework
Ovrhd 2-9. MUDS/Treatment Update
Ovrhd 2-10. Other Topics

5. Ted Benson, DNR, gave an overview of the PSDDA disposal site monitoring and management activities for the Puget Sound sites and the Grays Harbor and Willapa Bay sites during dredge years 1998/1999. He first indicated which of the Puget Sound sites were the dispersive sites, and which were the non-dispersive sites. He then summarized the activities at each of the three dispersive sites in Puget Sound (Port Angeles, Port Townsend, and Rosario Strait). Next, Mr. Benson summarized the activities at each of the five non-dispersive sites in Puget Sound (Bellingham Bay, Port Gardner, Elliott Bay, Commencement Bay, and Anderson/Ketron Islands). He mentioned that the Anderson/Ketron Island site has received relatively little use over the history of the PSDDA program. The DMMP agencies are considering conducting temporally triggered monitoring at this site despite its low useage. Mr. Benson discussed the disposal activities for the Grays Harbor and Willapa Bay sites for dredging years 1998/1999. He then talked about the PSDDA site use history from dredging years 1994 through 1999. He noted that the program has seen some fairly large projects in the last few years, and some site management problems have surfaced, which will be discussed later on in the meeting. Overall, however, the program has been doing very well and there have been few problems. Mr. Benson then discussed the site use history for Grays Harbor and Willapa Bay, and noted that there

was a fairly large increase in the number of projects and volume of sediment from dredging year 1998 to 1999.

6. The next topic he discussed was environmental site monitoring. None has taken place this biennium, although physical monitoring was conducted at Commencement Bay in December 1998. Instead, funds were used to conduct the TBT/*Leptocheirus* study which is currently underway. He noted that Elliott Bay would be monitored this year, and Commencement Bay would be monitored next year. There was also a good possibility that the Anderson/Ketron Islands site may also be monitored next year. The purpose of the monitoring would be to assess the sites relative to the site management objectives and to acquire new baseline data. Mr. Benson then talked about shoreline permits: those that have been received, those that are pending, and those for which applications are being completed for permit processing and renewal.

Ovrhd 3-1. Disposal Site Use Report
Ovrhd 3-2. Dredge Years ’98 and ’99
Ovrhd 3-3. Puget Sound Sites
Ovrhd 3-4. Dispersive Sites
Ovrhd 3-5. Non-Dispersive Sites
Ovrhd 3-6. Non-Dispersive Sites (cont.)
Ovrhd 3-7. Grays Harbor/Willapa Bay
Ovrhd 3-8. PSDDA Use History
Ovrhd 3-9. GH/WBDDA Use History
Ovrhd 3-10. Environmental Site Monitoring
Ovrhd 3-11. Shoreline Permits
Ovrhd 3-12. GH/WBDDA Shoreline Permits

Selected Projects and Policies Overview/Panel Discussion

7. Ted Benson, DNR, provided information on Commencement Bay PSDDA disposal site issues. There was a very large project at the Commencement Bay site- where 748,000 cubic yards were disposed, including over 600 disposal events. Physical monitoring of the site took place during December 1998 and dredged material was found off-site. During auditing of the site use reports, it was discovered that there were 166 disposals for which no position was recorded. Mr. Benson said that they had reason to believe that most of these disposals were within the disposal boundary, but that without the positioning information there was no way to know exactly where the disposals occurred. This lack of information restricts DNR’s ability to manage the site. Mr. Benson mentioned that there is a potential penalty of $5.00 per cubic yard for this oversight. The 166 disposals for which no position was recorded represent a total of 181,000 cubic yards.

Mr. Benson next talked about another problem DNR recently discovered relating to position recording. It was noted that a large number of positions had been recorded in NAD 27 instead of NAD 83. He reminded everyone that all positions should be reported in NAD 83 until further notice. He also emphasized that the U.S. Coast Guard does not have enforcement authority for

the disposal of dredged material, and the Coast Guard's Vessel Traffic System (VTS) will only provide concurrence that the tug-and-barge are within the disposal site boundary.

Ovrhd 4-1. Commencement Bay Disposal Issues
Ovrhd 4-2. A Very Large Project
Ovrhd 4-3. Discrepancy
Ovrhd 4-4. Discrepancy (cont.)
Ovrhd 4-5. Another Problem
Ovrhd 4-6. Last Caveat

8. Stephanie Stirling, USACE, discussed some projects where freshwater sediment quality guidelines have been applied. She first talked about the Portland Harbor sediment cleanup project. She provided background information and a description of Portland Harbor, mentioning how it had industrial uses going back to the mid-1800s. By the 1920's, low dissolved oxygen was observed in the harbor. By the 1950's, the harbor was starting to get some sewage and source control, and by the 1970's source control was really underway. Previous testing efforts for the harbor showed the main contaminants of concern to be metals, PAHs, and semivolatile organics. In 1997, the Oregon Department of Environmental Quality (DEQ) and EPA began a joint investigation that included the investigation of upland contaminants, collection of sediment toxicity data, and the implementation of some source controls. Ms. Stirling mentioned that during the site discovery process, additional sites were found that were potential sources of contamination. With all of this contamination, there was the possibility of a National Priorities List (NPL) listing for the site, although the Oregon DEQ requested deferral. In June 1999, the DEQ developed the Portland Harbor Sediment Management Plan in order to demonstrate to EPA that the site should stay under state control without needing to be on the NPL. Ms. Stirling discussed the formulation of the management plan, which included legal, technical and administrative elements, a conceptual model for clean-up, the identification of information needs, and the integration of individual and area-wide clean-up. A workplan for a Remedial Investigation/Feasibility Study (RI/FS) was completed in March 2000. Two stakeholder groups, the Technical Exchange Workgroup and the Stakeholders Advisory Group, were involved in the process.

Ms. Stirling then talked about how one of the major achievements out of this effort has been the development of a method for calculating AET values for the freshwater environment. Dr. Teresa Michelsen developed the method and applied the existing threshold values to the freshwater data available for Portland Harbor, and found a high number of both false positives and false negatives, depending on which contaminant of concern was examined. Ms. Stirling described how the method is a floating percentile method: the percentile floats rather than remaining fixed to a particular contaminant of concern. She mentioned that the information is available on the Oregon DEQ website. Ms. Stirling then talked about the current status of the Portland Harbor project, and explained that the EPA had determined that deferral was not possible, and that the EPA was continuing with the NPL listing process. Ms. Stirling also summarized other Portland Harbor sediment issues. These issues included the WRDA 1999 listing of the lower Willamette as a priority environmental dredging candidate under section 312, O&M dredging sediment

evaluations, and the fact that the Willamette River deepening project sediment evaluations are currently on hold.

Ms. Stirling's next topic was the Quendall Terminals site. Quendall Terminals is located in Lake Washington. She gave a brief background on the site and mentioned that testing has been going on since 1971, including soil, groundwater, sediment and upland areas. Contaminants of concern at the site include PAHs and benzene. Ms. Stirling indicated that there is tremendous interest in cleaning up the site, as it is one of the most contaminated sites in Lake Washington. The City of Renton is in the process of trying to get funding to perform some cleanup activities. She then described the sediment issues at the site, which include PAH contamination, seeps, wood debris, and low dissolved oxygen concentrations. Next, she outlined the current testing activities which include a suite of four freshwater bioassays for areas with greater than 50% coverage of wood debris. Ms. Stirling then presented a map identifying which areas on the property will be tested and which will be cleaned up. She mentioned that freshwater tests had been completed, and that Microtox testing was currently underway for J. H. Baxter, the property to the north of Quendall Terminals. Ms. Stirling then talked about the next steps for Quendall Terminals, and also about the lessons learned from this site. She indicated that it would be very nice to have a set of freshwater guidelines for the state of Washington so that they would not need to be negotiated each time testing is conducted at a particular freshwater site. She also emphasized that any freshwater guidelines or interpretive guidelines that get developed at this site should not be used and interpreted at another freshwater site, because there were many very site-specific characteristics at this site, such as dealing with wood debris.

Ovrhd 5-1. Portland Harbor Sediment Cleanup
Ovrhd 5-2. Background
Ovrhd 5-3. Steps in the Current Process
Ovrhd 5-4. Steps in the Current Process (cont.)
Ovrhd 5-5. Portland Harbor Sediment Management Plan
Ovrhd 5-6. Remedial Investigation/Feasibility Study
Ovrhd 5-7. Freshwater Guidelines
Ovrhd 5-8. Current Status
Ovrhd 5-9. Other Portland Harbor Sediment Issues
Ovrhd 5-10. Quendall Terminals
Ovrhd 5-11. Site Location Map
Ovrhd 5-12. Background
Ovrhd 5-13. Sediment Issues
Ovrhd 5-14. Current Testing
Ovrhd 5-15. Locations of Proposed Stations within the Gray Zone
Ovrhd 5-16. J. H. Baxter
Ovrhd 5-17. Next Steps
Ovrhd 5-18. Lessons Learned

9. Tom Gries, Ecology, gave a presentation on freshwater sediment quality management in Washington State. He hoped his presentation would serve as a forum for comments and discussion of freshwater sediment management issues and needs. Mr. Gries first provided a brief

background on the issues. He pointed out that everything in the past has focused on marine and estuarine guidelines, such as the PSEP Protocols and Guidelines, the PSDDA program, and SMS. He noted that the SMS guidelines were originally intended to be more broad and to encompass the entire state of Washington, but on reading the SMS rules, one finds that it applies mainly to the marine areas of Puget Sound. The freshwater section is reserved with no specific guidance on freshwater areas, so decisions are usually made on a case-by-case basis. In many instances that may be appropriate, but it can also slow things down and the process could be facilitated with more specific guidance. Mr. Gries pointed out that Jim Cubbage had done a significant amount of work on developing some guidelines. His work culminated in 1997 when he left the agency, and Ecology hasn't made much progress since. Mr. Gries noted that one recent action has been the development of the Dredged Material Evaluation Framework for the Lower Columbia River Management Area, also known as the Columbia River Manual. This manual was developed a year and a half ago and essentially borrowed the framework from the PSDDA program. It uses sediment quality criteria and essentially applies marine guidance standards in a freshwater environment.

Mr. Gries then talked about the 1999 Regulatory Workgroup which was originally convened to provide input to the PSDDA program on changes to their guidelines. The objectives of the Workgroup were to research alternative frameworks for evaluating low salinity/freshwater sediment quality, including methods of measuring biological effects, and to submit recommendations to Ecology for SMS rule amendments. Mr. Gries then discussed the progress the Workgroup had made recently. The Workgroup had three meetings in 1999, which were attended by nearly 30 experts and interest group representatives. The Workgroup's draft recommendations included a draft tiered evaluation framework and draft protocols to assess toxicity, bioaccumulation, and benthic communities. He also mentioned several other sources of information which will continue to be considered before finalizing the Workgroup's recommendations. These sources include the U. S. EPA's Great Lakes National Program Office (GLNPO) and Assessment/Remediation of Contaminated Sediments (ARCS), the U. S. Army Corps Waterways Experiment Station, the Journal of Environmental Toxicology and Chemistry, the American Society of Testing and Materials (ASTM), the Canadian Ministry of the Environment, and the British Columbia provincial government. Mr. Gries also mentioned the GLNPO and ARCS websites, because there are many freshwater guidance documents available on those sites relating to dredging, cleanup decisions, test methods, and treatment technologies. He then discussed a recent paper by Ingersoll *et al*. (in press) involving the prediction of sediment toxicity using consensus-based freshwater sediment quality guidelines. He said that the authors have assembled a pretty healthy database on paired freshwater sediment chemistry and biological effects. In the paper, the authors evaluate the ability of freshwater sediment quality guidelines (SQGs) to predict sediment toxicity in the Great Lakes and elsewhere, and the effects of chemical mixtures on observed toxicity. The authors concluded that freshwater SQGs are predictive of sediment toxicity across North America, that exceeding the guidelines to a certain degree increases the probability that toxic effects will be seen, and that freshwater SQGs based on the longer-term toxicity tests may be more sensitive than SQGs derived using the shorter-term tests.

Mr. Gries mentioned that another source of information for finalizing the Regulatory Workgroup's recommendations are many of the projects occurring in the region right now. Some of these potential case studies are the Lower Columbia River, Port Quendall/Baxter (City of Renton), Portland Harbor, the Spokane River, and Lake Roosevelt projects. He then gave a brief overview of the Spokane River contaminated sediment. He explained that the section of the Spokane River in question is over 100 miles long, and drains the Coeur d'Alene River basin. Mine tailing wastes are ubiquitous in the watershed, and the primary contaminants of concern are cadmium, lead and zinc, in both the water and the sediments. Concentrations of these metals are fairly high in the area. There is a stretch of river about 33 miles long from the Idaho border to the west where elevated levels of these metals are seen. In the case of lead, the contamination seems to be highest quite a bit east of the city of Spokane, but for zinc, the contamination is more related to a source much closer to the city. Mr. Gries stated that the arsenic and lead in shoreline deposits represent a human health risk from recreational use. A fish consumption health study is currently underway. Also, the fish and aquatic community in the upper river are likely impaired by sublethal zinc and lead concentrations. Ecology is pursuing appropriate cleanup, a Natural Resource Damage Assessment (NRDA) claim, and restoration for the sites.

Mr. Gries concluded with an explanation of the next steps that will be taken to develop freshwater sediment quality guidelines. He explained that a second draft of the Regulatory Workgroup recommendations will be completed and will include freshwater sediment quality evaluation frameworks, toxicity and bioaccumulation assessment methods, and "lessons learned" from regional projects. The Regulatory Workgroup recommendations are expected to be finalized this summer. Additionally, an alternative Microtox test protocol may be evaluated, and laboratory training for long-term freshwater toxicity tests may be sponsored.

Ovrhd 6-1. Freshwater Sediment Quality Management in Washington
Ovrhd 6-2. Purpose
Ovrhd 6-3. Background
Ovrhd 6-4. Background (cont.)
Ovrhd 6-5. 1999 Regulatory Work Group
Ovrhd 6-6. 1999 Regulatory Work Group (cont.)
Ovrhd 6-7. Other Sources of Information
Ovrhd 6-8. Other Sources of Information (cont.)
Ovrhd 6-9. Freshwater Sediment Quality Guidelines
Ovrhd 6-10. Freshwater Sediment Quality Guidelines (cont.)
Ovrhd 6-11. Regional Case Studies
Ovrhd 6-12. Spokane River Contaminated Sediment
Ovrhd 6-13. Spokane River Contaminated Sediment (cont.)
Ovrhd 6-14. Sediment Lead Concentrations in Spokane River
Ovrhd 6-15. Sediment Zinc Concentrations in Spokane River
Ovrhd 6-16. Spokane River Contaminated Sediment
Ovrhd 6-17. Next Steps

Discussion and Public Comment

Erika Hoffman asked Tom Gries if he could talk about how he did the mapping of the contamination for the Spokane River sites. Mr. Gries explained that the data was gathered over the last year or two, entered into SEDQUAL, and linked to ArcView to produce the maps. He added that Brett Betts, Ecology, was providing a demonstration of the newest SEDQUAL release during the meeting.

Ms. Peeler mentioned that she knew there had been additional data generated for the Spokane River from previous years, and she wondered if the reason for not entering that data into SEDQUAL was because of QC problems?

Mr. Gries stated that he didn't know what had and had not been incorporated into SEDQUAL, but he believed the data displays he presented represent fairly recent data. He deferred the question to Brett Betts, Ecology.

Mr. Betts answered that all that is work that he did. He ended up inputting the data himself from hard copies and stated that this is 9/10s of the problem of entering data into SEDQUAL. The only reason the data doesn't go into SEDQUAL is because it hasn't been submitted in SEDQUAL templates yet.

Ms. Peeler asked if the reason the older data is not in SEDQUAL yet is not necessarily because of QA/QC problems.

Mr. Betts answered yes. Most of the data sets done on the Spokane River have been on selected chemicals, not on very large data sets. He said that most of the studies done in that area for the last 15 years or so have been that way, except for a USGS study.

Ms. Peeler added that EPA had done quite an extensive study of the Spokane River, but that the data is old.

10. Marian Abbett, Ecology, discussed the U.S. Navy Puget Sound Naval Shipyard navigation and CERCLA cleanup dredging projects. She explained that a panel had been put together to discuss some of the challenges the agencies have been faced with in trying to coordinate the two dredging projects taking place at the Puget Sound Naval Shipyard (PSNS), which are the Superfund cleanup dredging and the navigation dredging. She began by stating that the shipyard facility has been the subject of Superfund investigations for a number of years, and a major focus of those investigations has been to try to determine how to clean up the contaminated sediments. She explained that over two years ago, the Navy informed the EPA and Ecology that they had a proposal for a navigation and dredging project that would begin in the summer of 2000. The project involved dredging around three piers, turning basins, and reconstruction of one of the piers. The agencies saw many benefits of trying to coordinate these two projects, including cost-savings and environmental benefits. Ms. Abbett explained that it has been a rather daunting task to coordinate these projects. The Navy was invited to participate in the panel, but were unable to attend. Ms. Abbett was hopeful that the projects would go forward this summer, and that perhaps at next year's SMARM meeting, there could be another panel to discuss lessons learned from the two projects.

Ms. Abbett provided some background on the Remedial Investigation studies conducted in 1994 and 1995. She mentioned that this is one of the most comprehensive datasets for the Navy base. These studies included sediment chemistry, sediment bioassays, caged mussels, sea cucumbers, and English sole studies. She said there were no surprises in the sediment chemistry data- there was a little bit of everything. Many chemicals had detection limits above the sediment quality standards (SQS) and cleanup screening levels (CSL). The highest concentrations were found near the shipyard, and decreased moving away from the shipyard. Over half of the bioassay stations passed, showing no adverse effects at those stations, and the remainder showed only minor adverse effects. Ms. Abbett explained a difficulty in trying to correlate the bioassays with the sediment chemistry. For the stations with higher chemical concentrations, there were no adverse biological effects, and stations that had lower chemical concentrations, had minor adverse biological effects. The results of the ecological risk assessment showed that the sediment chemistry posed at most a minor adverse effect. The human health risk assessment concluded that PCBs were the main risk driver.

Ms. Abbett explained the challenge of trying to set cleanup goals that are both protective of the environment and human health, but also setting action levels which lead to pragmatic and cost-effective cleanup of the site. They looked to SMS for setting action levels, but the criteria were only narrative, and provided no guidance on how to actually set the numbers. Next, they looked at Model Toxics Control Act (MTCA), which provides acceptable risk levels as well as provisions for natural background levels. A lot of time has been spent in the last few years trying to develop a risk-based cleanup level, but there has not yet been agreement on the assumptions used to calculate that risk-based level. Instead, they have turned to the provision in MTCA related to natural background levels. Ms. Abbett explained that MTCA acknowledges that some persistent organic chemicals (such as PCBs) are present in natural background areas in fish tissues as well as sediments, due to global use. They are now looking into using reference area concentrations for sediments, with a value of 1.2 ppm organic carbon-normalized (OC). She noted that the number comes from the 90^{th} percentile of PCBs detected in reference embayments. They are also setting reference concentrations for fish tissue as measured in English sole, with a value of 18.8 ppb wet weight, although this number is still under development.

Ms. Abbett explained that to set a dredge action level, they looked at a cost-benefit analysis and decided to set the action level at 12 ppm OC for total PCBs. This number is also consistent with SQS and other Puget Sound cleanup projects. The enhanced natural recovery action level was set at 6 ppm OC, although Ms. Abbett did not have a technical justification for choosing that value. Although action levels have now been determined, there are constraints to cleanup within an operating shipyard. With the Navy's help, a large no-capping boundary was identified, which restricts Ecology's ability to take action based on these action levels. A second constraint is the re-location of ships. It is a major effort to move the ships around in order to gain access for cleanup. Because of these constraints, there are areas within the shipyard which are above 6 ppm that Ecology will not be able to cap or be able to gain access, and will instead have to rely on natural recovery. Ms. Abbett explained how the boundary of the marine operable unit was chosen as 1,500 feet from the shoreline.

Ms. Abbett then talked about the results of some natural recovery modeling done by the Navy. According to their models, natural recovery would result in PCB levels of 3 ppm OC within 10 years. These models incorporated dredging above 12 ppm OC, the navigation dredge actions, and enhanced natural recovery above 6 ppm OC. The Remedial Action Objective (RAO) that was reached was to reduce the concentration of PCBs in sediments to below 3 ppm OC in the biologically active zone as a measure to reduce PCB concentrations in fish tissue. Dredging and capping would be done in areas with PCB concentrations greater than 12 ppm OC. Enhanced natural recovery would be done in areas with PCB concentrations above 6 ppm OC (where practicable), and the natural recovery would be monitored. She then explained that for greater Sinclair Inlet, there will be monitoring which will include the monitoring of fish tissue and sediment until sediments reach 1.2 ppm OC or fish tissue concentrations reach 18.8 ppb wet weight (still under development).

Ms. Abbett explained that the alternatives for disposal of dredged material involve taking the material to an upland facility or disposing of the material in the water in a pit Confined Aquatic Disposal (CAD), which involves digging a pit down into the surface sediments. Fortunately, there is an area to do that on the Navy property. After evaluating these alternatives against criteria under Superfund, it was decided to dispose of the material in a pit CAD on Navy property. Ms. Abbett then discussed the potential benefits of combined dredging during one construction season, and disposal in a pit CAD on Navy property. The benefits include minimizing short-term environmental impacts, cost savings on mobilization, no delay to the cleanup efforts, a large reduction in project time, and smart management of unsuitable navigation dredge and cleanup material. Ms. Abbett concluded her discussion by presenting a map showing conceptually which areas will be dredged for Superfund, which areas will be dredged for navigation, which areas will undergo enhanced natural recovery, and areas where a pit CAD can be created.

Ovrhd. 7-1. Bremerton Naval Complex Superfund Cleanup Dredging Navigation Dredging
Ovrhd 7-2. Remedial Investigation- 1994, 1995
Ovrhd 7-3. Risk Assessment Results
Ovrhd 7-4. Cleanup Goals, Cleanup Levels & Action Levels
Ovrhd 7-5. Cleanup Goals- Sediment Quality Objectives
Ovrhd 7-6. Cleanup Goals- Sediment Quality Objectives (cont.)
Ovrhd 7-7. Action Levels
Ovrhd 7-8. Action Levels (cont.)
Ovrhd 7-9. Marine Operable Unit Boundary
Ovrhd 7-10. Minimum Cleanup Level
Ovrhd 7-11. Preferred Remedy
Ovrhd 7-12. Preferred Remedy (cont.)
Ovrhd 7-13. Coordination with navigation project
Ovrhd 7-14. CERCLA and Navigation Dredge Areas

9. Lon Kissinger, Ecology, gave a presentation on the development of RAOs based on human health concerns for the Puget Sound Naval Shipyard. He discussed the two options for

RAOs, which are the risk based approach and the background approach. The risk based approach is based on the consumption of fish and shellfish, and is derived using a standard equation. He explained that the Navy's concern was the time that it would take to bring all of the interested parties together to discuss the selection of exposure parameters. The Navy agreed to remediate to a background concentration, which was actually fairly conservative. He then described the derivation of an English sole background concentration. First, Aroclor concentrations from English sole fillets were obtained from the WA Department of Fish and Wildlife. Then, a qualitative analysis was done to verify that the tissue sampling sites were non-urban sites. Finally, the 95% upper confidence limit (UCL) was calculated for compliance criterion by the U.S. EPA. Mr. Kissinger then showed where the stations were, and described the process for using SEDQUAL and ArcView to identify the non-urban stations.

An attendee asked if Mr. Kissinger knew if this data was derived from Puget Sound Ambient Monitoring Program (PSAMP) data. Mr. Kissinger answered that it was indeed derived from PSAMP data, and explained that he used only data from 1992 and later due to some question about the data prior to 1992.

Another individual expressed some concerns about the integrity of Mr. Kissinger's dataset, and asked him if he might be able to compare the data he was presenting with some of the other data sources for PCBs in English sole. Mr. Kissinger expressed his interest in discussing that idea with the gentleman after the presentation, and said that because the dataset was being used to establish a regulatory number, he'd like to try to verify the accuracy as much as possible.

Mr. Kissinger then presented some of the data, comparing PCB concentrations in English sole tissue to concentrations in the sediment. He pointed out that in some areas, such as Saratoga Passage, there were high PCB concentrations in the tissue, but fairly low concentrations in the sediment. Mr. Kissinger then talked about some statistics that were performed by the EPA. The statistician at EPA examined the variance associated with samples being drawn from different bays, between composite samples taken at the same time, and between sampling events. The statistician also examined the effect of using half values and full values for the detection limits. Mr. Kissinger pointed out that the full detection limit value was used to obtain the value of 18.8 ppb that Marian Abbett previously discussed.

Ovrhd 8-1.	Development of PSNS RAOs Based on Human Health Concerns
Ovrhd 8-2.	RAO Options
Ovrhd 8-3.	Risk Based Approach
Ovrhd 8-4.	Derivation of an English Sole Background Concentration
Ovrhd 8-5.	English Sole Non-Urban Sampling Stations
Ovrhd 8-6.	PCB Concentrations in English Sole tissue and Sediments for Non-Urban Stations
Ovrhd 8-7.	PCB Concentrations in English Sole tissue and Sediments for Non-Urban Stations (cont.)
Ovrhd 8-8.	Calculation of a 95% UCL English Sole Tissue Aroclor Concentration

11. David Kendall, USACE, summarized the DMMP characterization at the Puget Sound Naval Shipyard. He first oriented everyone to where the dredging prisms were at the shipyard. He then briefly presented several figures indicating the unsuitable surface and subsurface DMMUs for each of the dredge areas (Turning Basin and inner channel area, Pier D, Pier B, and Pier 3). Dr. Kendall continued his summary of the DMMP characterization by describing the specifics of the characterization. The total navigation volume was 368,050 cubic yards, with a total of 91 DMMUs characterized in two phases. He then described the sediment grain size characteristics of the DMMUs by area and discussed some of the differences. The turning basin sediments were generally very fine, and the pier area sediments were generally much coarser. Next, Dr. Kendall discussed the number of chemical guideline exceedances. Mercury and total PCBs had the highest number of DMMUs exceeding the chemical guidelines. Copper, zinc, TBT, fluoranthene, pyrene, and total DDT guidelines were also exceeded, although at a much lower frequency. The surface DMMUs at Piers D, B, and 3 had the greatest number of chemical guideline exceedances.

Dr. Kendall then discussed the bioassay testing species which were used in the two testing phases. *Eohaustorius estuarius* was used in both phases, however there were major failures with this amphipod during the initial testing which had no concordance with the chemistry. There were many amphipod bioassay failures where there were no chemical exceedances. Given the results most DMMUs would have failed. He then compared the responses of the amphipod *Eohaustorius estuarius* to the proposed navigation dredged material for Phase I and Phase II. The majority of the amphipods exhibited a one-hit response in the Phase I testing. Dr. Kendall then presented the data showing the *Eohaustorius* mortality versus chemical exceedances. The percent mortality was not very well correlated with the number of SL exceedances. He then showed how the *Eohaustorius* mortality had a pronounced correlation with high clay percentages. There were also some concerns about the acclimation procedure used when the amphipods were collected. Therefore, an acclimation study was conducted to determine if this could have been a factor in the observed mortality. This was not found to be the case. The DMMP concluded that clay content was likely to be the primary factor contributing to the observed mortality. Dr. Kendall then compared the amphipod mortality versus clay content for the DMMUs selected for *Eohaustorius* retest for the three different acclimation study settings (extreme, moderate, and gradual acclimation). The gradual acclimation showed the most pronounced mortality. He then summarized the bioassay responses for both testing phases. Both amphipod species, *Ampelisca abdita* and *Eohaustorius estuarius* were used during the second phase of testing. All the retested DMMUs exhibited no-hit responses for the *Ampelisca* bioassay. Testing results for the Neanthes test also exhibited no-hit responses. Many of the DMMUs exhibited a two-hit response for the bivalve larval bioassay.

Dr. Kendall then described the Atomic Emission Detector (AED) analysis which was performed for some of the DMMUs that did not have a high clay content or chemical exceedances, but which had *Eohaustorius* mortality. The AED analysis is used as a broad spectrum pesticide and petroleum hydrocarbon screen. The results of the AED analysis documented the presence of a petroleum product lighter than motor oil but heavier than diesel fuel. It also documented the presence of total phosphate compounds. The DMMP concluded that these compounds may have

contributed to observed toxicity, but the consensus was that the clay was the primary contributing factor.

Dr. Kendall also described the Tentatively Identified Compounds (TIC) analysis which was performed on a limited subset of the DMMUs during Phase II. The analysis identified additional hydrocarbons at concentrations ranging from 370-800 ppb. The laboratory performing the analysis also acknowledged the possibility of higher concentration compounds, which may have been eliminated during the GPC cleanup step.

Next, Dr. Kendall talked about the bioaccumulation testing which was performed for one of the DMMUs (S51). He compared the initial and re-test sediment concentrations for the chemicals triggering the bioaccumulation testing (total DDT, pentachlorophenol, silver and mercury). There was a fairly large disparity in the initial and re-testing concentrations for total DDT, which was a great concern to the DMMP. The tissue levels were therefore adjusted based on the disparity between the initial and second sediment chemistry test results. He then compared the test and reference tissue concentrations of mercury and total DDT in the two test species. Only mercury and DDT showed significant bioaccumulation in the test. Because of the large sediment disparity for DDT, the DMMP concluded that it would be necessary to re-test the DMMU for total DDT, or rule the DMMU as unsuitable. The Navy opted to accept the unsuitability determination for this DMMU.

Dr. Kendall concluded by summarizing the testing outcome for the sediment characterization. The vast majority of the dredged material from the Turning Basin determined to be suitable, whereas slightly over half of the surface and subsurface Pier area volumes were determined to be suitable. He then discussed the regulatory status of the project. The final suitability determination was completed on March 21, 2000, and an initial public notice was issued on March 13, 2000. The second of two public notice errata was issued on April 28, 2000, and the public notice comment period closes on May 22, 2000.

Ovrhd 9-1. DMMP Characterization Summary
Ovrhd 9-2. Map of Puget Sound Naval Shipyard Dredging Prisms
Ovrhd 9-3. Turning Basin and Inner Channel DMMUs
Ovrhd 9-4. Pier D Surface DMMUs
Ovrhd 9-5. Pier D Subsurface DMMUs
Ovrhd 9-6. Pier B Surface DMMUs
Ovrhd 9-7. Pier B Subsurface DMMUs
Ovrhd 9-8. Pier 3 Surface DMMUs
Ovrhd 9-9. DMMP Characterization
Ovrhd 9-10. Summary of Subarea Sediment Characteristics
Ovrhd 9-11. Chemical Guideline Exceedances
Ovrhd 9-12. Summary of Chemical Guideline Exceedances
Ovrhd 9-13. Bioassay Testing Species
Ovrhd 9-14. *Eohaustorius estuarius* Responses
Ovrhd 9-15. US Navy PSNS Dredging Project- *Eohaustorius* mortality versus chemical exceedances

Ovrhd 9-16. Scatter Plot of Amphipod Mortality versus Clay Content
Ovrhd 9-17. Scatter Plot of *Eohaustorius* Mortality versus Clay Content- Turning Basin and Inner Channel (Phase I testing results)
Ovrhd 9-18. Scatter Plot of Amphipod Mortality versus Clay Content- DMMUs selected for *Eohaustorius* retest
Ovrhd 9-19. Scatter Plot of *Eohaustorius* Mortality versus Clay Content
Ovrhd 9-20. Bioassay Response Summary- Phase I and Phase II
Ovrhd 9-21. Atomic Emission Detector (AED) Screen
Ovrhd 9-22. AED Analysis Results and Conclusions
Ovrhd 9-23. Analysis of TIC's (tentatively identified compounds)
Ovrhd 9-24. Sediment Retesting- Bioaccumulation testing (S51)
Ovrhd 9-25. Bioaccumulation (DMMU S51)- Mercury
Ovrhd 9-26. Bioaccumulation (DMMU S51)- Total DDT
Ovrhd 9-27. Bioassay Determination Summary
Ovrhd 9-28. Testing Outcome Summary
Ovrhd 9-29. Regulatory Status

Discussion and Public Comment

An attendee wondered why so much biological testing was done on DMMUs with no screening level exceedances.

David Kendall responded that the Navy had opted to go with concurrent biological testing.

Todd Thornberg, Hart-Crowser, commented that the MTCA guidance for developing risk levels for human health specifies using the 90th percentile, and asked Lon Kissinger, Ecology, what his rationale was in using the 95th percentile instead of the 90th percentile.

Mr. Kissinger responded that that was a good question, but he was worried about the upper range because of composite samples, and decided the 95th percentile would be more conservative.

AFTERNOON SESSION

Agency/Program Status Reports

12. John Malek, EPA, provided a brief discussion on the proposed dispersive guidelines of the DMMP. He explained that some in the PSDDA program are proposing to do away with the biological interpretation of the dispersive criteria. He then briefly described where these criteria were derived. The PSDDA program decided to cut back on the biological criteria because only really clean material goes to the dispersive sites. This will be done while the site effects at nondispersive sites are examined. He then gave some recommendations for the program. First, the program needs to try to find the best disposal option possible. Second, the material needs to be assessed by way of chemical tests. Third, the program needs to have accountability, in terms

of monitoring and management. At the dispersive sites, however, the material goes away quickly and there is insufficient time to monitor the effects. The program needs to make predictions of what will happen to the material, and then go back and see if those predictions were true. An issue paper to this effect will be presented at the 2001 SMARM.

13. David Bradley, Ecology, gave an update on the Sediment Management Standards Rule Amendments. He explained that Ecology had decided to halt the SMS rulemaking for several reasons, including the lack of rulemaking capacity and competing priorities within Ecology, issues relating to the Clean Water Act and Endangered Species Act, alignment with the MTCA rule, and the need for additional technical work. Instead, they will focus on implementing the current SMS rule. This will include implementation of sediment cleanup and source control projects, regulatory integration and coordination, reinvigorating the interagency decision-making processes, improving the alignment of current monitoring programs, and performance tracking and evaluation. Mr. Bradley then spoke about the status of the SMS rule closure activities. He explained that a draft responsiveness summary is currently undergoing internal Ecology review. After the SMARM, Ecology intends to post the updated marine AET values on its webpage, and issue the final Regulatory Workgroup recommendations on freshwater sediments. In addition, the benthic effects reports will be distributed for expert peer review.

Mr. Bradley next spoke about the status of regional cleanup sites. He noted that there are currently about twice as many sediment cleanup sites as there were five years ago. However, there has also been a steady increase in the number of sites requiring no further action, indicating that the sites are moving well through the system.

Mr. Bradley then discussed one of the regional sediment cleanup sites, the Lower Duwamish Waterway. The waterway area of concern is approximately six river miles long. The contaminants of concern include PCBs, phthalates, metals, and others. EPA did a complicated study that determined that the Waterway would qualify as a Superfund site. However, a non-Superfund option is being pursued. A joint Ecology/EPA Administrative Order/Statement of Work is being negotiated with the Port of Seattle, King County, City of Seattle, and Boeing Company for a Remedial Investigation/Feasibility Study. Mr. Bradley stated that an early-action approach to high priority contaminated sediments will be taken.

Next, Mr. Bradley gave an update on sediment source control. He presented a graph of NPDES dischargers with sediment monitoring, comparing dischargers with and without sediment quality "hits". He indicated that there has been much progress in source control just as there has been in sediment cleanup; however, about 70% of the monitored NPDES dischargers have some level of contamination. Mr. Bradley mentioned some of the sediment source control issues, which include a second round of NPDES monitoring, revised water quality protection (WQP) guidance for identifying "potential" impacts, the impacts of total maximum daily load (TMDL) requirements on source control activities, and sediment quality impacts associated with stormwater discharges. Mr. Bradley also talked about the SMS implementation, integration, and coordination, which involve a triad between the Clean Water Act, the Endangered Species Act, and the SMS and MTCA Rules.

Mr. Bradley talked about the SEDQUAL Information System Release Four. He mentioned some of the major feature and environmental data improvements which now make SEDQUAL a more robust system. Some of these improvements included the migration from Microsoft® Access to Microsoft® Data Engine (MSDE) SQL Server, an integrated GIS component, and a greater web presence. Distribution of the new release was projected for the third quarter of 2000. Mr. Bradley mentioned that Martin Payne was providing demonstrations of the new version and was available in the back of the room for questions.

Mr. Bradley then spoke about performance tracking and evaluation. He mentioned that Brenden McFarland had put together sediment cleanup and source control status reports. Some of the performance measures used were the number of cleanup action plans and the acres of cleaned-up sediment. Finally, Mr. Bradley discussed activities planned for SMS implementation for 2000-2001. These activities involve sediment cleanup, source control activities, information management, performance tracking and evaluation, and technical procedures and policies.

Ovrhd 10-1. Sediment Management Standards- May 2000 Update
Ovrhd 10-2. SMS Rule Amendments
Ovrhd 10-3. Status of SMS Rule Closure Activities
Ovrhd 10-4. Regional Cleanup Site Status
Ovrhd 10-5. Site Status
Ovrhd 10-6. Northwest Region Lower Duwamish Waterway
Ovrhd 10-7. Northwest Region Lower Duwamish Waterway (cont.)- Map
Ovrhd 10-8. Northwest Region Lower Duwamish Waterway (cont.)
Ovrhd 10-9. Sediment Source Control Update
Ovrhd 10-10. Sediment Source Control Issues
Ovrhd 10-11. SMS Implementation Integration & Coordination
Ovrhd 10-12. SEDQUAL Information System Release Four
Ovrhd 10-13. Performance Tracking and Evaluation
Ovrhd 10-14. SMS Implementation Planned Activities (2000-2001)

14. James Pendowski, Ecology, gave an overview of the Bellingham Bay Pilot project. The pilot project is a multi-organization effort to address sediment cleanup and disposal, pollution sources, habitat restoration, and land use in the Bay. The Comprehensive Strategy for the Bay integrates these elements and presents a range of near-term remedial actions for high priority sediment sites. The Comprehensive Strategy Final EIS will be issued in June with a preferred near-term remedial action alternative. The preferred alternative addresses 200 acres of contaminated sediment and combines several conventional approaches, including dredging, confined aquatic disposal (CAD), and capping outside navigation areas. Mr. Pendowski explained that the preferred alternative provides an opportunity for treatment, if the technologies are available within the timeframe necessary for moving the CAD forward, or if treatment becomes available after construction of the CAD. After completion of the EIS, the Comprehensive Strategy for the Bay can be used as guidance for decision-makers, and to select a near-term remedial action as a remedy under MTCA. Mr. Pendowski also made some brief comments regarding liability issues.

Ovrhd 11-1. Northwest Region Bellingham Bay Pilot
Ovrhd 11-2. Northwest Region Bellingham Bay Pilot (cont.)
Ovrhd 11-3. Northwest Region Bellingham Bay Pilot (cont.)- Map
Ovrhd 11-4. Northwest Region Bellingham Bay Pilot (cont.)

Discussion and Public Comment

Mark Herrenkohl asked Mr. Pendowski if they had applied MTCA differently in this case.

Mr. Pendowski responded that the four entities really brought the solution. They wanted to make sure they had something permanent to the maximum extent possible. The liable parties are willing to go back and look at the treatment technologies.

Mr. Herrenkohl asked Mr. Pendowski if there was a hard date for the preferred alternative meeting.

Mr. Pendowski answered yes, and that they want a second meeting also. There will be a public meeting for the log pond around the end of May or the first part of June.

Maria Victoria-Peeler added that the proposal is for a dredging project, not MTCA cleanup alone. It is a complex process to put all the requirements in place. The disposal of material on public land requires compensation. DNR is willing to put up money or take a risk and sponsor looking into treatment processes. She also indicated that she had a slight disagreement with Mr. Pendowski. She stated that it is not DNR that has the liability, but that it is the State of Washington, and that the money ultimately comes from the public. It is a public process, and it requires that the public pay attention to what is going on.

Mr. Pendowski responded that he does not disagree with Ms. Peeler. He said that there are still many issues, such as habitat damage and tribal concerns. One of the central policies is who can commit to accept the liability. He asked whether DNR can take on the liability for the people of the state. He said there are still many details to work out.

Lincoln Loehr of Heller, Ehrman, White & McAuliffe, asked if the decision gets made that viable treatment options might not make sense, are there any provisions for what happens to the pool of money in the annuity?

Mr. Pendowski answered that he believes someday the treatment technologies will mature and eventually be available, and that the treatment technologies and the annuity will be put to work.

Maria Peeler pointed out that the decision that was made by the entities was whether the money could be used for treatment, recovery, or further mitigation if there was no other solution. She answered that the money would be used for other important habitat enhancement projects or mitigation within Bellingham Bay.

Mr. Loehr asked if it could actually be used to do additional mitigation elsewhere to create additional habitat.

Ms. Peeler answered no, not elsewhere, only in Bellingham Bay.

Mr. Loehr stated that if we do not move forward with removing the material for treatment and then having to remitigate it, improvements could be made elsewhere.

Ms. Peeler answered that it was a baywide approach, and that the concept is that recovery would be done under the context of today.

15. Brian Ross, EPA, Region 9, provided a brief update on what the cooperative interagency sediment management agencies in San Francisco are doing. He stated that the San Francisco Dredged Material Management Office (DMMO) just had its first annual meeting, although the group has been around for about three years. It issued its annual report, and over the last year, there have been about 51 projects. The San Francisco DMMO does not divide the volumes up into DMMUs as the DMMP does. The volumes are simply divided up as cubic yards by new work versus navigation/maintenance dredging. Approximately 97% of the navigation/maintenance dredged material was found to be suitable for unconfined aquatic disposal.

Mr. Ross mentioned that their solutions for contaminated sediments have so far been project-specific. For their agencies, they are also dealing with issues of where to put the unsuitable maintenance dredged material, and it has been difficult to come up with alternatives. The unsuitable maintenance dredged material roughly equated to 250-300 DMMUs last year. The annual report is available on the San Francisco DMMO website.

Mr. Ross talked about another interagency group, the Los Angeles Basin Contaminated Sediment Task Force. This group deals with the day-to-day dredged material navigation projects. They are also specifically trying to come up with confined disposal and rehandling facility options for contaminated sediments in Southern California.

The San Francisco DMMO also has an active enforcement effort going on. They are having very similar compliance problems, and are focusing on raising the sensitivity of the dredging community to complying with the permits. A settlement was recently reached with a violator in Southern California who missed the disposal site for the first 976 disposals in a row.

Mr. Ross mentioned that both the Southern California and San Francisco efforts are very interested in doing some of the same things that have been done here, such as trying to come up with sediment quality guidelines and bioaccumulation triggers to help streamline things and make them more predictable. The bad news is that they are lacking in the fundamental aspect of getting started on that work, which is data tracking for the information that is being collected.

Public Issue Papers

16. Erika Hoffman, EPA, Region 10, described the results of a study of PCBs in Duwamish River sediments. The study analyzed the sediments with various different analytical methods. The study was designed to determine whether dioxin-like congeners were observed in sediments with known PCB contamination, and whether dioxin-like congeners were observed in sediments and tissues at toxicologically significant concentrations. The study was also designed to provide a comparison of results from various methods, and to identify possible screening approaches for sediments in order to minimize the costs of PCB analysis. Ms. Hoffman then discussed the four different methods used in the study: 1) Aroclors using Method 8081, 2) the NMFS-HPLC-screen, 3) High Resolution GC/MS, and 4) P450 RGS (Cell-line). She explained how these different methods give different kinds of information, and how all of them can be used for both tissues and sediment. She then talked about the cost and approximate runtime for each of these four methods.

Ms. Hoffman described the sampling design for the study. The sediments were collected from the navigation channel area of the Duwamish River in an area known for PCB contaminated sediments. Three sediment samples were collected from composites of four foot cores. She then described the testing timeline for the study, which involved first performing an Aroclor determination. The three samples with the highest Aroclor concentration then underwent High Resolution GC/MS analysis to determine if dioxin-like congeners were present. HPLC-screen and cell-line testing were then performed on samples with dioxin-like congeners.

The results showed these sediments to be moderately contaminated with PCBs, although higher concentrations were expected. Ms. Hoffman then briefly discussed differences in the results of the two methods (HPLC and Aroclor analysis) for determining total PCBs. She then briefly talked about the differences in the results of the two methods (GC/MS and HPLC) for determining individual congeners. Concentrations for the individual congeners were generally fairly similar for the two methods. Ms. Hoffman then discussed the data in terms of Toxic Equivalency Quotients (TEQs) calculated from congeners. Data from the most contaminated sample indicates that there are dioxin-like congeners present in potentially relevant concentrations. She then compared human and avian TEQs calculated from the results obtained from each method. There was a pattern of increase in TEQ values in relation to the total amount of PCBs in the samples. Ms. Hoffman then discussed developing a screening approach to congener testing, and explained how a correlation between results of a less expensive test method (e.g., cell line) and those of a more expensive method (e.g., high resolution GC/MS) could be used to predict receptor-specific TEQs. High resolution GC/MS testing could then be focused on the PCB samples of greatest concern.

Ms. Hoffman then presented the conclusions of the study. She stated that dioxin-like congeners are present in the Duwamish Waterway sediments and in toxicologically significant concentrations, particularly for avian wildlife. The estimate of total PCBs in a sample varies with the method used, but the specific congener quantification is largely consistent between the methods (High Resolution GC/MS and HPLC). Also, the TEQs varied among the different methods from which they were derived. In addition, Ms. Hoffman believed the potential exists

for using correlations between TEQs derived using inexpensive methods and those derived using high resolution methods to develop a trigger for high resolution congener testing. Ms. Hoffman recommended doing more of this type of sampling whenever possible, particularly in areas with elevated PCB concentrations. Specifically, she recommended conducting more HR GC/MS testing in sediments and tissues to determine the degree and extent of dioxin-like congener contamination. She also recommended conducting more synoptic testing of both sediments and tissues using cell-line, Aroclor, and HR GC/MS methods. Finally, she recommended developing a cell-line or Aroclor TEQ "screen" in sediments to determine the need for congener testing in tissues.

Ovrhd 12-1. PCBs in Duwamish River Sediments
Ovrhd 12-2. Purpose
Ovrhd 12-3. Purpose (cont.)
Ovrhd 12-4. Methods Used
Ovrhd 12-5. Method Used- Cost
Ovrhd 12-6. Sampling
Ovrhd 12-7. Sampling locations: surface
Ovrhd 12-8. Testing timeline
Ovrhd 12-9. Results
Ovrhd 12-10. Results: Total PCBs
Ovrhd 12-11. Results: Individual Congeners
Ovrhd 12-12. Results: Individual Congeners (cont.)
Ovrhd 12-13. TEQs Calculated from Congeners
Ovrhd 12-14. Results: Human TEQs
Ovrhd 12-15. Results: Avian TEQs
Ovrhd 12-16. Developing a screening approach to congener testing
Ovrhd 12-17. Conclusions
Ovrhd 12-18. Conclusions: continued
Ovrhd 12-19. Recommendations

17. Raleigh Farlow, D.M.D., Inc., presented a comparison between PCB congeners and Aroclor analyses. Mr. Farlow began with a brief explanation of the differences between Aroclors and congeners, explaining that each Aroclor consists of a number of congeners, and gave some examples using chromatograms. He also explained some of the reasons for analytical interferences, which drive up the detection limits. Using EPA Method 1668, they have been able to see through some of the garbage. He then showed how it was possible to determine which congeners are present and in what concentration in some of the various commercial Aroclor mixtures. He also explained how it is possible to come up with a TEQ for each Aroclor based on the congeners of concern in each of the Aroclors. Mr. Farlow pointed out that it is important to know what Aroclors are present in order to know the relative toxicity of a sample. He then gave an example of how, once the Aroclor concentration is known, it is possible to use conversion factors to estimate toxicity based on dioxin-like TEQs. This method yields fairly good agreement between the methods. Mr. Farlow explained that the reason this works is because the Aroclors in the commercial PCB mixtures of interest rarely undergo significant degradation and weathering in the kinds of highly contaminated sediments that are generally looked at. Mr. Farlow's

recommendations for congener analysis include continuation of the GC/ECD method (method 8081/8082), as well as some proprietary cleanup methods for the extracts in order to isolate the PCB-specific fraction.

Mr. Farlow then provided a brief comparison between the two analyses (HR GC/MS versus GC/ECD), including the focus or objective, universality of analysis, sensitivity, applicability, amount of information gained, and the cost of each. The sensitivity of the two methods was comparable. One difference Mr. Farlow pointed out in the applicability of the congener-specific versus the Aroclor method is that the congener-specific method is especially appropriate for is the analysis of tissues in higher organisms in which metabolic transformation results in significant change in congener distribution. He emphasized that an objective needs to be determined in order to decide which method is more appropriate for that objective. Mr. Farlow concluded by saying that he does not suggest doing the congener-specific analysis in every case, because he believes it isn't necessary.

Ovrhd 13-1. PCB Congeners vs. Aroclors Analyses
Ovrhd 13-2. Duwamish River FY2000 PSDDA Sampling Locations (North)
Ovrhd 13-3. Chromatogram of Aroclors 1016, 1260, and 1248
Ovrhd 13-4. Chromatogram of Aroclor 1242 and Sediment (PCB fraction)
Ovrhd 13-5. PCBs Congener TEQ Comparison
Ovrhd 13-6. Comparison Table- Congener vs. Aroclor Method

Discussion and Public Comment

John Wakeman, USACE, asked for some direction on how to request results for both Aroclor 1262 and 1268 from the laboratory for Method 8082. He wondered if there were any additional standards necessary.

Mr. Farlow responded by saying that as a user of the data, it is necessary to go into the laboratory and feel comfortable with and understand what they are doing, as well as feel comfortable with the analyst. He emphasized that we need to become more comfortable with our analytical support- know the people we're working with, and know their capabilities.

Mr. Wakeman further clarified his question by stating that if he tells the laboratory to search for these additional Aroclors, is he also asking for additional spiking standards, and what other details might he need to consider.

Mr. Farlow recommended that he have the laboratory go ahead and run the additional standards beyond 1260.

Mr. Wakeman then asked if the proprietary cleanup method that Mr. Farlow had mentioned was routinely performed.

Mr. Farlow explained that it is based on a classical technique that is generally not used because of manpower limitations, however some laboratories are willing to do that if they know what you want.

Another attendee asked if the acid cleanup helped, or if it is just not good enough.

Mr. Farlow explained that acid cleanup is okay in some cases. In other cases it tends to eat up some of the other lower-substituted compounds, but that may not be much of a concern because there is generally not as much toxicity associated with those compounds. However, if it is important to know if Aroclor 1016 or 1242 are present because of the need for source identification or liability allocation, it may be important to know that Aroclor 1242 is there, even if there is not much toxicity associated with it.

Another individual asked two questions. First, he asked if the "magic" conversion number works the same on samples with high or low PCB concentrations. Second, with regards to effects, he asked where the TEQ information becomes the most important- at the high levels, at the low levels, or over the whole range of PCB concentrations.

Mr. Farlow answered that the conversion factor will be unvarying with sample PC concentration because it describes the composition of the Aroclor. These factors were developed from standards, and that have little variability.

John Hicks, Columbia Analytical Services, asked Mr. Farlow if D.M.D., Inc. is the only laboratory performing the cleanup technique, and if so, whether they are they willing to share the technology. He was very impressed by their work.

Mr. Farlow responded that right now they are the only one, and they are responding to a smaller market. They do try to support and supplement other laboratories, but are not necessarily going to sell their secrets. He suggested perhaps sending questionable samples to D.M.D., Inc. for further analysis.

Erika Hoffman, EPA, mentioned that the Aroclor-method has come under a lot of scrutiny lately with many favoring the 1668 method. She asked for clarification on Mr. Farlow's comments regarding the insignificance of the weathering in sediment samples, and whether his statements apply to Puget Sound sediments only.

Mr. Farlow indicated that in his opinion, sediments generally don't weather as much as others suggest, and, in fact, the variability between different batches of the same Aroclor may be a bigger factor than weathering in the variability associated with Aroclor measurements.

18. Michael Salazar, Applied Biomonitoring, presented rationale and methods for combining exposure and effects endpoints in a single bioassay, and about the details of the protocols that should be used in toxicity and bioaccumulation testing. After summarizing the purpose of his presentation, he began by discussing a quote made by McCarty related to revising bioassay protocols. He then discussed the weight of evidence which suggests TBT is bioavailable, and that

higher TBT concentrations in sediments are reflected in tissues. He summarized results from several studies, including natural *Scrobicularia* populations in the UK, lab tests with San Diego Bay sediment, and caged mussel studies in San Diego Bay and at Harbor Island, and the theoretical perspective that TBT desorbs from particles below pH 8. His conclusion was that TBT is not unique in its chemical behavior, and that its accumulation and associated effects can be predicted.

Mr. Salazar then discussed the TBT exposure pathways and explained why bivalves are good surrogate organisms. An important point he noted is that TBT has a strong affinity for organic carbon. He explained that one of the problems from initial tests was that they were done with microcrustaceans and other organisms suggesting that TBT was not bioavailable, because they didn't have the same gut content and dietary pathway of exposure, which further emphasizes why bivalves are good to use.

Mr. Salazar discussed the tendency to forget about the importance of feeding in these pathways of exposure, particularly if feeding is an important pathway, which he believes it is for bivalves. He then talked about similar inconsistencies in the selection of test organisms which he believes may have happened in some DMMP activities. He discussed the ASTM test organism criteria for bioaccumulation and toxicity testing, and then provided his recommendations. He emphasized his belief that there should not be different exposure pathways for bioaccumulation testing than for toxicity testing, noting the lack of sediment ingestion as a criterion for test organism selection for toxicity testing. Mr. Salazar pointed out his belief that there is a strong possibility that the way tests are conducted are actually altering the responses. He illustrated this point by summarizing a graph comparing PAH concentrations in *Hyalella* tissue for flow-through and static exposures. The graph showed that in each case, the accumulation of PAHs was much higher in the static than in the flow-through tests, suggesting the possibility that the flow-through system was carrying chemicals away, diluting them, or somehow altering the way the chemicals were behaving.

Next, Mr. Salazar compared the natural exposure pathways with the laboratory exposure pathways for bivalves. In a natural situation, there is a significant contribution of food sources, in the form of algae, bacteria, and sediment particles, being carried down to the sediment, and TBT is carried down with it as it is adsorbed onto the particulates. In a laboratory situation, Mr. Salazar explained that the potential food sources from the water are reduced, especially if conducting a flow-through test with filtered seawater, because the potential food and particulates may be carried away and therefore may not be available. Mr. Salazar also discussed the filter and deposit feeding modes for the bivalves. He explained that the feeding radius is dependent on the burial depth, such that the deeper the burial depth, the smaller the feeding radius. He emphasized that not only is the surface feeding restricted by the amount of material being introduced by the water, but that there is also a very small radius of feeding opportunity for these organisms, assuming that they are not moving around. Therefore, a lot of the material on the surface of the sediment may not actually be available for them to feed on. He added that some protocols include the addition of another species in the same test, such as *Nephtys*; however, this could possibly interfere with the bivalves' feeding.

Mr. Salazar then made several suggestions for protocol refinements for the *Macoma* bioaccumulation test. He suggested that it is a better estimate of health to use changes in tissue weight rather than external weight or length. He also noted that restricting the size range produces the best data, because size affects growth and feeding rates, and rate of accumulation, and this will reduce data variability. He also recommended using smaller test animals in order to optimize growth and marking them so that each individual can be measured individually. Mr. Salazar stated that it is extremely important to know if the animals are in good condition or not, and recommended using the weight-of-evidence approach for effects endpoints, in addition to chemical measurements in order to confirm the animals are in reasonably good health. His recommended approach is using the Exposure-Dose-Response Triad. He believed these three elements should be given equal emphasis, and that regulatory decisions should be made on some combination of the three elements. It is important to measure external exposure in both water and sediment, internal dose by measuring chemicals in the tissue, and response by evaluating bioassays and community structure. Mr. Salazar summarized by mentioning several questions he believes should be addressed as part of the Bioaccumulation Workgroup.

Ovrhd 14-1. Rationale & Methods for Combining Exposure & Effects Endpoints in a Single Bioassay: Revising Sediment Bioaccumulation & Toxicity Test Protocols
Ovrhd 14-2. Purpose
Ovrhd 14-3. Revise Bioassay Protocols?
Ovrhd 14-4. Weight of Evidence
Ovrhd 14-5. TBT Exposure Pathways
Ovrhd 14-6. Food & Feeding Forgotten
Ovrhd 14-7. Test Organism Selection Criteria
Ovrhd 14-8. Laboratory Artifacts
Ovrhd 14-9. PAH Concentrations in *Hyalella* Tissue Flow-Through vs Static Exposures
Ovrhd 14-10. Natural Exposure Pathways
Ovrhd 14-11. Laboratory Exposure Pathways
Ovrhd 14-12. Protocol Refinements
Ovrhd 14-13. Effects Endpoints not Trivial
Ovrhd 14-14. Exposure-Dose-Response Triad
Ovrhd 14-15. Summary & Conclusions

19. Colin Elliott, Metro, King County, discussed acceptance limits for laboratory quality control. He began by stating that this was an issue they have found in the King County Environmental Laboratory. He said that a lot of laboratories are not necessarily meeting these acceptance limits, although they may be meeting the acceptance limits of the method. He explained that when the acceptance limits don't match the capabilities of a specific method, the quality control samples are used to judge whether the method is working properly in the laboratory and whether the data quality objectives (DQOs) are being met by the procedure. Mr. Elliott explained that for sediment programs, their clients have been taking acceptance limits out of the PSEP protocols, which for sediment studies actually define what is acceptable for inclusion into the SEDQUAL database. Those acceptance limits are generally set up as a

screening technique in order to show if there were any biases in the data- not necessarily to show if the data was meeting the method objectives. His experience has shown that nearly half of the organics analyses are failing to meet those acceptance limits. The laboratories are collaborating on proposing some different acceptance limits to be submitted to Ecology for inclusion into the Sediment Sampling and Analysis Plan Appendix (SAPA). He expressed hope that when these potential updates are incorporated into the SAPA, they will be more indicative of the method and fewer re-runs will be necessary. Then the laboratory and the data will actually show if there was a failure or a problem with the analysis, instead of flagging acceptance limits that are out of line with what is appropriate for the analytical method.

Discussion and Public Comment

Colin Elliott asked Raleigh Farlow how his laboratory system deals with mixtures of Aroclors. He said that has always been a challenge in his lab, especially if the two Aroclors don't match in concentration.

Mr. Farlow answered that it is possible to resolve the mixture if you spend the time to do it. He stated that his laboratory is in the process of developing reliable algorithms, which could sort that out automatically. He mentioned that there are different ways to resolve the Aroclors from each other, and that it has been done in the past.

Mr. Elliott responded that a challenge they have found is that various labs have various algorithms, so that when they have had to split samples, they have seen a lot of bias there.

Mr. Farlow thought it would be important to throw some mixtures at the laboratories to see how rigorous and how well their algorithms work. He said that many times laboratories receive performance evaluation (PE) samples in order to evaluate their performance.

Pat Romberg, King County, made a comment on one of the papers that was not presented regarding cosmetic changes to phthalate numbers that are used for screening levels in the decision for whether biological testing should be performed. He noted that Tom Gries has gone through the data and shown that making the change now to putting in the present low AET values doesn't change anything that's happened in the past in terms of sediment that would've been tested. He thought that was good because it showed that the current numbers were working pretty well, but he was a little concerned about jumping in and putting in the current LAET values because there has been much discussion on potentially changing those numbers. He thought it might be premature to try to make the switch now, and recommended waiting until the numbers get worked out so the most current numbers can then be added.

Tom Gries, Ecology, responded that the point was well taken. He mentioned there would be new marine AET values, and that they will be considering changing the normal dredging guidelines based on those numbers next year. He mentioned that comments generated from outside the agency indicate that there is an apparent inconsistency between the DMMP guidelines and the SMS criteria, which was the purpose of the clarification change.

Summary and Closing

20. David Kendall summarized the DMMP issues that would be addressed as a result of this meeting. The DMMP would evaluate the use of Aroclors with cleanup to quantitate congeners as an alternative to the GC/MS Method 1668 as part of the Bioaccumulation Workgroup deliberation. The DMMP and Bioaccumulation Workgroup would evaluate the bioaccumulation and toxicity assessment recommendations in order to improve test performance. The DMMP agencies would also consider keying regulatory performance limits to the method. Lastly, the DMMP would revisit the timing for implementing the phthalate clarification paper. The DMMP agencies provide additional post-SMARM responses to these four issues in Appendix A.

Ovrhd 15-1. DMMP Issues for Consideration

21. Diane Parks closed the meeting and thanked everyone for attending and participating in the meeting. She said that she enjoyed the opportunity to meet with everyone and learn more about the program. She stated that written comments concerning the SMARM proceedings must be submitted to the DMMP agencies by May 31, 2000 for consideration, and that written comments concerning the SMS annual review should be submitted by June 30, 2000 for consideration.

Ovrhd 16-1. Summary and Closing

ATTACHMENT 1

Agenda

Sediment Management
Annual Review Meeting 2000
Final Agenda
Date: May 10, 2000
Location: Federal Center South / Galaxy Conference Room

8:00 Registration, coffee

8:30 Welcome (Moderator: Diane Parks, Corps)
Opening Remarks: Maria Victoria Peeler, Department of Natural Resources

9:00 Overview of Dredged Material Management Program Activities
(Stephanie Stirling, Corps; Ted Benson, DNR)

9:30 Break

Selected Projects and Policies Overview/Panel Discussion

9:45 Commencement Bay PSDDA Disposal Issues (Ted Benson, DNR)
10:00 Questions and Answers
10:15 US Navy, Puget Sound Naval Shipyard Navigation/CERCLA Cleanup Dredging (Marian Abbett, Ecology, Lon Kissinger, Ecology, David Kendall, Corps)
11:15 Freshwater Sediment Quality Issues (Tom Gries, Ecology; Stephanie Stirling, Corps)

12:00 Lunch

Agency/Program Status Reports

1:00 Proposed dispersive guideline revisions, DMMP (John Malek, EPA)
1:15 SMS Update (David Bradley, Ecology)
1:30 Questions and Answers

1:45 Break

Public Issue papers (Includes one agency discussion paper)

2:00 Sediment PCBs in the Duwamish River (Erika Hoffman, EPA)
2:20 PCB Congeners versus Aroclors (Raleigh Farlow, DMD Inc.)
2:40 Questions and Answers
3:00 Rationale and Methods for Combining Exposure and Effects in a Single Bioassay: Revising Bioaccumulation and Toxicity Testing Protocols (Michael and Sandra Salazar, Applied Biomonitoring)
3:30 Acceptance Limits for Quality Control (Colin Elliott, Metro, King County)

3:45 Questions and answers (open public forum on preceding including all non-presented papers: see enclosure 3 for list)

Summary/Closing (Agency Panel):

4:30 **Public Issues Summary**: Written comments may be submitted on the SMARM proceedings, but must be submitted to the DMMP agencies by May 31, 2000.

SMS Issues Summary: Written comments may be submitted for SMS annual review for consideration by June 30, 2000.

4:45 Meeting Adjourn

ATTACHMENT 2

List of Attendees

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING
LIST OF ATTENDEES

Name	Organization	Phone #	FAX #	E-Mail Address
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SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING
LIST OF ATTENDEES

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Stoltz, Peter	Landau Associates 130 – 2nd Avenue South Edmonds, WA 98020	425/778-0907		peterstoltz@home.com
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SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING
LIST OF ATTENDEES

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APPENDIX A

Post-SMARM Comments and Responses

Appendix A. DMMP RESPONSE TO SMARM ISSUES

1. **Comment. Evaluate the use of Aroclor quantitation with special cleanup steps that would enable quantitating congeners (e.g., see recommendations of Raleigh Farlow) as an alternative to GC/MS Method 1668 as part of the Bioaccumulation Workgroup deliberations**.

DMMP response. When DMMP addresses the issue of how to update methods for measuring and evaluating risks associated with total PCBs and congeners in sediments, they will look into Raleigh's approach as a potential cost-saving method.

2. **Comment. The DMMP bioaccumulation workgroup should evaluate bioaccumulation/toxicity assessment recommendations (see Salazar presentation) to improve test performance.**

DMMP response. Performance and interpretation of bioaccumulation tests (e.g., exposure regime, species selection, collection of sub-lethal endpoint data) is one of the priority topics that will be addressed by the Bioaccumulation Workgroup. In addition, experience with test modifications for specific dredging and cleanup projects may also lead to proposals for revising bioaccumulation testing protocols at a future SMARM.

3. **Comment. Regulatory performance limits for chemical analyses of sediments relative to QA/QC Criteria and Acceptance Limits should be keyed to methods.** As a followup to the SMARM presentation of issue, the DMMP agencies met with Colin Elliott (METRO Laboratory) on 10/5/2000 to discuss and further clarify his concerns. Colin Elliott reviewed the problems with certain methods cited in PSEP relative to METRO laboratories experience. In some cases, the acceptance limits defined by PSEP for a specific analytical method appear to be more stringent than the performance capabilities of some labs resulting in QC failures. Colin recommends that the quality control acceptance limits be modified in future PSEP updates/revisions for the chemicals noted, and indicated that the acceptance limits defined in the reference methods are the most logical acceptance limits to be presented in the Sediment Sampling and Analysis Plan Appendix (SAPA) for SMS testing. Colin recommended gathering commercial labs together to discuss establishing uniform acceptance limits that reflect current reality. It was recommended that a QC retrospective analysis be performed on existing DAIS and SEDQUAL databases to see how labs have been performing relative to current QC acceptance limits. An additional task is to reconcile the various qualifier codes that labs use to report DMMP and SMS data.

DMMP response. The DMMP agencies are sensitive to the concerns raised by Collin Elliott, and are committed to appropriately addressing these concerns during future PSEP revisions. The agencies will work with Colin as time and staff permit to assess DMMP and SMS laboratory data relative to the current QC acceptance limits, and to look at ways of reconciling the various qualifier codes used to report DMMP and SMS data.

4. **<u>Comment.</u> The DMMP agencies should revisit the timing for implementing the Phthalate clarification paper.**

<u>DMMP response</u>. The commenter (Pat Romberg, King County) agreed that DMMP guidelines for phthalate compounds should be changed for sake of consistency and that the proposed changes apparently had minimal effect. Mr. Romberg asked if it made sense for DMMP agencies to change only the guidelines for phthalates when the Department of Ecology was in the process of a comprehensive revision of AET values upon which all the guidelines are based. Mr. Romberg suggested that the phthalate guidelines should be changed as part of a more extensive revision of guidelines, that this approach would be more efficient and less confusing to the regulated community. The DMMP agencies agree, with the caveat that Ecology's AET revision process remains timely. DMMP agencies may revisit this proposal if it appears AET revisions will be greatly delayed.

APPENDIX B

SMARM Issue Papers,
Clarification Papers, and Status Reports

List of 2000 SMARM Papers[1]

Title	Type of Paper	Lead Author	Topic Presented
Clarifications to the DMMP Bioaccumulation Protocol	Clarification	David Kendall	No
Uniform Application of Disposal Guidelines to all Puget Sound Open-Water Disposal Sites	Status (future Issue)	John Malek	Yes
Multiuser Disposal Site ("MUDS") Feasibility Study	Status	Tom Gries	No
New DMMP Guidelines for Phthalates	Clarification	Tom Gries	No
Purpose of Maximum Level (ML) – Clarification of Use in Regulatory Program	Clarification	John Malek	No
Updates to PSDDA and Grays Harbor/Willapa Bay Users Manuals	Status	Lauran Cole-Warner	No
Use of *Leptocheirus plumulosus* for Measuring the Chronic Toxicity and Bioaccumulation of Tributyltin (TBT) Contaminated Sediments	Status	Lauran Cole-Warner	No
Rationale and Methods for Combining Exposure and Effects Endpoints in a Single Bioassay: Revising Sediment Bioaccumulation and Toxicity Test Protocols	Public Issue	Michael & Sandra Salazar	Yes
Acceptance Limits for Quality Control Results	Public Issue	Colin Elliott	Yes

1 All papers are posted on the Seattle District/Dredged Material Management Office homepage at URL http://www.nws.usace.army.mil/dmmo/homepage.htm

APPENDIX C

SMARM Overheads

LIST OF OVERHEADS

Diane Parks

Ovrhd 1-1	Sediment Management Program Annual Review Meeting
Ovrhd 1-2	2000 SMARM
Ovrhd 1-3	Meeting Objectives and Purpose
Ovrhd 1-4	Dredged Material Management Program Overview
Ovrhd 1-5	Selected Projects and Policies Overview/Discussion
Ovrhd 1-6	Agency/Program Status Reports
Ovrhd 1-7	Public Issue Papers
Ovrhd 1-8	Public Issue Papers (continued)

Stephanie Stirling

Ovrhd 2-1	DMMP Program Overview
Ovrhd 2-2	1998-1999 Biennial Report
Ovrhd 2-3	Program Accomplishments
Ovrhd 2-4	Bioaccumulation Workgroup
Ovrhd 2-5	DAIS Update
Ovrhd 2-6	User's Manuals
Ovrhd 2-7	*Leptocheirus* Study
Ovrhd 2-8	Lower Columbia River Dredged Material Evaluation Framework
Ovrhd 2-9	MUDS/Treatment Update
Ovrhd 2-10	Other Topics

Ted Benson (Disposal Site Use)

Ovrhd 3-1	Disposal Site Use Report
Ovrhd 3-2	Dredge Years '98 and '99
Ovrhd 3-3	Puget Sound Sites
Ovrhd 3-4	Dispersive Sites
Ovrhd 3-5	Non-Dispersive Sites
Ovrhd 3-6	Non-Dispersive Sites (cont.)
Ovrhd 3-7	Grays Harbor/Willapa Bay
Ovrhd 3-8	PSDDA Use History
Ovrhd 3-9	GH/WBDDA Use History
Ovrhd 3-10	Environmental Site Monitoring
Ovrhd 3-11	Shoreline Permits
Ovrhd 3-12	GH/WBDDA Shoreline Permits

Ted Benson (Commencement Bay)

Ovrhd 4-1	Commencement Bay Disposal Issues
Ovrhd 4-2	A Very Large Project
Ovrhd 4-3	Discrepancy
Ovrhd 4-4	Discrepancy (cont.)
Ovrhd 4-5	Another Problem
Ovrhd 4-6	Last Caveat

Stephanie Stirling

Ovrhd 5-1	Portland Harbor Sediment Cleanup
Ovrhd 5-2	Background
Ovrhd 5-3	Steps in the Current Process
Ovrhd 5-4	Steps in the Current Process (cont.)
Ovrhd 5-5	Portland Harbor Sediment Management Plan
Ovrhd 5-6	Remedial Investigation/Feasibility Study
Ovrhd 5-7	Freshwater Guidelines
Ovrhd 5-8	Current Status
Ovrhd 5-9	Other Portland Harbor Sediment Issues
Ovrhd 5-10	Quendall Terminals
Ovrhd 5-11	Site Location Map
Ovrhd 5-12	Background
Ovrhd 5-13	Sediment Issues
Ovrhd 5-14	Current Testing
Ovrhd 5-15	Locations of Proposed Stations within the Gray Zone
Ovrhd 5-16	J. H. Baxter
Ovrhd 5-17	Next Steps
Ovrhd 5-18	Lessons Learned

Tom Gries

Ovrhd 6-1	Freshwater Sediment Quality Management in Washington
Ovrhd 6-2	Purpose
Ovrhd 6-3	Background
Ovrhd 6-4	Background (cont.)
Ovrhd 6-5	1999 Regulatory Work Group
Ovrhd 6-6	1999 Regulatory Work Group (cont.)
Ovrhd 6-7	Other Sources of Information
Ovrhd 6-8	Other Sources of Information (cont.)
Ovrhd 6-9	Freshwater Sediment Quality Guidelines
Ovrhd 6-10	Freshwater Sediment Quality Guidelines (cont.)
Ovrhd 6-11	Regional Case Studies
Ovrhd 6-12	Spokane River Contaminated Sediment
Ovrhd 6-13	Spokane River Contaminated Sediment (cont.)
Ovrhd 6-14	Sediment Lead Concentrations in Spokane River
Ovrhd 6-15	Sediment Zinc Concentrations in Spokane River
Ovrhd 6-16	Spokane River Contaminated Sediment
Ovrhd 6-17	Next Steps

Marian Abbett

Ovrhd 7-1	Bremerton Naval Complex Superfund Cleanup Dredging Navigation Dredging
Ovrhd 7-2	Remedial Investigation- 1994, 1995
Ovrhd 7-3	Risk Assessment Results
Ovrhd 7-4	Cleanup Goals, Cleanup Levels & Action Levels

Ovrhd 7-5	Cleanup Goals- Sediment Quality Objectives
Ovrhd 7-6	Cleanup Goals- Sediment Quality Objectives (cont.)
Ovrhd 7-7	Action Levels
Ovrhd 7-8	Action Levels (cont.)
Ovrhd 7-9	Marine Operable Unit Boundary
Ovrhd 7-10	Minimum Cleanup Level
Ovrhd 7-11	Preferred Remedy
Ovrhd 7-12	Preferred Remedy (cont.)
Ovrhd 7-13	Coordination with navigation project
Ovrhd 7-14	CERCLA and Navigation Dredge Areas

Lon Kissinger

Ovrhd 8-1	Development of PSNS RAOs Based on Human Health Concerns
Ovrhd 8-2	RAO Options
Ovrhd 8-3	Risk Based Approach
Ovrhd 8-4	Derivation of an English Sole Background Concentration
Ovrhd 8-5	English Sole Non-Urban Sampling Stations
Ovrhd 8-6	PCB Concentrations in English Sole tissue and Sediments for Non-Urban Stations
Ovrhd 8-7	PCB Concentrations in English Sole tissue and Sediments for Non-Urban Stations (cont.)
Ovrhd 8-8	Calculation of a 95% UCL English Sole Tissue Aroclor Concentration

David Kendall

Ovrhd 9-1	DMMP Characterization Summary
Ovrhd 9-2	Map of Puget Sound Naval Shipyard Dredging Prisms
Ovrhd 9-3	Turning Basin and Inner Channel DMMUs
Ovrhd 9-4	Pier D Surface DMMUs
Ovrhd 9-5	Pier D Subsurface DMMUs
Ovrhd 9-6	Pier B Surface DMMUs
Ovrhd 9-7	Pier B Subsurface DMMUs
Ovrhd 9-8	Pier 3 Surface DMMUs
Ovrhd 9-9	DMMP Characterization
Ovrhd 9-10	Summary of Subarea Sediment Characteristics
Ovrhd 9-11	Chemical Guideline Exceedances
Ovrhd 9-12	Summary of Chemical Guideline Exceedances
Ovrhd 9-13	Bioassay Testing Species
Ovrhd 9-14	*Eohaustorius estuarius* Responses
Ovrhd 9-15	US Navy PSNS Dredging Project- *Eohaustorius* mortality versus chemical exceedances
Ovrhd 9-16	Scatter Plot of Amphipod Mortality versus Clay Content
Ovrhd 9-17	Scatter Plot of *Eohaustorius* Mortality versus Clay Content- Turning Basin and Inner Channel (Phase I testing results)
Ovrhd 9-18	Scatter Plot of Amphipod Mortality versus Clay Content- DMMUs selected for *Eohaustorius* retest
Ovrhd 9-19	Scatter Plot of *Eohaustorius* Mortality versus Clay Content

Ovrhd 9-20	Bioassay Response Summary- Phase I and Phase II
Ovrhd 9-21	Atomic Emission Detector (AED) Screen
Ovrhd 9-22	AED Analysis Results and Conclusions
Ovrhd 9-23	Analysis of TIC's (tentatively identified compounds)
Ovrhd 9-24	Sediment Retesting- Bioaccumulation testing (S51)
Ovrhd 9-25	Bioaccumulation (DMMU S51)- Mercury
Ovrhd 9-26	Bioaccumulation (DMMU S51)- Total DDT
Ovrhd 9-27	Bioassay Determination Summary
Ovrhd 9-28	Testing Outcome Summary
Ovrhd 9-29	Regulatory Status

David Bradley

Ovrhd 10-1	Sediment Management Standards- May 2000 Update
Ovrhd 10-2	SMS Rule Amendments
Ovrhd 10-3	Status of SMS Rule Closure Activities
Ovrhd 10-4	Regional Cleanup Site Status
Ovrhd 10-5	Site Status
Ovrhd 10-6	Northwest Region Lower Duwamish Waterway
Ovrhd 10-7	Northwest Region Lower Duwamish Waterway (cont.)- Map
Ovrhd 10-8	Northwest Region Lower Duwamish Waterway (cont.)
Ovrhd 10-9	Sediment Source Control Update
Ovrhd 10-10	Sediment Source Control Issues
Ovrhd 10-11	SMS Implementation Integration & Coordination
Ovrhd 10-12	SEDQUAL Information System Release Four
Ovrhd 10-13	Performance Tracking and Evaluation
Ovrhd 10-14	SMS Implementation Planned Activities (2000-2001)

James Pendowski

Ovrhd 11-1	Northwest Region Bellingham Bay Pilot
Ovrhd 11-2	Northwest Region Bellingham Bay Pilot (cont.)
Ovrhd 11-3	Northwest Region Bellingham Bay Pilot (cont.)- Map
Ovrhd 11-4	Northwest Region Bellingham Bay Pilot (cont.)

Erika Hoffman

Ovrhd 12-1	PCBs in Duwamish River Sediments
Ovrhd 12-2	Purpose
Ovrhd 12-3	Purpose (cont.)
Ovrhd 12-4	Methods Used
Ovrhd 12-5	Method Used- Cost
Ovrhd 12-6	Sampling
Ovrhd 12-7	Sampling locations: surface
Ovrhd 12-8	Testing timeline
Ovrhd 12-9	Results
Ovrhd 12-10	Results: Total PCBs
Ovrhd 12-11	Results: Individual Congeners
Ovrhd 12-12	Results: Individual Congeners (cont.)

Ovrhd 12-13	TEQs Calculated from Congeners
Ovrhd 12-14	Results: Human TEQs
Ovrhd 12-15	Results: Avian TEQs
Ovrhd 12-16	Developing a screening approach to congener testing
Ovrhd 12-17	Conclusions
Ovrhd 12-18	Conclusions: continued
Ovrhd 12-19	Recommendations

Raleigh Farlow

Ovrhd 13-1	PCB Congeners vs. Aroclors Analyses
Ovrhd 13-2	Duwamish River FY2000 PSDDA Sampling Locations (North)
Ovrhd 13-3	Chromatogram of Aroclors 1016, 1260, and 1248
Ovrhd 13-4	Chromatogram of Aroclor 1242 and Sediment (PCB fraction)
Ovrhd 13-5	PCBs Congener TEQ Comparison
Ovrhd 13-6	Comparison Table- Congener vs. Aroclor Method

Michael Salazar

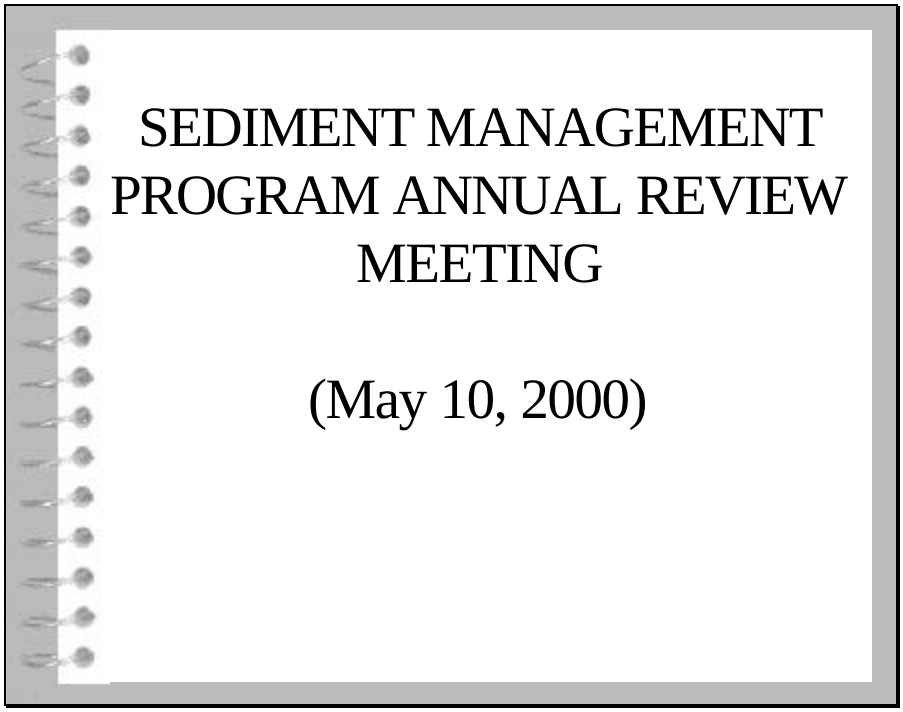
Ovrhd 14-1	Rationale & Methods for Combining Exposure & Effects Endpoints in a Single Bioassay: Revising Sediment Bioaccumulation & Toxicity Test Protocols
Ovrhd 14-2	Purpose
Ovrhd 14-3	Revise Bioassay Protocols?
Ovrhd 14-4	Weight of Evidence
Ovrhd 14-5	TBT Exposure Pathways
Ovrhd 14-6	Food & Feeding Forgotten
Ovrhd 14-7	Test Organism Selection Criteria
Ovrhd 14-8	Laboratory Artifacts
Ovrhd 14-9	PAH Concentrations in *Hyalella* Tissue Flow-Through vs Static Exposures
Ovrhd 14-10	Natural Exposure Pathways
Ovrhd 14-11	Laboratory Exposure Pathways
Ovrhd 14-12	Protocol Refinements
Ovrhd 14-13	Effects Endpoints not Trivial
Ovrhd 14-14	Exposure-Dose-Response Triad
Ovrhd 14-15	Summary & Conclusions

David Kendall

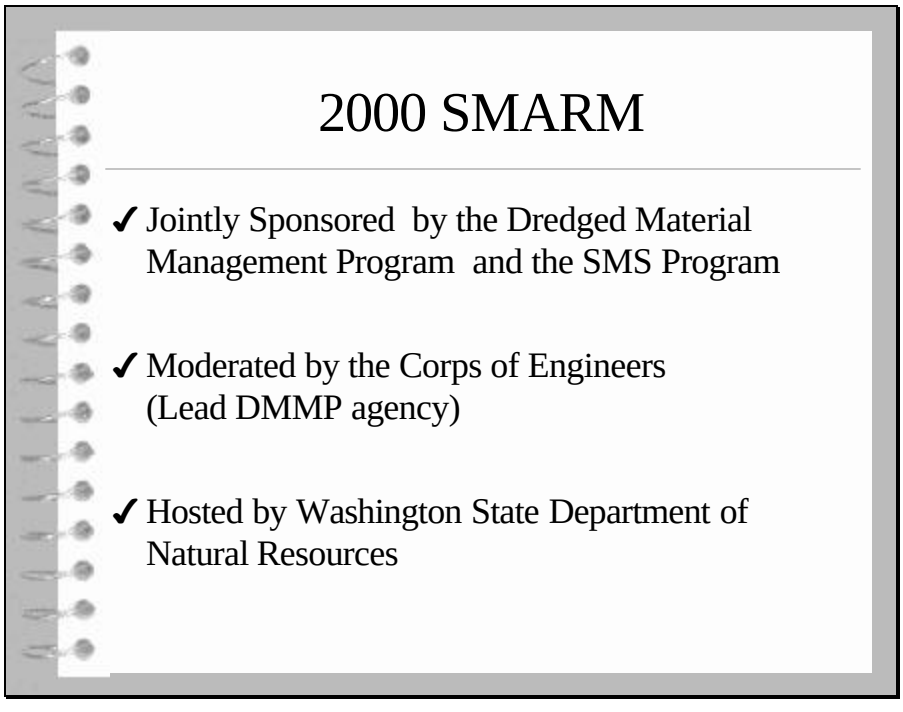
Ovrhd 15-1	DMMP Issues for Consideration

Diane Parks

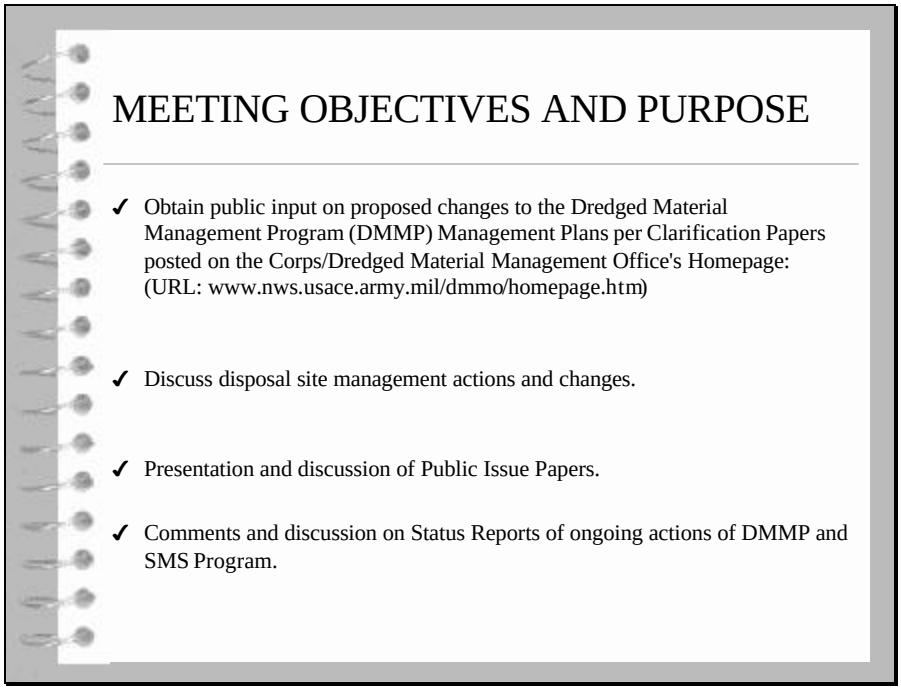
Ovrhd 16-1	Summary and Closing



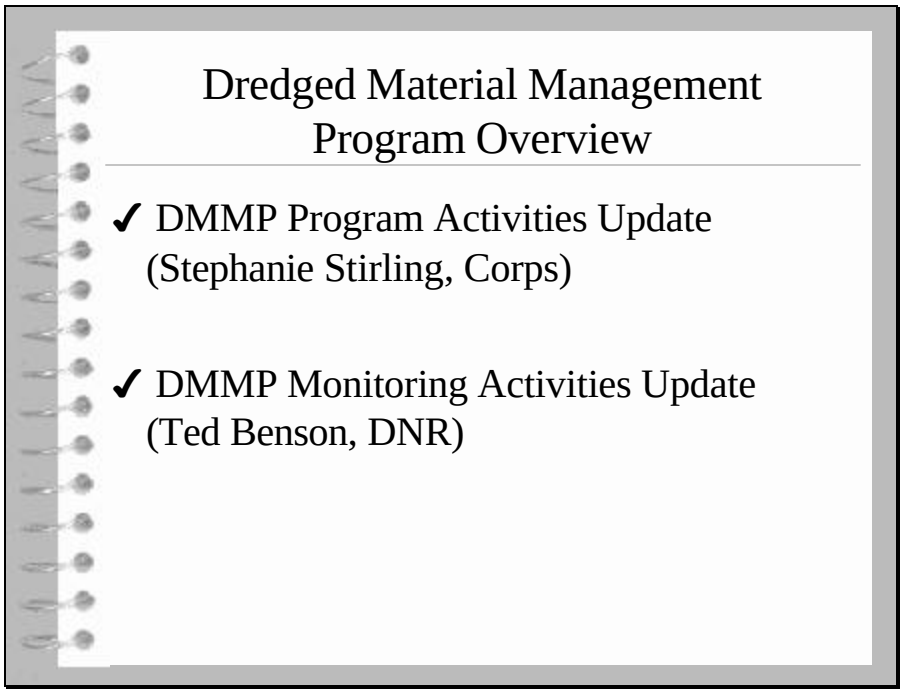
Ovrhd 1-1. Sediment Management Program Annual Review Meeting.



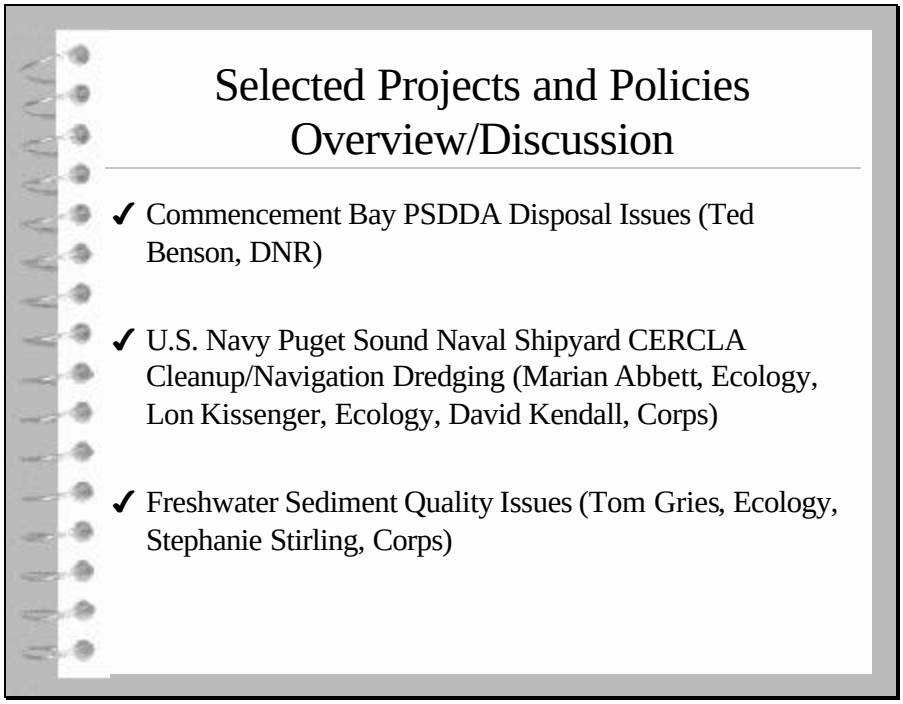
Ovrhd 1-2. 2000 SMARM.



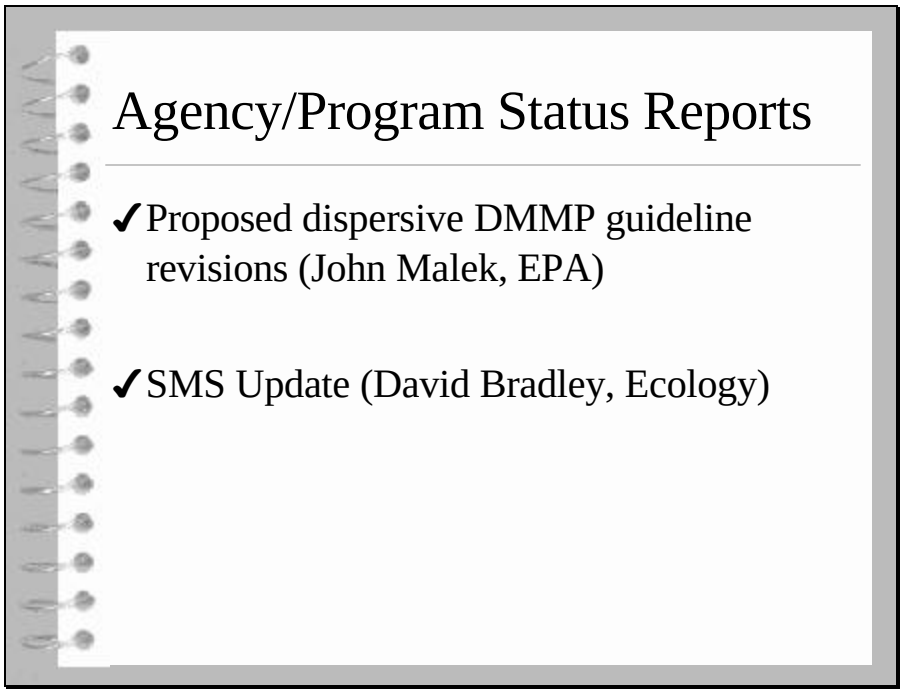
Ovrhd 1-3. Meeting Objectives and Purpose.



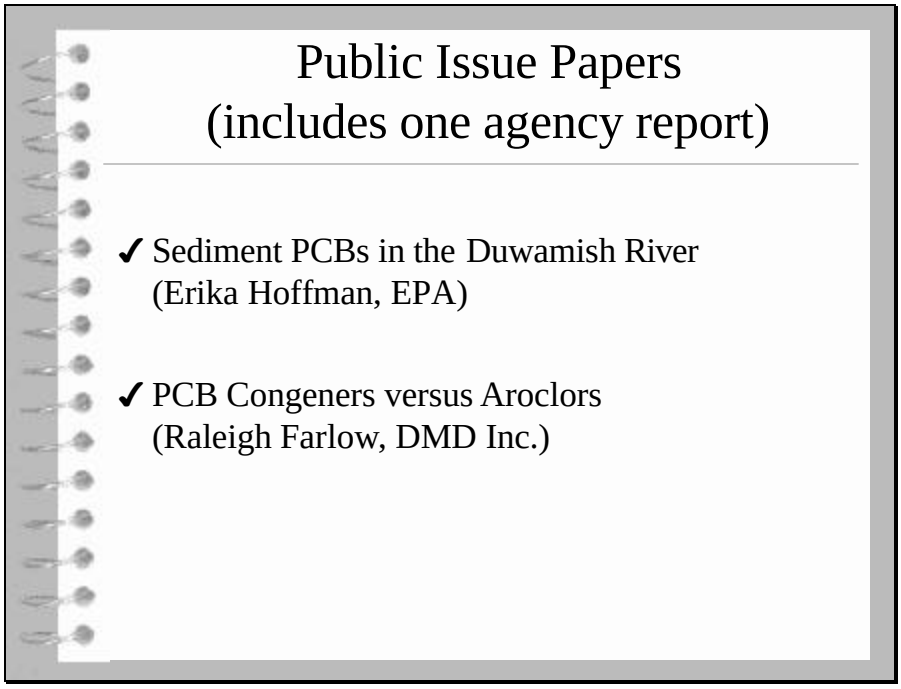
Ovrhd 1-4. Dredged Material Management Program Overview.



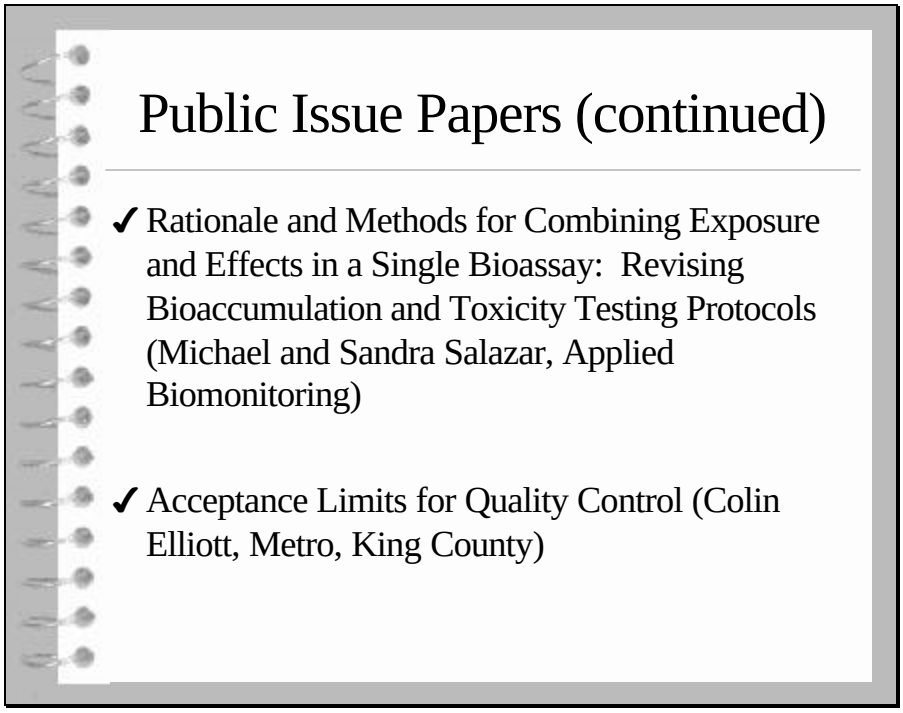
Ovrhd 1-5. Selected Projects and Policies Overview/Discussion.



Ovrhd 1-6. Agency/Program Status Reports.



Ovrhd 1-7. Public Issue Papers.



Ovrhd 1-8. Public Issue Papers (continued).

DMMP PROGRAM OVERVIEW

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING

May 10, 2000

Ovrhd 2-1. DMMP Program Overview.

1998-1999 Biennial Report

- 29 projects
  - 21 completed the process
- Largest projects - Grays Harbor O&M and Blair deepening
- 6,527,532 cubic yards
- Cost data

Ovrhd 2-2. 1998-1999 Biennial Report.

Program Accomplishments

- Bioaccumulation Workgroup
- DAIS Update
- Updated User's Manual
- *Leptocheirus* study
- Lower Columbia River Dredged Material Evaluation Framework

Ovrhd 2-3. Program Accomplishments.

Bioaccumulation Workgroup

- 1999 meetings
- Current activities
- Next steps for BCoC list
- Upcoming topics for workgroup

Ovrhd 2-4. Bioaccumulation Workgroup.

DAIS Update

- Windows version
- VisualBasic
- Simplified QA
- Beta-testing

Ovrhd 2-5. DAIS Update.

User's Manuals

- PSDDA
  - update February 2000
  - web access
  - revisions
- Grays Harbor/Willapa
  - conversion to user's manual
  - revisions

Ovrhd 2-6. User's Manuals.

Leptocheirus Study

- Three objectives
- Phase I
  - use of spiked sediment
  - report due summer of 2000
- Phase II
  - field-collected sediment
  - synoptic PSDDA bioassays

Ovrhd 2-7. *Leptocheirus* Study.

Lower Columbia River Dredged Material Evaluation Framework

- Implementation underway
- Planned updates

Ovrhd 2-8. Lower Columbia River Dredged Material Evaluation Framework.

MUDS/Treatment Update

- PIANC Workshop
- DNR Workshop
- Project status
- Next steps

Ovrhd 2-9. MUDS/Treatment Update.

Other Topics

- Bioaccumulation protocol changes
- Revised Phthalate guidelines
- Clarification of MLs
- http://www.nws.usace.army.mil/dmmo/homepage.htm

Ovrhd 2-10. Other Topics.

Disposal Site Use Report

Ted Benson
Aquatic Resources Division
Department of Natural Resources

Ovrhd 3-1. Disposal Site Use Report.

Dredge Years ‘98 and ‘99

- Puget Sound Sites (PSDDA)
- Grays Harbor and Willapa Bay Sites (GH/WBDDA)

Ovrhd 3-2. Dredge Years ’98 and ’99.

Puget Sound Sites

- Dispersive Sites
  - Port Angeles
  - Port Townsend
  - Rosario Straits
- Non-Dispersive Sites
  - Bellingham Bay
  - Port Gardner
  - Elliott Bay
  - Commencement Bay
  - Anderson/Ketron Islands

Ovrhd 3-3. Puget Sound Sites.

Dispersive Sites

- Port Angeles
  - No disposals in either DY'98 or DY'99
- Port Townsend
  - 1 project, total volume of 4,000 cy in DY'98
- Rosario Straits
  - 3 projects, total volume of 53,000 cy in DY'98
  - 1 project, total volume of 140,761 cy in DY'99

Ovrhd 3-4. Dispersive Sites.

Non-Dispersive Sites

- Bellingham Bay
  - 1 project, total volume of 1,200 cy in DY'98
  - No disposals in DY'99
- Port Gardner
  - No disposals in either DY'98 or DY'99
- Elliott Bay
  - 4 projects, total volume of 110,645 cy in DY'98
  - 4 projects, total volume of 414,794 cy in DY'99

Ovrhd 3-5. Non-Dispersive Sites.

Non-Dispersive Sites (cont.)

- Commencement Bay
  - 2 projects, total volume of 693,540 cy in DY'98
  - 2 projects, total volume of 140,319 cy in DY'99
- Anderson/Ketron Islands
  - No disposals in either DY'98 or DY'99

Ovrhd 3-6. Non-Dispersive Sites (cont.).

Grays Harbor/Willapa Bay

- All sites reported together
  - 7 projects, total volume of 1,252,404 cy in DY'98
  - 17 projects, total volume of 2,899,613 cy in DY'99

Ovrhd 3-7. Grays Harbor/Willapa Bay.

PSDDA Use History

- DY'94: 5 projects; 426,529 cy
- DY'95: 13 projects; 561,706 cy
- DY'96: 9 projects; 1,035,056 cy
- DY'97: 6 projects; 155,613 cy
- DY'98: 14 projects; 862,385 cy
- DY'99: 8 projects; 697,860 cy

Ovrhd 3-8. PSDDA Use History.

GH/WBDDA Use History

- DY'94: Not reported
- DY'95: Not reported
- DY'96: 2 projects; 1,723,267 cy
- DY'97: 7 projects; 1,624,637 cy
- DY'98: 7 projects; 1,252,404 cy
- DY'99: 17 projects; 2,899,613 cy

Ovrhd 3-9. GH/WBDDA Use History.

Environmental Site Monitoring

- None this biennium
- TBT/*Leptocheirus* study underway
  - Reported in a "Status Paper"
- Elliott Bay will be monitored this year
- Commencement Bay will be monitored next year
  - Anderson/Ketron site may also be monitored next year

Ovrhd 3-10. Environmental Site Monitoring.

Shoreline Permits

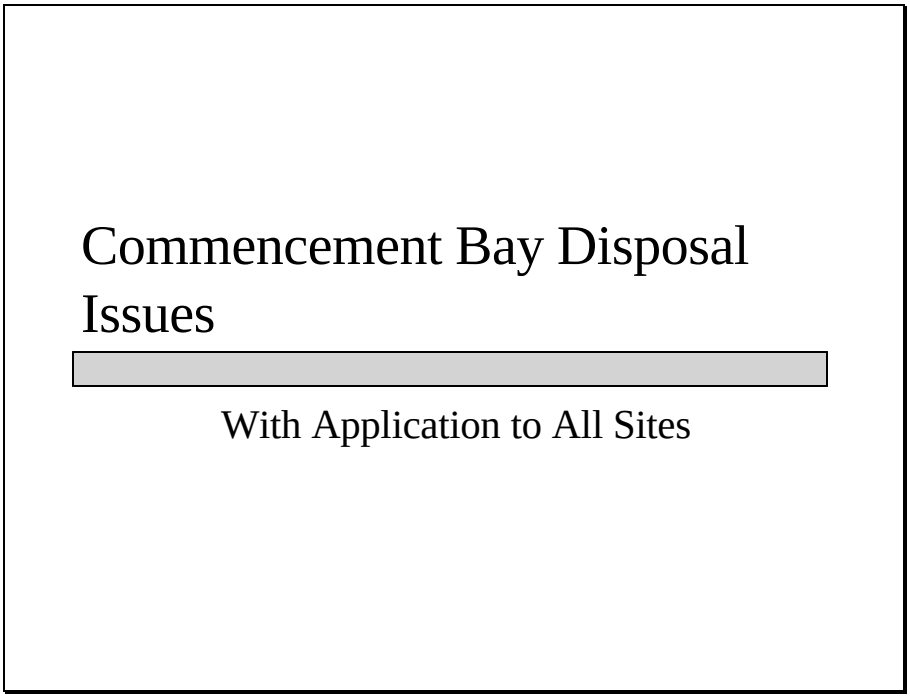
- Permits received for:
  - Port Gardner
  - Commencement Bay
- Permit pending for Elliott Bay
- Permits for which applications need to be submitted:
  - Bellingham Bay, Rosario, Port Angeles, Port Townsend, Anderson/Ketron

Ovrhd 3-11. Shoreline Permits.

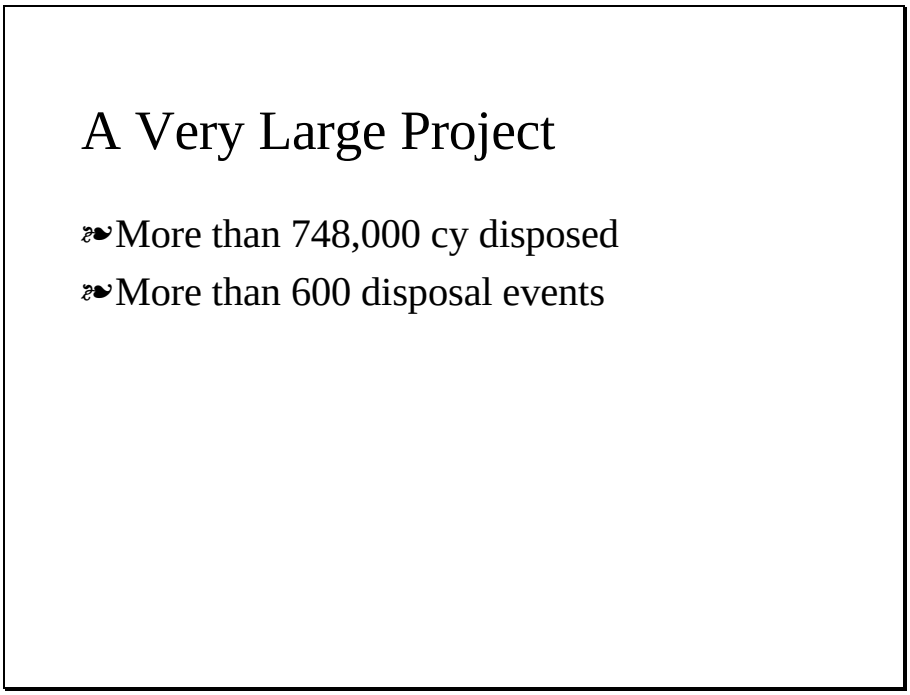
GH/WBDDA Shoreline Permits

- Willapa Bay application submitted
- Grays Harbor sites renewal not yet submitted

Ovrhd 3-12. GH/WBDDA Shoreline Permits.



Ovrhd 4-1. Commencement Bay Disposal Issues.



Ovrhd 4-2. A Very Large Project.

Discrepancy

- 166 disposals for which no position was recorded
- Discovered when Site Use Reports were audited following discovery of off-site dredged material (reported last year)
- Coast Guard VTS concurrence given for all disposals

Ovrhd 4-3. Discrepancy.

Discrepancy (cont.)

- No site position recorded in ship's log nor at VTS
- Lack of this information restricts site management ability
- Possible penalty of $5.00 per cubic yard (over $900,000 for this oversight)

Ovrhd 4-4. Discrepancy (cont.).

Another Problem

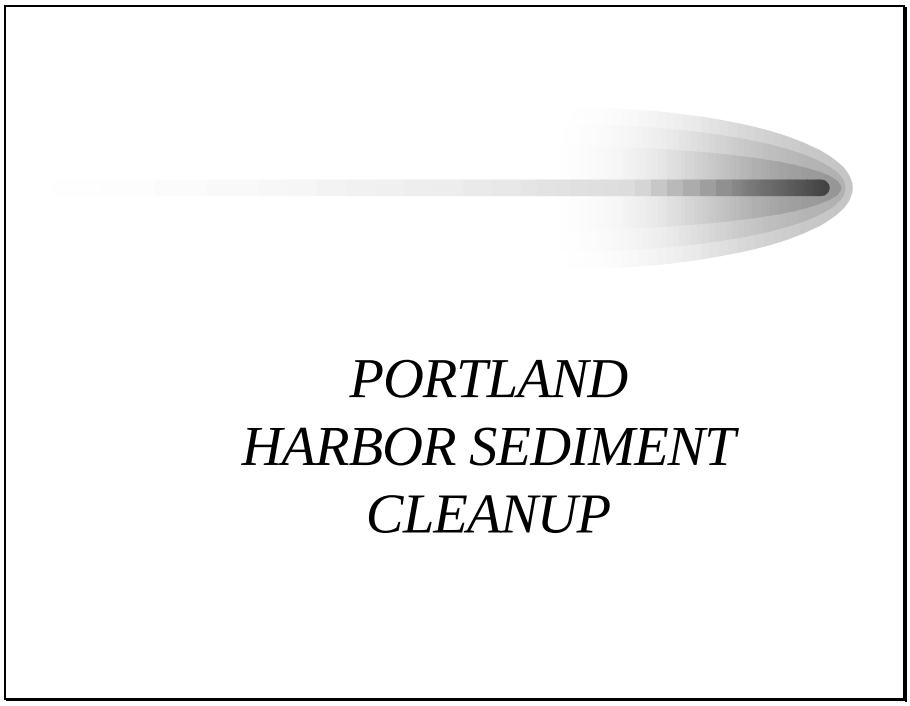
- Position Recording
  - Some positions reported in NAD27
  - Positions must be in NAD83
  - All positions now input into data base
    - Bearing and distance from site center calculated
    - Copy of spreadsheet available

Ovrhd 4-5. Another Problem.

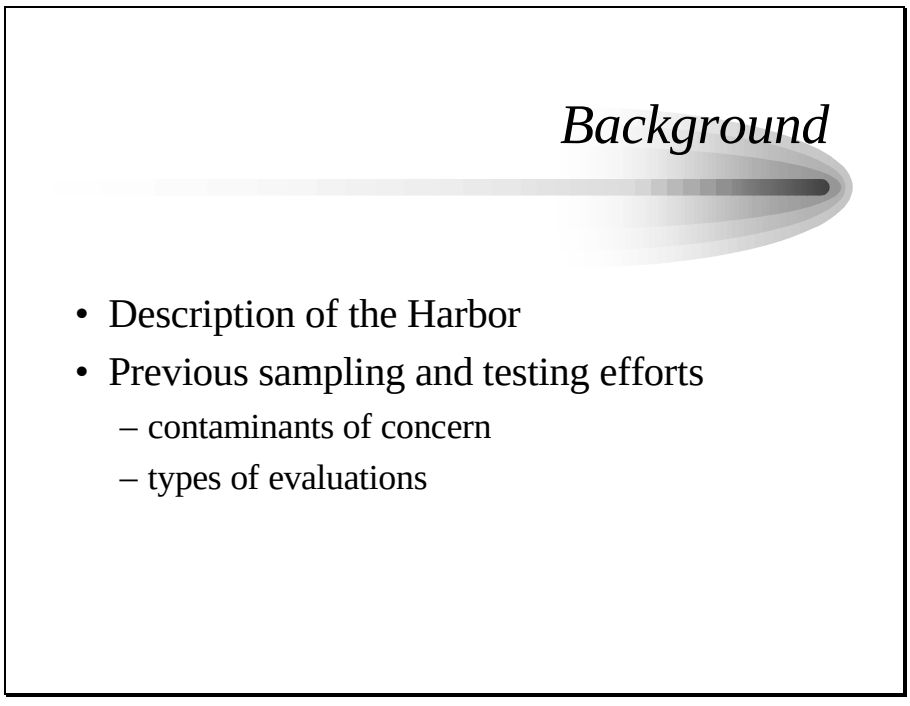
Last Caveat

- The U.S. Coast Guard does not have enforcement authority for dredged material disposal.
- The Coast Guard VTS will provide concurrence that the tug-and-barge are within the site boundary for those sites with radar coverage.
- Only this is recorded and reported.

Ovrhd 4-6. Last Caveat.



Ovrhd 5-1. Portland Harbor Sediment Cleanup.



Ovrhd 5-2. Background.

Steps in the Current Process

- 1997 EPA/DEQ investigation
  - investigation of upland contaminants
  - collection of sediment toxicity data
  - implementation of some source control
  - site discovery
    - 50 additional sites
    - 18 outfalls

Ovrhd 5-3. Steps in the Current Process.

Steps in the Current Process (continued)

- Possible NPL listing
- DEQ requests deferral
- DEQ develops Portland Harbor Sediment Management Plan - June 1999

Ovrhd 5-4. Steps in the Current Process (cont.).

Portland Harbor Sediment Management Plan

- Addressed legal, technical and administrative elements
- Conceptual model for clean-up
- Information needs identified
- Integration of individual and area-wide clean-up

Ovrhd 5-5. Portland Harbor Sediment Management Plan.

Remedial Investigation/ Feasibility Study

- Workplan completed March 2000
- Two groups for stakeholder involvement
  - Technical Exchange Workgroup
    - sample locations, specific tests, etc.
  - Stakeholders Advisory Group
    - broader policy issues

Ovrhd 5-6. Remedial Investigation/Feasibility Study.

Freshwater Guidelines

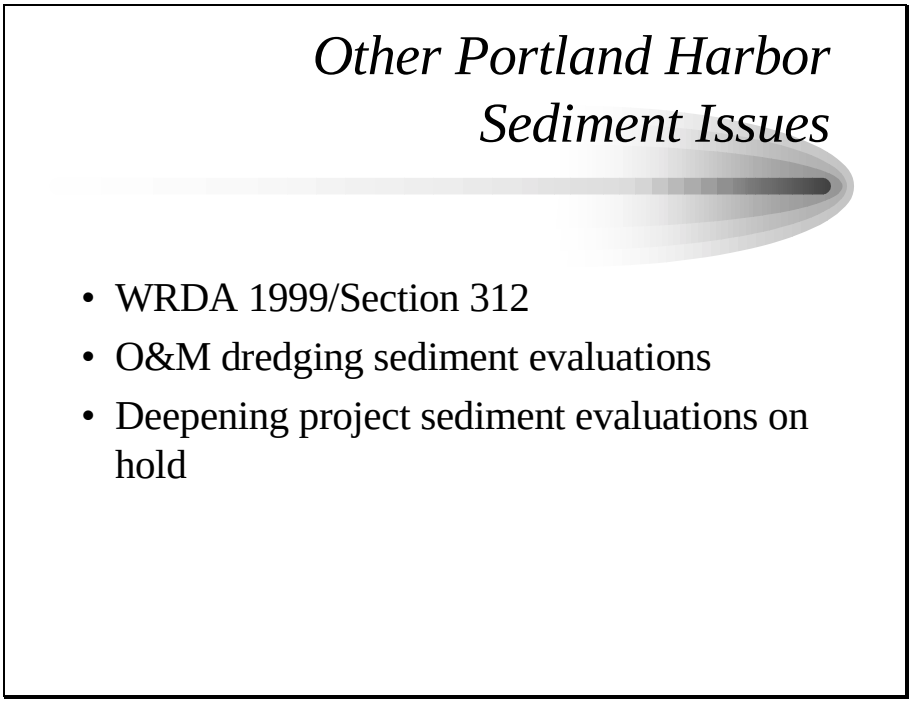
- Floating Percentile method
- http://www.deq.state.or.us/wmc/cleanup/PortlandHarbor/plan/g6.htm

Ovrhd 5-7. Freshwater Guidelines.

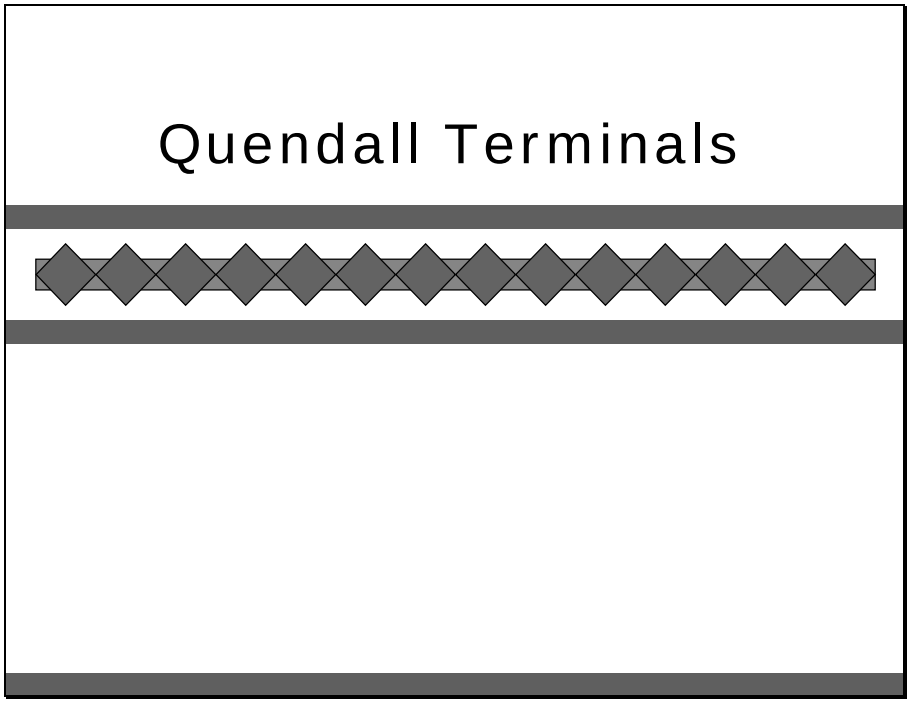
Current Status

- EPA determined that deferral was not possible
- EPA continuing with NPL listing process

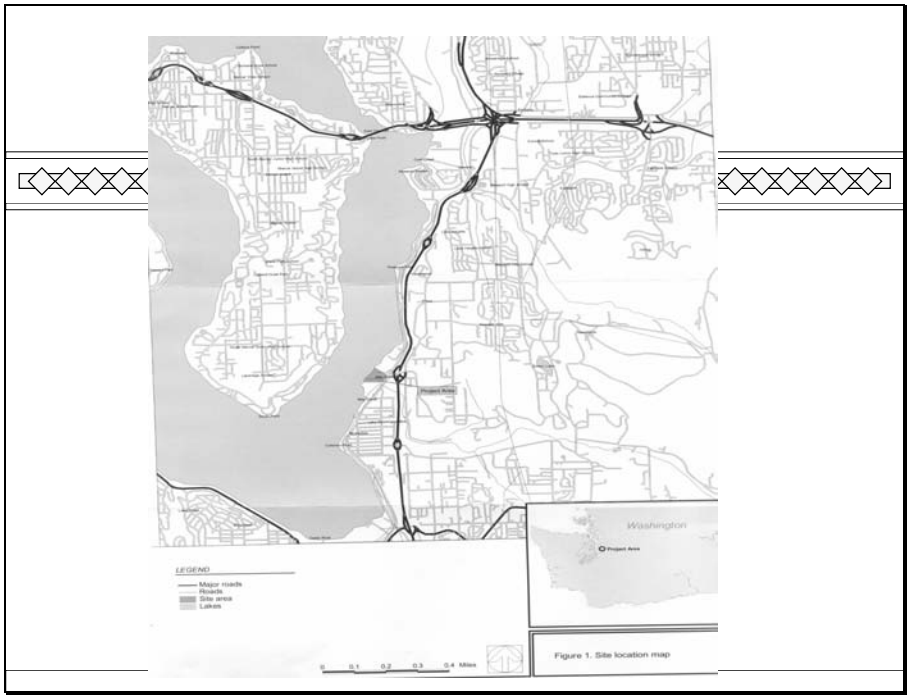
Ovrhd 5-8. Current Status.



Ovrhd 5-9. Other Portland Harbor Sediment Issues.



Ovrhd 5-10. Quendall Terminals.

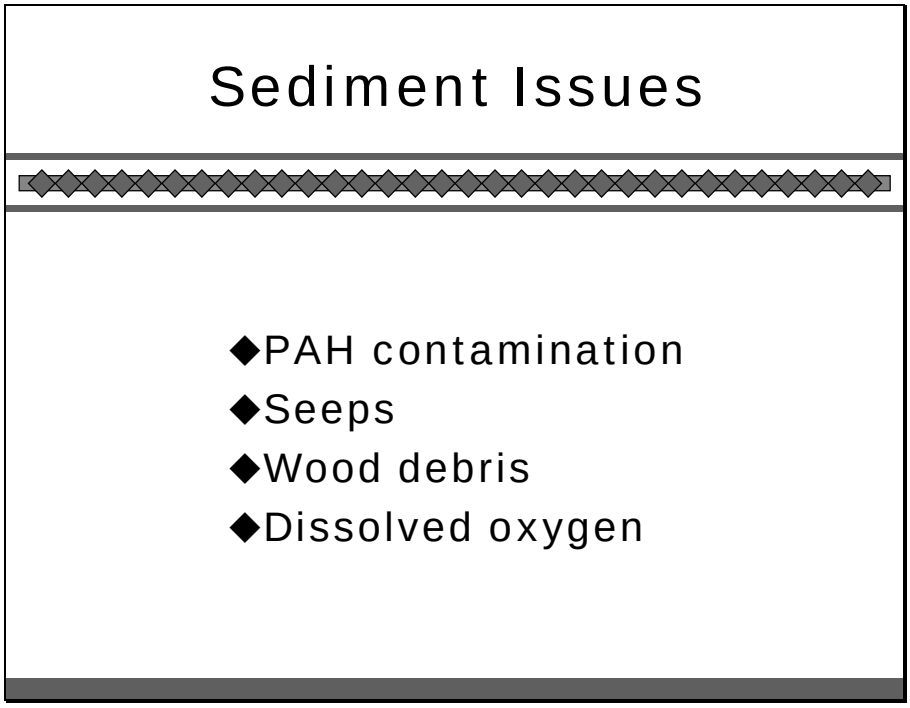


Ovrhd 5-11. Site Location Map.

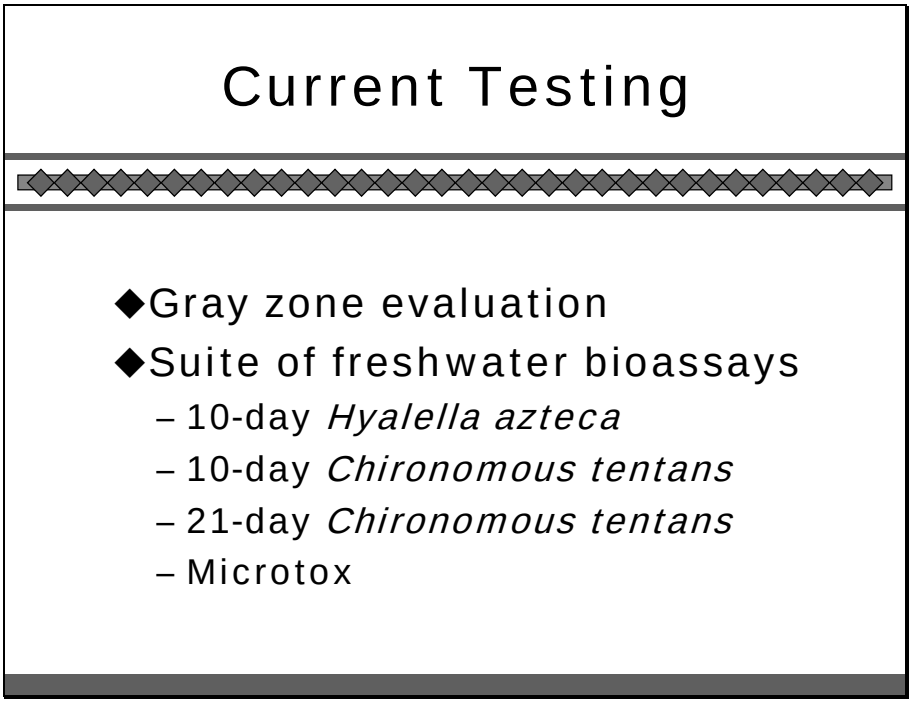
Background

- Previous testing
- Upland/Sediment contamination
- Port Quendall
- City of Renton

Ovrhd 5-12. Background.



Ovrhd 5-13. Sediment Issues.



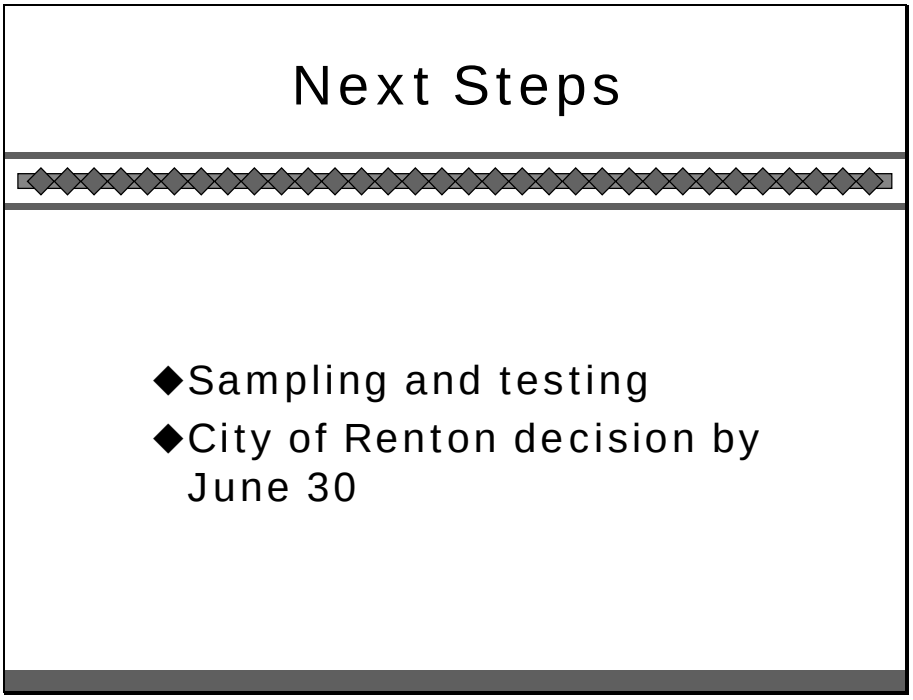
Ovrhd 5-14. Current Testing.

Ovrhd 5-15. Locations of Proposed Stations within the Gray Zone.

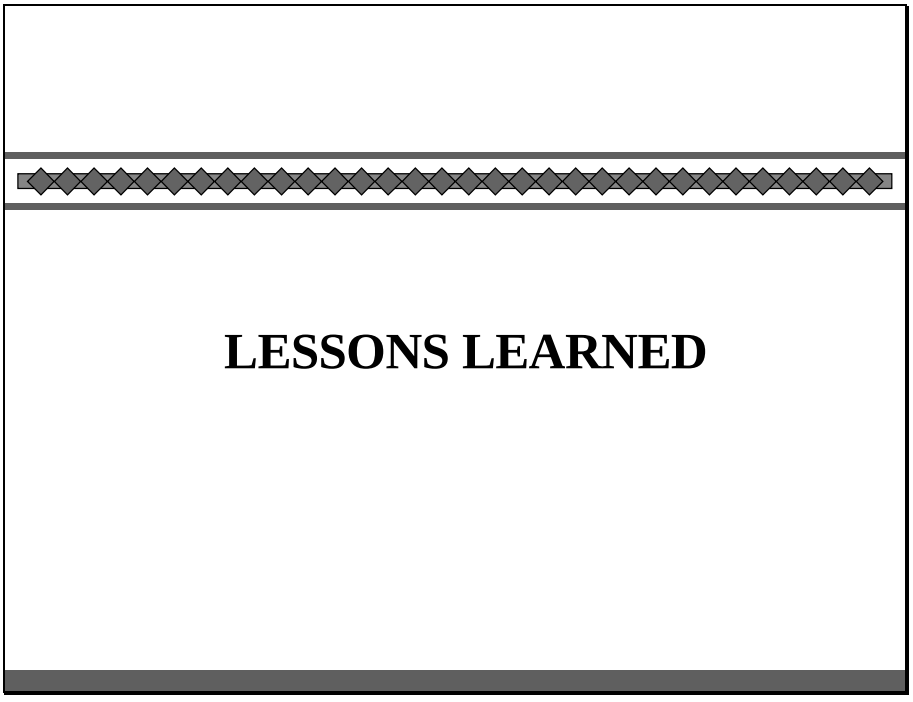
J.H. Baxter

- Freshwater tests completed
  - 10-day *Hyalella azteca*
  - 10-day *Chironomous tentans*
  - 20-day *Chironomous tentans*
- Microtox testing underway
- Test results

Ovrhd 5-16. J. H. Baxter.



Ovrhd 5-17. Next Steps.



Ovrhd 5-18. Lessons Learned.

Freshwater Sediment Quality Management in Washington

Outline:

- Purpose and Background
- 1999 Regulatory Work Group
  - Evaluation Framework
  - Measurement of Biological Effects
- Other Sources of Information
- Case Studies, e.g., Spokane River
- Next Steps

Ovrhd 6-1. Freshwater Sediment Quality Management in Washington.

Purpose

Overview development of a program for managing freshwater sediments in Washington

Forum for comments/discussion of freshwater sediment management issues and needs

Ovrhd 6-2. Purpose.

Background

- Puget Sound Estuary Program
- PSEP Protocols and Guidelines
- Puget Sound Dredged Disposal Analysis
- Sediment Management Standards Rule
  "WAC 173-204-330/340 Low salinity/Freshwater sediment quality standards. Reserved: The department shall determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this chapter."
- Ecology freshwater sediment quality reports

Ovrhd 6-3. Background.

Background

"Columbia River Manual"

http://www.nwp.usace.army.mil/ec/h/hr/final/

Ovrhd 6-4. Background (cont.).

1999 Regulatory Work Group

Objectives

- Research alternative frameworks for evaluating low salinity/freshwater sediment quality, including methods of measuring biological effects
- Submit recommendations to Ecology for SMS rule amendments

Ovrhd 6-5. 1999 Regulatory Work Group.

1999 Regulatory Work Group

Progress

- Three meetings in nine months
- Nearly 30 experts and interest group representatives
- Draft recommendations and comments on
  - Draft tiered evaluation framework
  - Draft protocols to assess for toxicity, bioaccumulation and benthic communities

Ovrhd 6-6. 1999 Regulatory Work Group (cont.).

Other Sources of Information

- U.S. EPA
  - Great Lakes National Program Office
  - Assessment/Remediation of Contaminated Sediments
- U.S. Army Corps Waterways Experiment Station
- Journal of Environmental Toxicology and Chemistry
- American Society of Testing Materials
- Canadian Ministry of the Environment
- British Columbia provincial government

Ovrhd 6-7. Other Sources of Information.

Other Sources of Information

GLNPO and ARCS Publications

http://www.epa.gov/glnpo/arcs/arcs-home.html

- Great Lakes Dredged Material testing & Evaluation Manual (with USACE)
- Assessment Guidance Document
- Biological and Chemical Assessment of Contaminated Great Lakes Sediment
- Remediation Guidance Document

Ovrhd 6-8. Other Sources of Information (cont.).

Freshwater Sediment Quality Guidelines

"Prediction of sediment toxicity using consensus-based freshwater sediment quality guidelines" (Ingersoll et al, in press.) evaluates

- the ability of freshwater SQGs to predict sediment toxicity in Great Lakes
- the ability of sediment SQGs to predict sediment toxicity elsewhere in North America
- the effects of chemical mixtures on observed toxicity

Ovrhd 6-9. Freshwater Sediment Quality Guidelines.

Freshwater Sediment Quality Guidelines

Ingersoll, et al conclude that freshwater SQGs

- predictive of sediment toxicity across North America
- increasing predicted toxicity in samples having mean Probable Effects Concentration quotients > 0.5
- based on *Hyalella azteca* 28-d test results may be 5 to 10 times more sensitive than SQGs derived using the *H. azteca* 10-d tests

Ovrhd 6-10. Freshwater Sediment Quality Guidelines (cont.).

Regional Case Studies

Lower Columbia River
Port Quendall/Baxter (Renton)
Portland Harbor
Spokane River
Lake Roosevelt

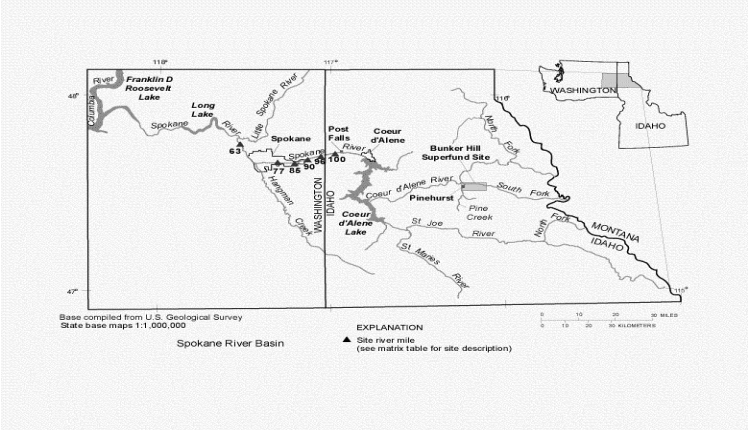
Ovrhd 6-11. Regional Case Studies.

Spokane River Contaminated Sediment

- More than 100 miles long
- Drains Coeur d'Alene River basin
- Mine tailing wastes ubiquitous in watershed
- Cadmium, lead and zinc in water and sediments
- Bulk sediment lead concentrations to 1500 ppm, zinc to 2800 ppm

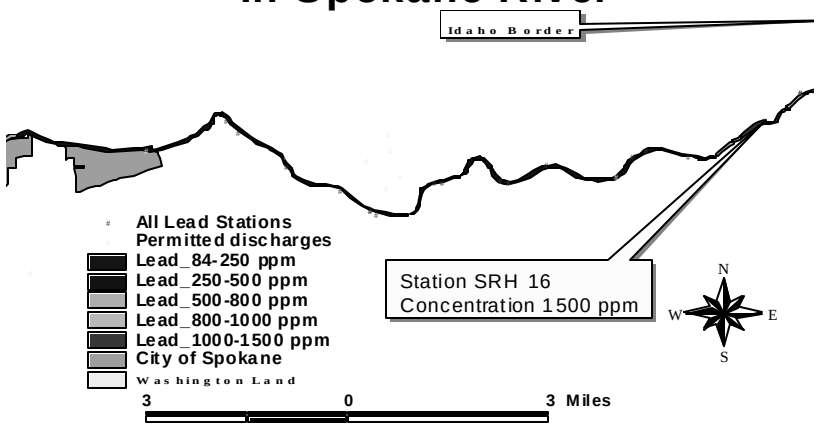
Ovrhd 6-12. Spokane River Contaminated Sediments.

Spokane River Contaminated Sediment

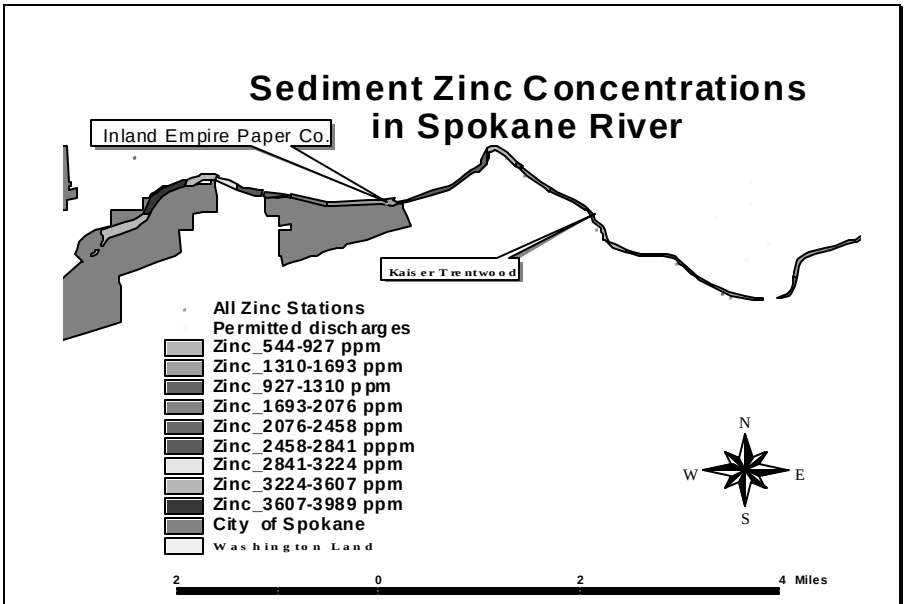


Ovrhd 6-13. Spokane River Contaminated Sediment (cont.).

Sediment Lead Concentrations In Spokane River



Ovrhd 6-14. Sediment Lead Concentrations in Spokane River.



Sediment Management Annual Review Meeting, 2000 15

Ovrhd 6-15. Sediment Zinc Concentrations in Spokane River.

Spokane River Contaminated Sediment

- Arsenic and lead in shoreline deposits a concern for recreational exposure scenario
- Fish consumption health study underway
- Fish and aquatic community in the upper river are likely impaired by sublethal zinc and lead
- Ecology pursuing appropriate cleanup, NRDA claim, and restoration

Sediment Management Annual Review Meeting, 2000 16

Ovrhd 6-16. Spokane River Contaminated Sediment.

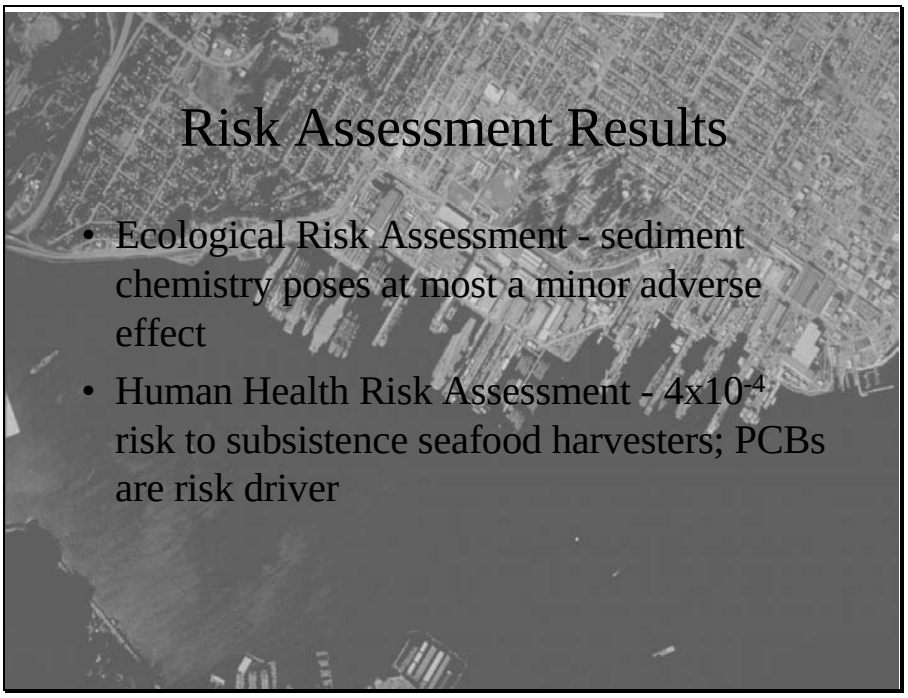
Next Steps

- 2nd draft RWG Recommendations will include
  - freshwater sediment quality evaluation frameworks
  - toxicity, bioaccumulation assessment methods
  - "lessons learned" from regional projects
- Final RWG Recommendations (Summer 2000)
- Evaluate alternative Microtox test protocol
- Sponsor laboratory training for long-term freshwater toxicity tests?

Ovrhd 6-17. Next Steps.

Ovrhd 7-1. Bremerton Naval Complex Superfund Cleanup Dredging Navigation Dredging.

Ovrhd 7-2. Remedial Investigation – 1994, 1995.

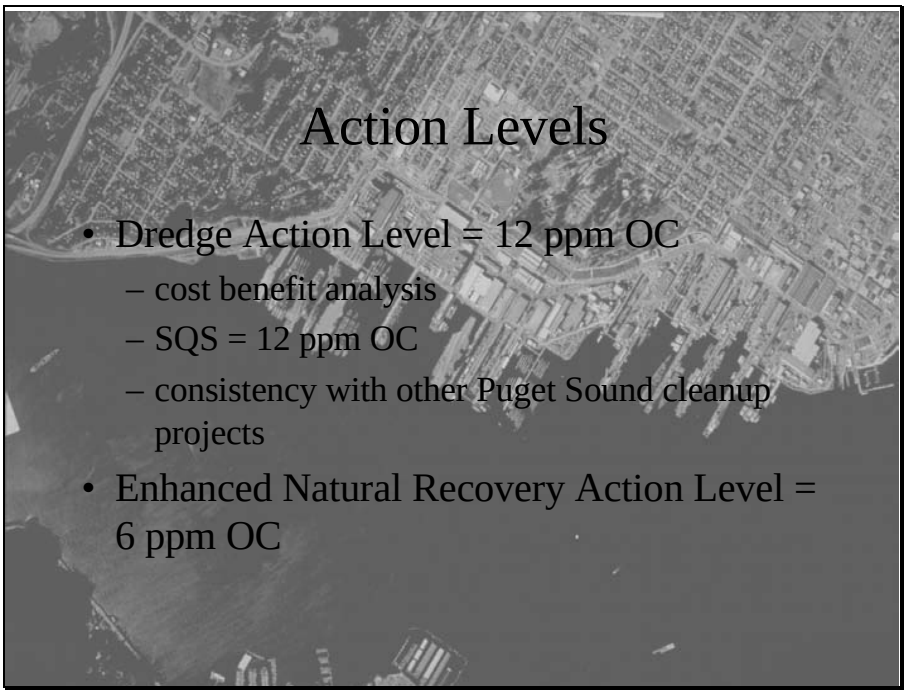


Ovrhd 7-3. Risk Assessment Results.

Ovrhd 7-4. Cleanup Goals, Cleanup Levels & Action Levels.

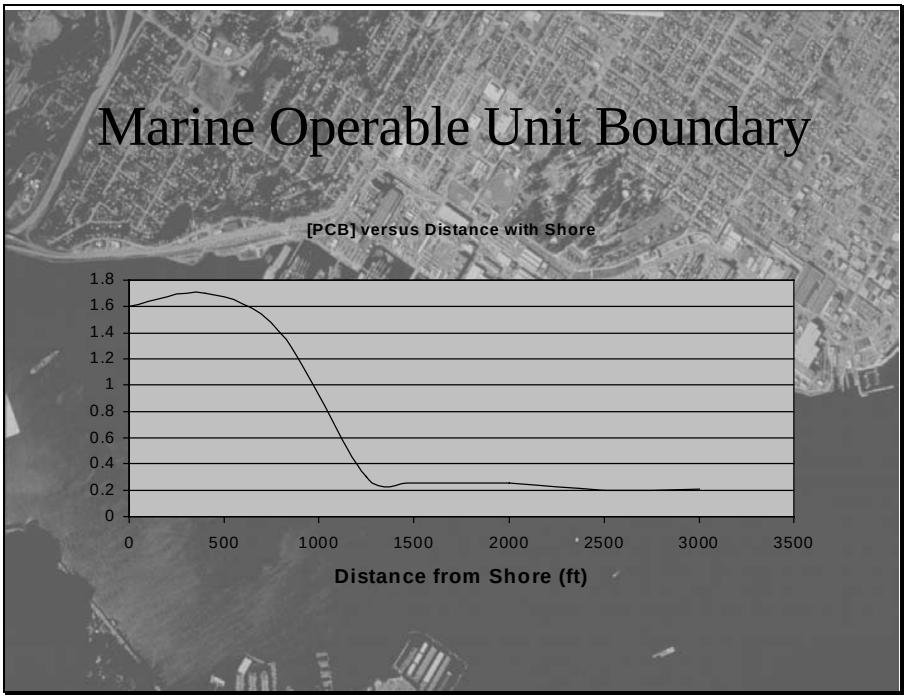
Ovrhd 7-5. Cleanup Goals – Sediment Quality Objectives.

Ovrhd 7-6. Cleanup Goals – Sediment Quality Objectives (cont.).

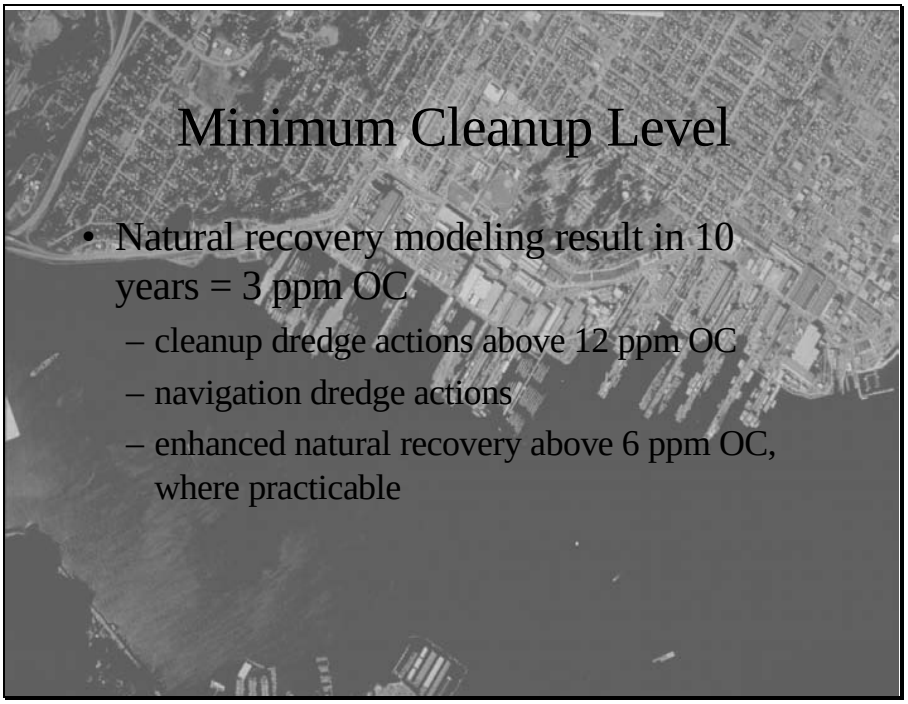


Ovrhd 7-7. Action Levels.

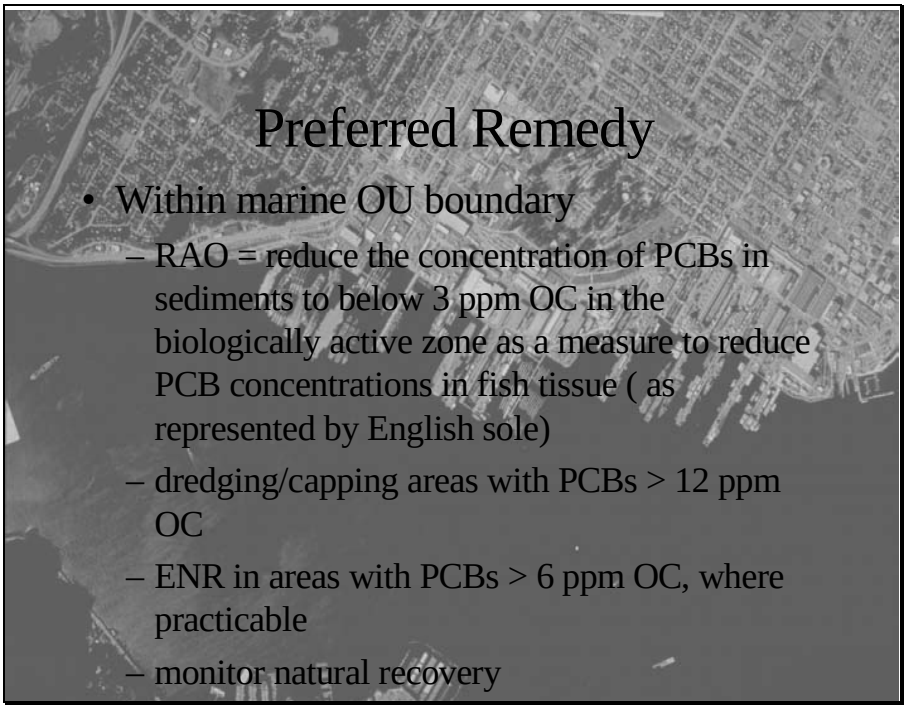
Ovrhd 7-8. Action Levels (cont.).



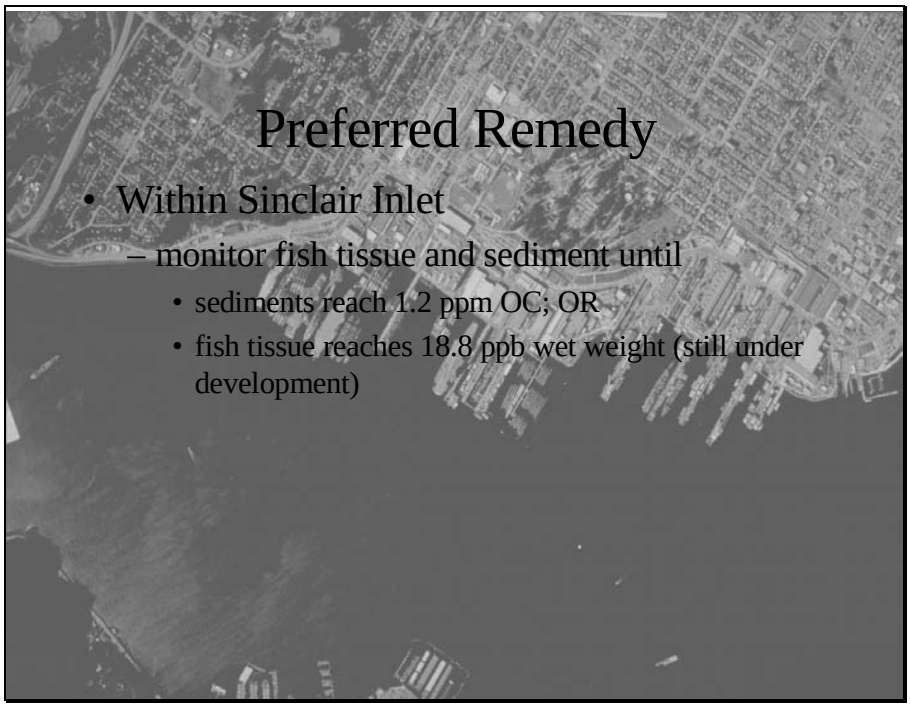
Ovrhd 7-9. Marine Operable Unit Boundary.



Ovrhd 7-10. Minimum Cleanup Level.



Ovrhd 7-11. Preferred Remedy.

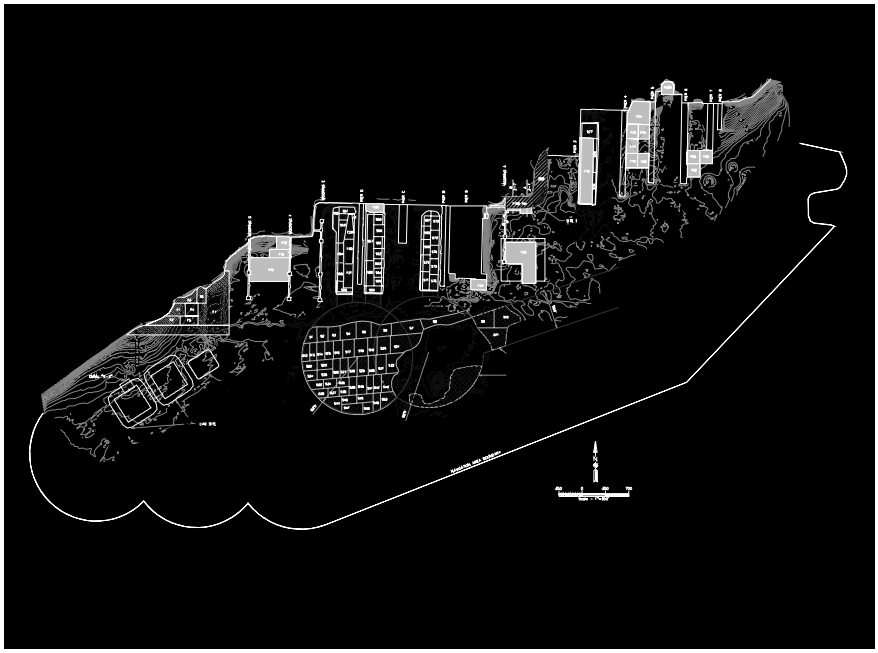


Ovrhd 7-12. Preferred Remedy (cont.).

Coordination with navigation project

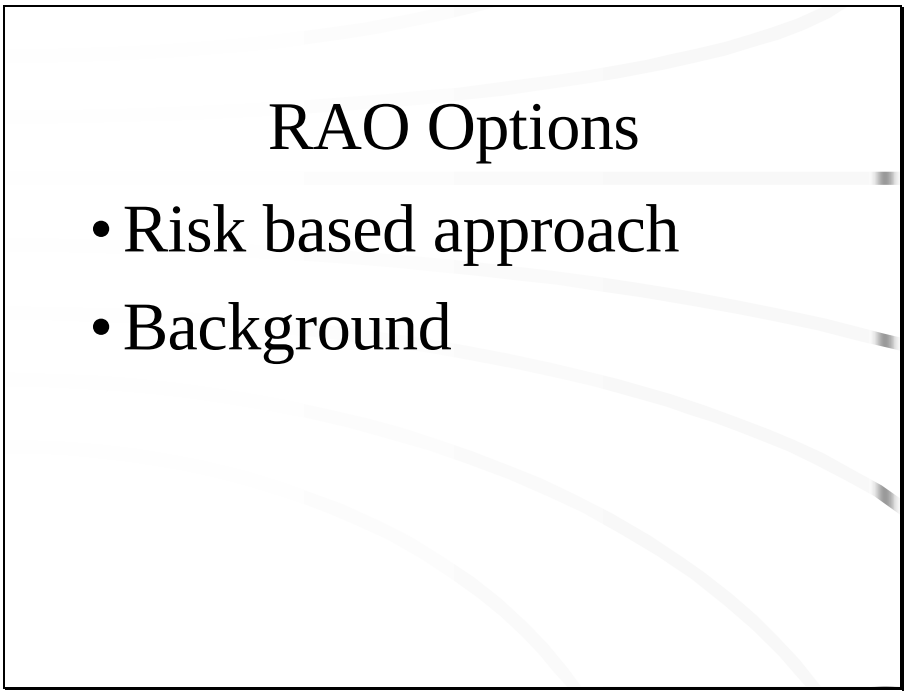
- Combined dredging during one construction season, and disposal in Pit CAD on Navy property
  - minimize short term impacts
  - cost savings on mobilization
  - no delay to cleanup
  - greatly reduces project time
  - smart management of unsuitable navigation dredge material and cleanup dredge material

Ovrhd 7-13. Coordination with Navigation Project.



Ovrhd 7-14. CERCLA and Navigation Dredge Areas.

Ovrhd 8-1. Development of PSNS RAOs Based on Human Health Concerns.



Ovrhd 8-2. RAO Options.

Risk Based Approach

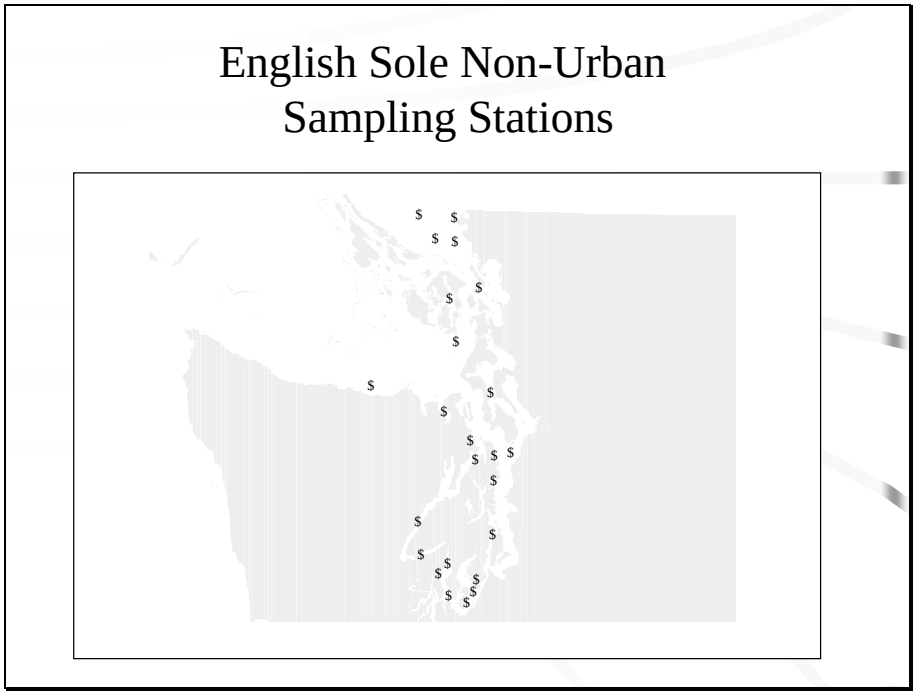
- Based on consumption of fish and shellfish
- RAO objective = Risk x BW x AT x f_{source}/ (SF x UCF1 x IR x ED x UCF2)

Ovrhd 8-3. Risk Based Approach.

Derivation of an English Sole Background Concentration

- English sole fillet Aroclor concentrations obtained from WA Dept. of Fish and Wildlife (Jim West and Greg Lippert)
- Qualitative analysis done to verify non-urban status of tissue sampling sites
- 95% UCL calculated for compliance criterion (Kristen Ryding, US EPA Region X)

Ovrhd 8-4. Derivation of an English Sole Background Concentration.



Ovrhd 8-5. English Sole Non-Urban Sampling Stations.

Avg. English sole [PCB], µg/kg	Station	Survey Code	Station ID #	Sediment Sample Date	Decimal Latitude	Decimal Longitude	Sediment [PCB], PPM
4.81	***Port Roberts***				***48.9676***	***123.0906***	
7.02	Birch Point	BIOEFF97	2-1	6/16/97	48.97333145	122.8533325	0.01
	Birch Point	BIOEFF97	3-1	6/19/97	48.98583221	122.8483353	0.011
	Birch Point	PSAMP89	1	4/1/89	48.98346329	122.8501968	0.03
	Birch Point	PSAMP90	1	4/1/90	48.98346329	122.8501968	0.02
	Birch Point	PSAMP91	1	4/1/91	48.98346329	122.8501968	0.015
	Birch Point	PSAMP92	1	4/1/92	48.98346329	122.8501968	0.02
	Birch Point	PSAMP93	1	4/1/93	48.98346329	122.8501968	0.018
5.94	Strait of Georgia	PSAMP89	3	4/1/89	48.86672592	122.9685974	0.018
	Strait of Georgia	PSAMP90	3	4/1/90	48.86672592	122.9685974	0.02
	Strait of Georgia	PSAMP91	3	4/1/91	48.86672592	122.9685974	0.01
	Strait of Georgia	PSAMP92	3	4/1/92	48.86672592	122.9685974	0.02
	Strait of Georgia	PSAMP93	3	4/1/93	48.86672592	122.9685974	0.02
No Data	***Outer Birch Point***				***48.8444***	***122.822***	
No Data	***Orcas Island East Sound***				***48.5762***	***122.8541***	
4.06	***Vendovi***				***48.63***	***122.6417***	
No Data	***McAurthur Bank***				***48.375***	***122.7936***	
8.1	Strait of Juan De Fuca	DNRREC91	PANG06XX	2/11/91	48.13650131	123.3796692	0.08
36.13	Saratoga Passage	BIOEFF97	25-2	6/30/97	48.13888931	122.5436096	0.016
	Saratoga Passage	BIOEFF97	25-3	6/30/97	48.1558342	122.5436096	0.016

Ovrhd 8-6. PCB Concentrations in English Sole Tissue and Sediments for Non-Urban Stations.

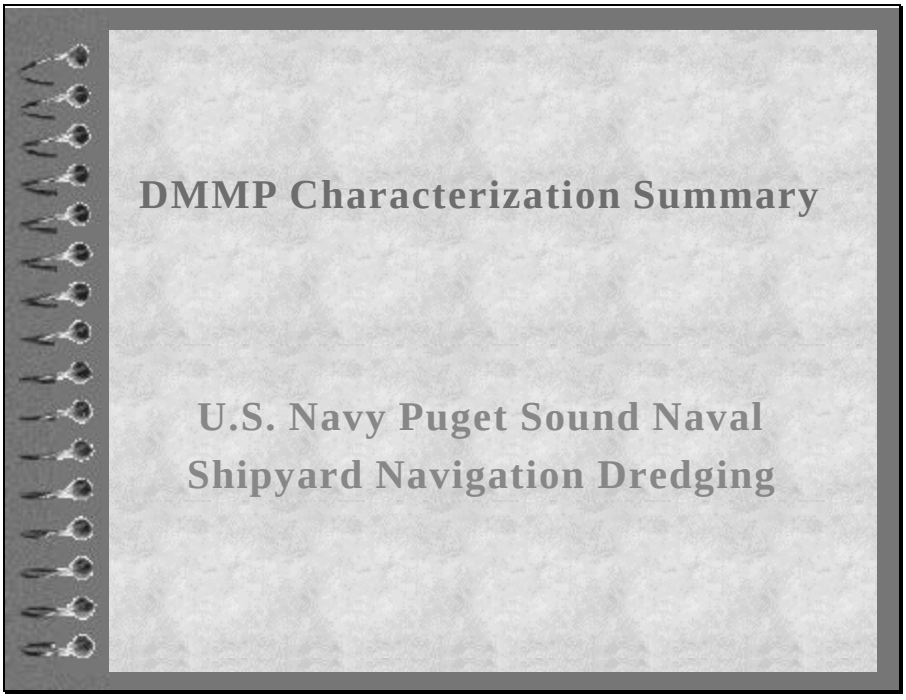
6.73	***Port Ludlow***				***47.9191***	122.5436096	
8.26	***Hood Canal North***				***47.8296***	122.5436096	
10.98	***Apple Cove Point***				***47.85***	122.5436096	
12.80	***Possession Point***				***47.8623***	122.5436096	
13.4	***Port Madison***				***47.7295***	122.5436096	
3.5	***Hood Canal Middle***				***47.5309***	122.5436096	
20.04	***Fern Cove***				***47.4829***	122.5436096	
4.78	***Hood Canal South***				***47.3675***	122.5436096	
8.5	Case Inlet 3	EIGHTBAY	CS-15	5/29/84	47.32500076	122.5436096	0.02
	Case Inlet 3	EIGHTBAY	CS-17	5/29/84	47.34700012	122.5436096	0.02
	Case Inlet 3	PSAMP90	110R	4/1/90	47.35006332	122.5436096	0.08
	Case Inlet 3	PSAMP93	110R	4/1/93	47.35006332	122.5436096	0.02
9.33	***Pickering Passage***				***47.2876***	122.5436096	
26.40	Wollochet	RILEY001	NG-8	8/1/82	47.27999878	122.5436096	0.0001
15.95	***Case Inlet 1***				***47.19***	122.5436096	
14.11	Carr Inlet 1	PSDDA1	CRR01	5/17/88	47.21983337	122.5436096	0.04
	Carr Inlet 1	PSDDA2	CRR01	4/28/89	47.21983337	122.5436096	0.04
	Carr Inlet 1	RILEY001	NG-10	8/1/82	47.22166824	122.5436096	0.0001
	Carr Inlet 1	RILEY001	NG-11	8/1/82	47.22166824	122.5436096	0.0001
22.07	Nisqually	PSDDA2	AKP04	4/28/89	47.159832	122.5436096	0.02
	Nisqually	PSDDA2	AKZ01	4/28/89	47.15716553	122.5436096	0.02
No Data	***Discovery Bay***				***48.05***	122.5436096	

Ovrhd 8-7. PCB Concentrations in English Sole Tissue and Sediments for Non-Urban Stations (cont.).

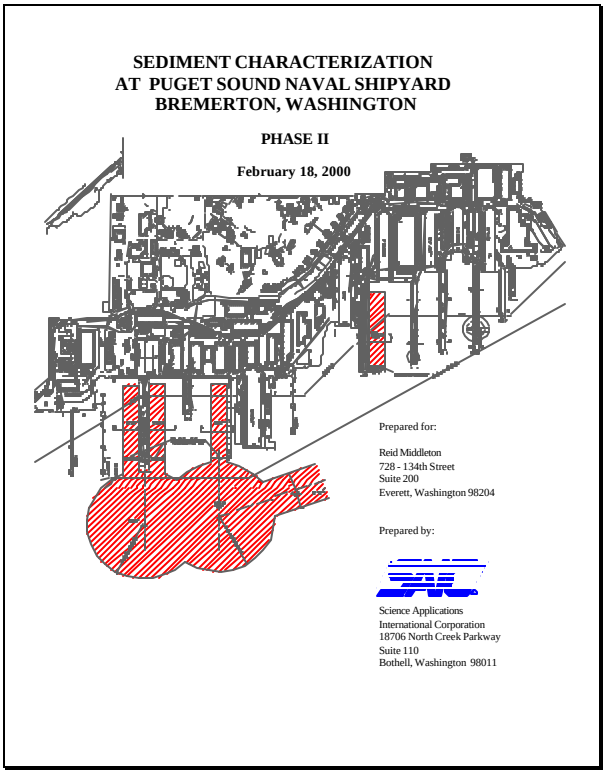
Calculation of a 95% UCL English Sole Tissue Aroclor Concentration

- Estimated variance associated with: samples being drawn from different bays, between composite samples taken at the same time, and between sampling events
- Examined effect of using half and full values for detection limits.

Ovrhd 8-8. Calculation of a 95% UCL English Sole Tissue Aroclor Concentration.



Ovrhd 9-1. DMMP Characterization Summary.



Ovrhd 9-2. Map of Puget Sound Naval Shipyard Dredging Prisms.

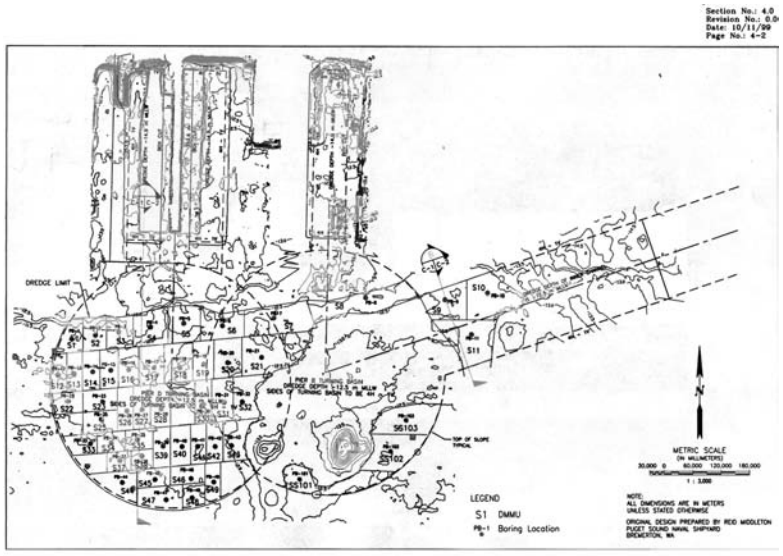


Figure 4-1. Turning basin and inner channel boring locations and surface DMMUs

Ovrhd 9-3. Turning Basin and Inner Channel DMMUs.

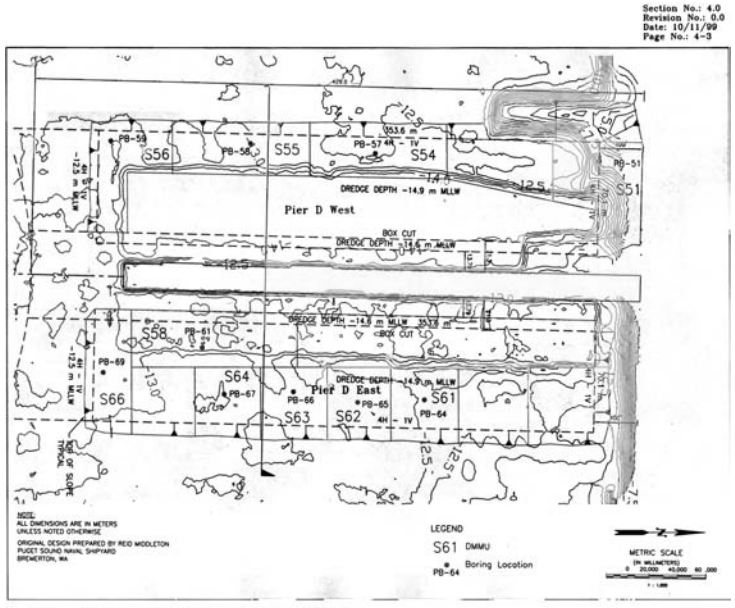


Figure 4-2. Pier D East and West boring locations and surface DMMUs

Ovrhd 9-4. Pier D Surface DMMUs.

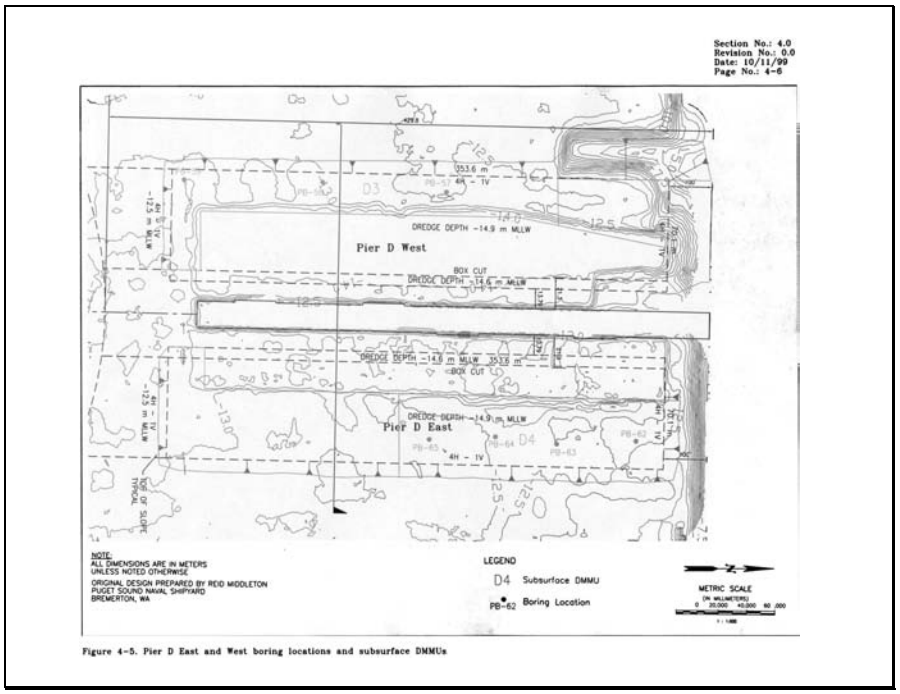


Figure 4-5. Pier D East and West boring locations and subsurface DMMUs

Ovrhd 9-5. Pier D Subsurface DMMUs.

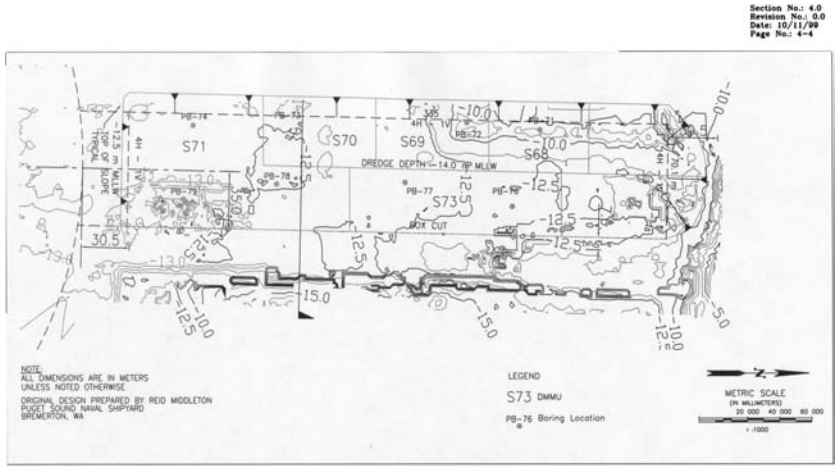


Figure 4-3. Pier B boring locations and surface DMMUs.

Ovrhd 9-6. Pier B Surface DMMUs.

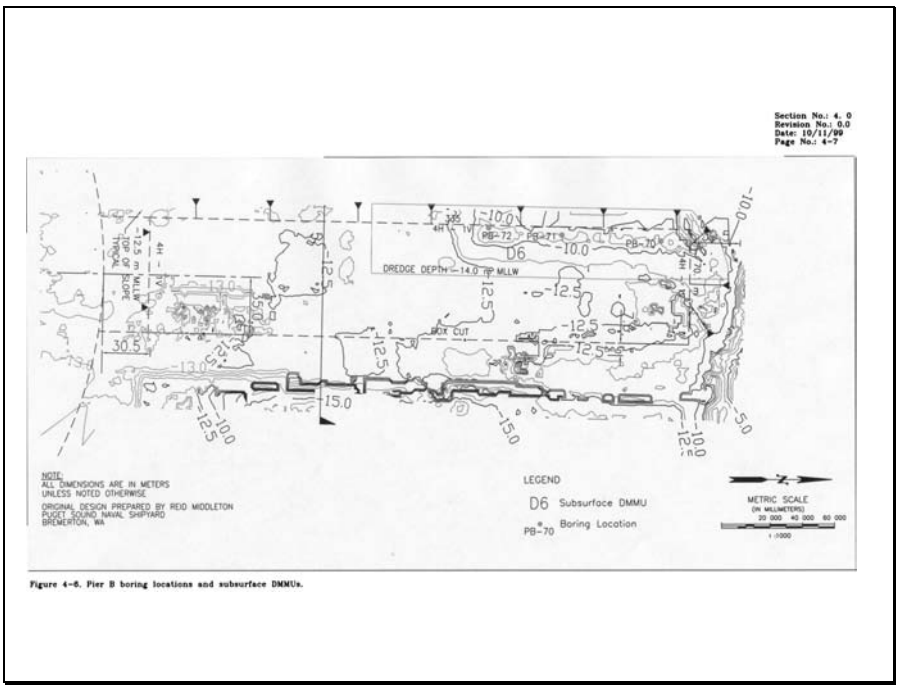


Figure 4-6. Pier B boring locations and subsurface DMMUs.

Ovrhd 9-7. Pier B Subsurface DMMUs.

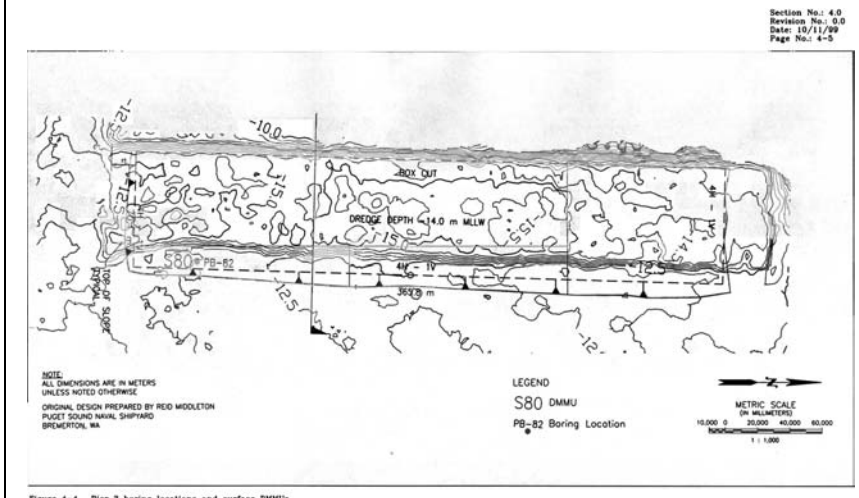


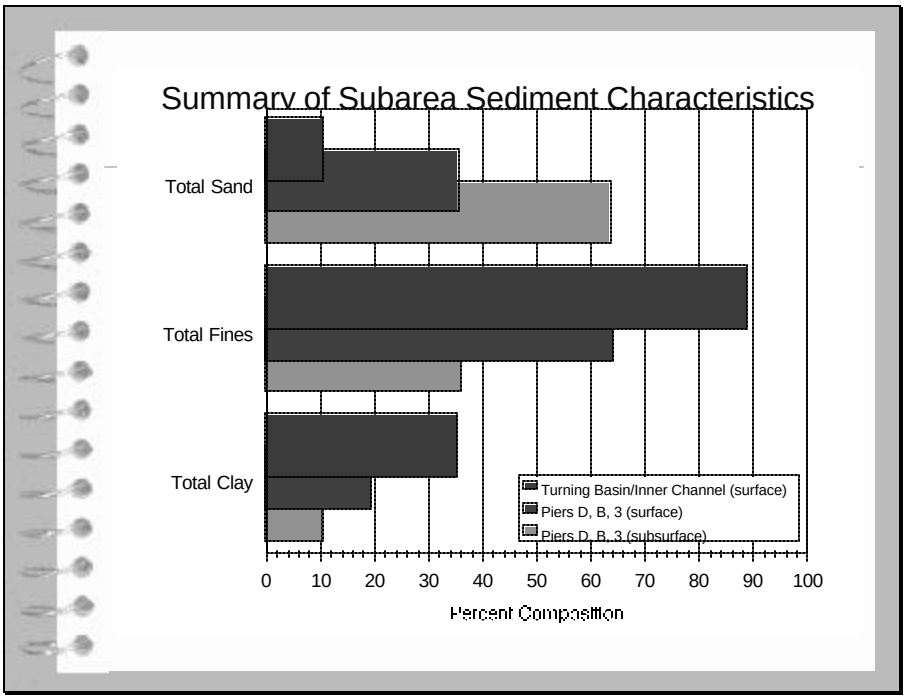
Figure 4-4. Pier 3 boring locations and surface DMMUs.

Ovrhd 9-8. Pier 3 Surface DMMUs.

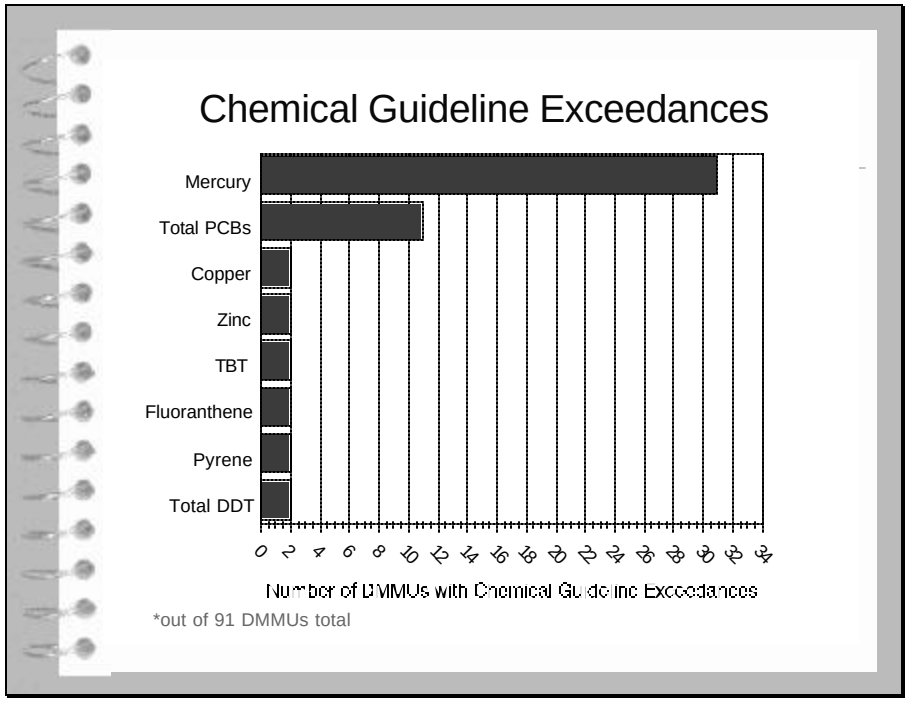
DMMP Characterization

- ✓Total Navigation volume: 368,050 cy
- ✓91 dredged material management units characterized (DMMUs), 53 (turning basin/inner channel), 38 (Piers D,B,3)
- ✓Two testing rounds (83 DMMUs Phase 1; 72 DMMUs Phase II, 62 DMMUs retested)

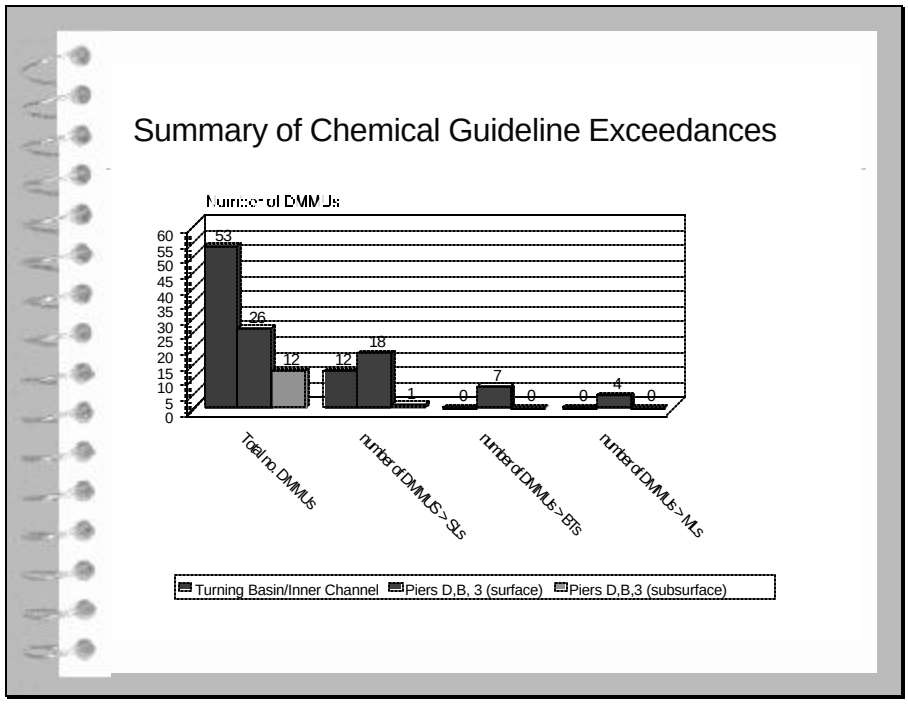
Ovrhd 9-9. DMMP Characterization.



Ovrhd 9-10. Summary of Subarea Sediment Characteristics.



Ovrhd 9-11. Chemical Guideline Exceedances.

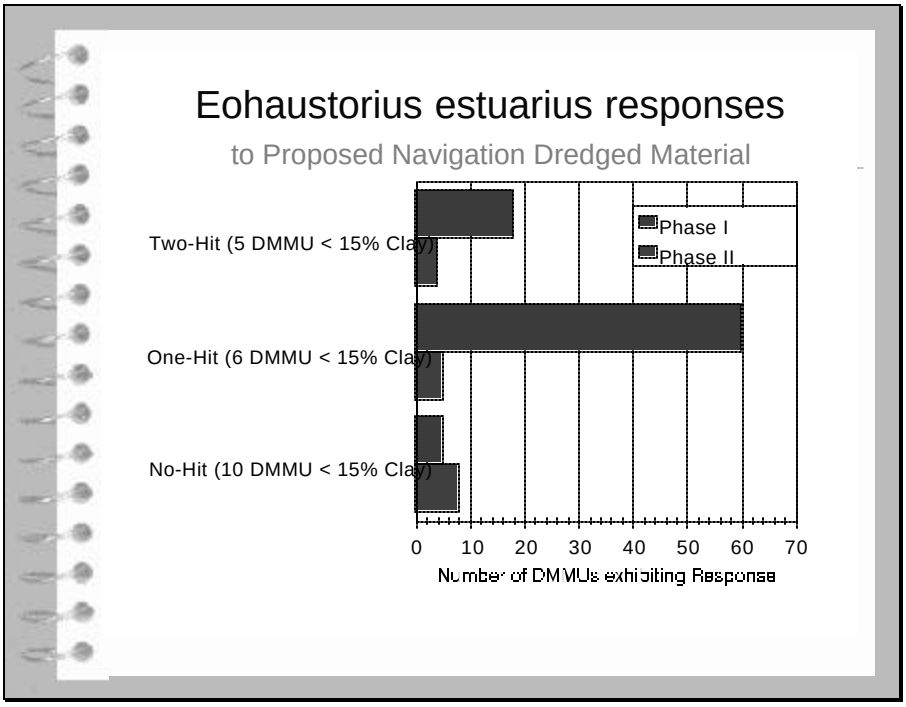


Ovrhd 9-12. Summary of Chemical Guideline Exceedances.

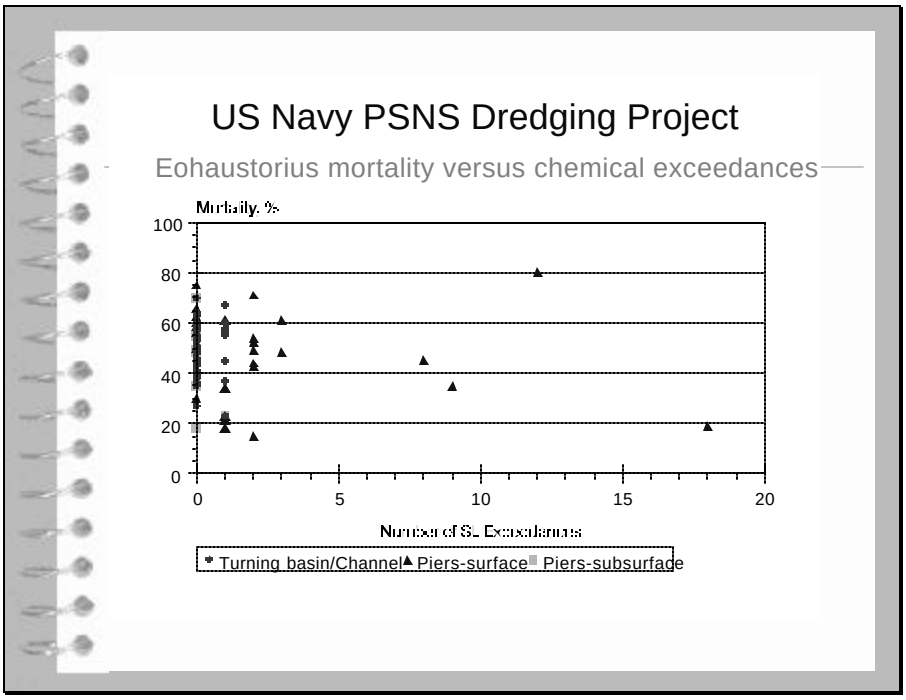
Bioassay testing species

- ✓ Amphipod (*Eohaustorius estuarius*: Phase I, Phase II)
- ✓ Amphipod (*Ampelisca abdita*: Phase II)
- ✓ Bivalve Larval (*Mytilus galloprovincialis*)
- ✓ Neanthes 20-day Growth (*Neanthes arenaceodenta*)

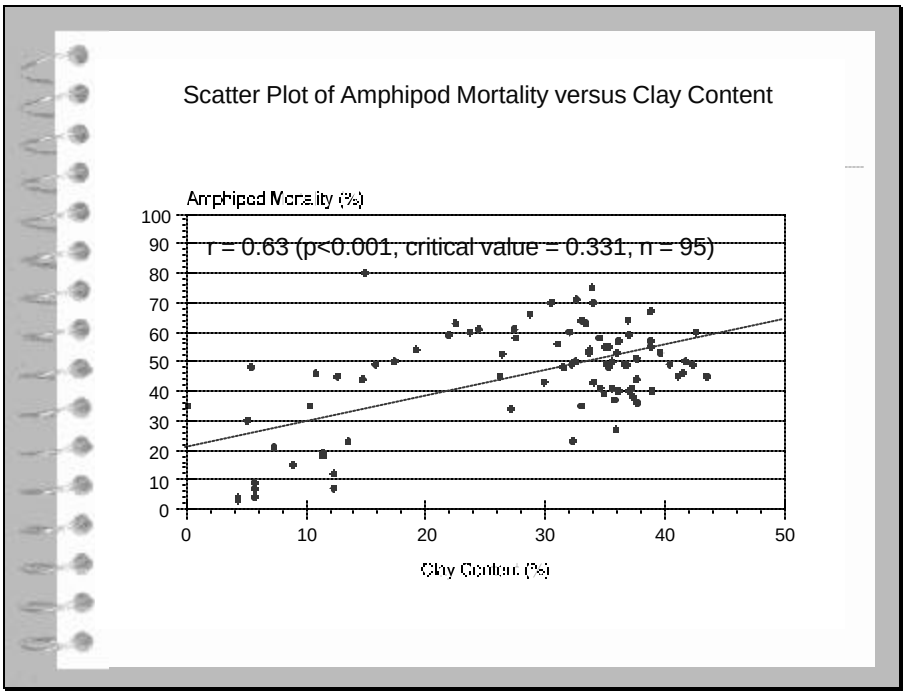
Ovrhd 9-13. Bioassay Testing Species.



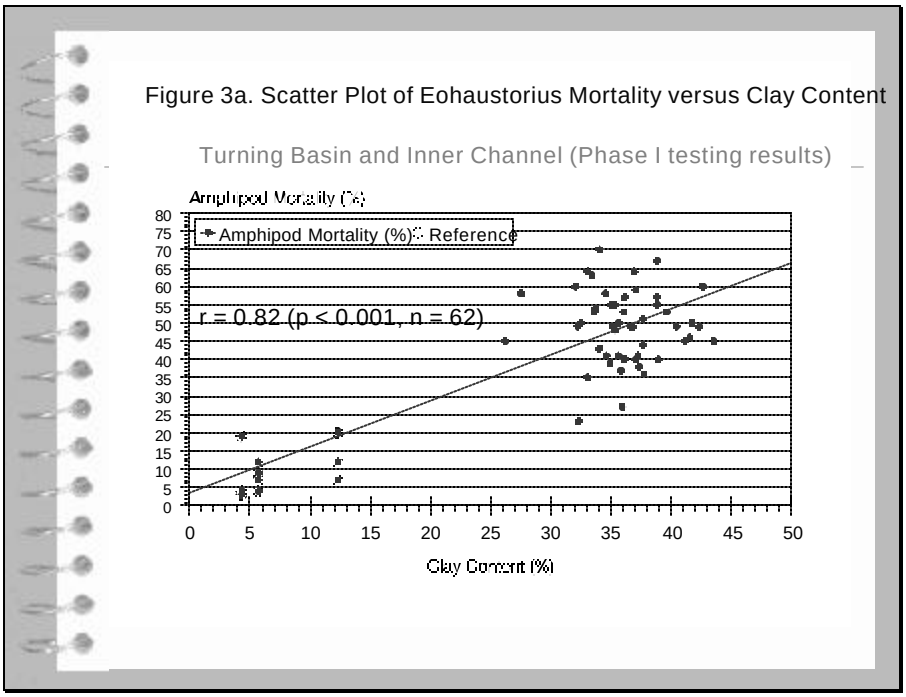
Ovrhd 9-14. *Eohaustorius estuarius* Responses.



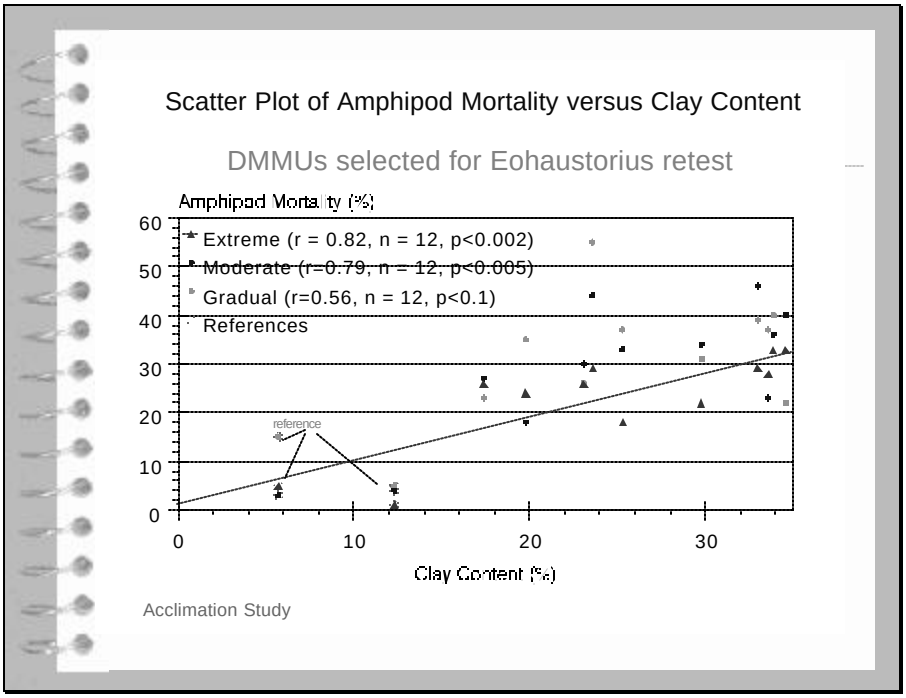
Ovrhd 9-15. US Navy PSNS Dredging Project – *Eohaustorius* mortality versus chemical exceedances.



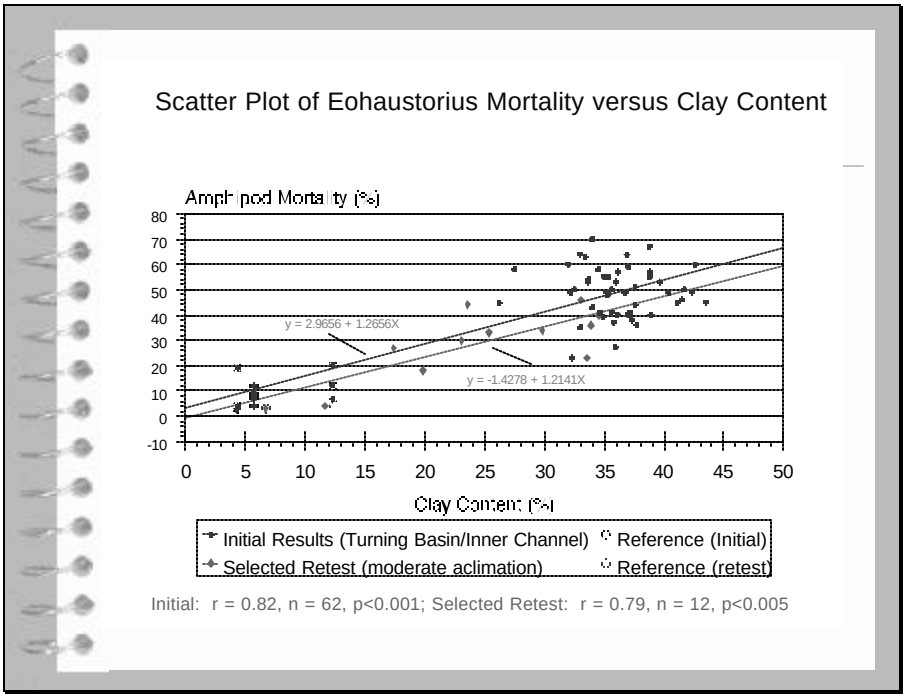
Ovrhd 9-16. Scatter Plot of Amphipod Mortality versus Clay Content.



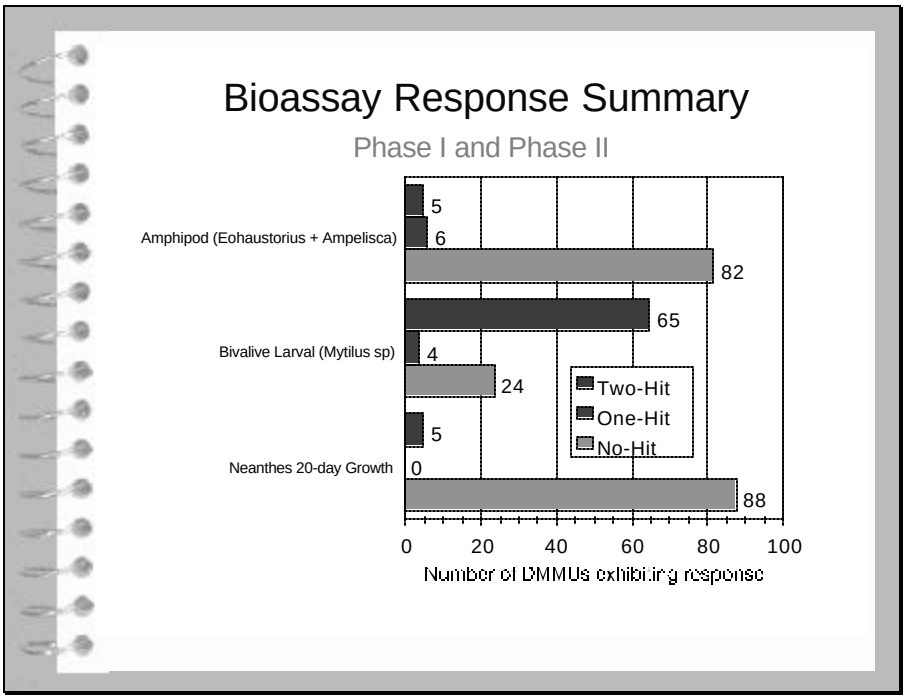
Ovrhd 9-17. Scatter Plot of *Eohaustorius* Mortality versus Clay Content – Turning Basin and Inner Channel (Phase I testing results).



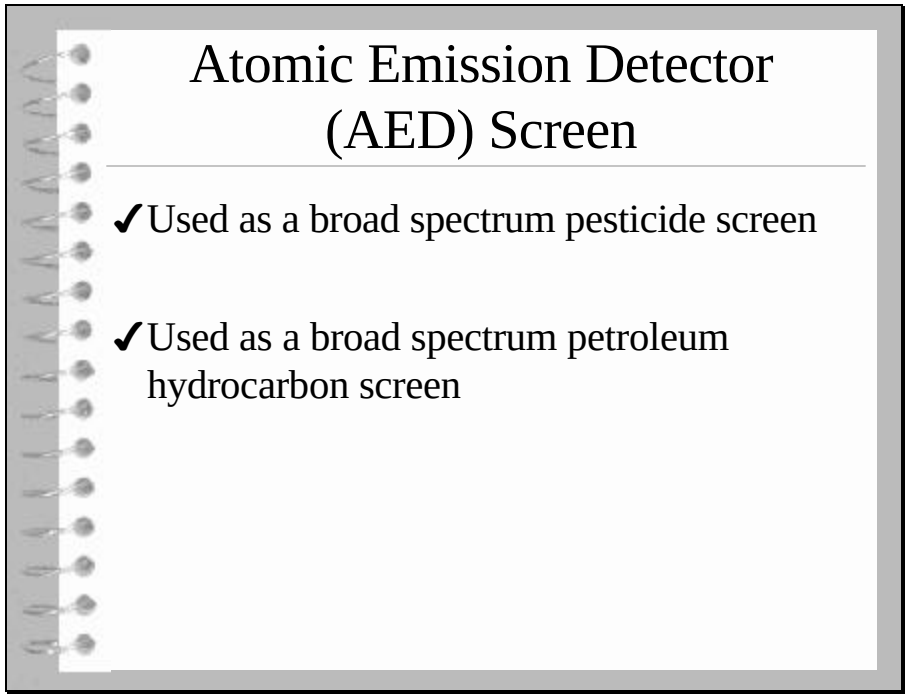
Ovrhd 9-18. Scatter Plot of Amphipod Mortality versus Clay Content– DMMUs selected for *Eohaustorius* retest.



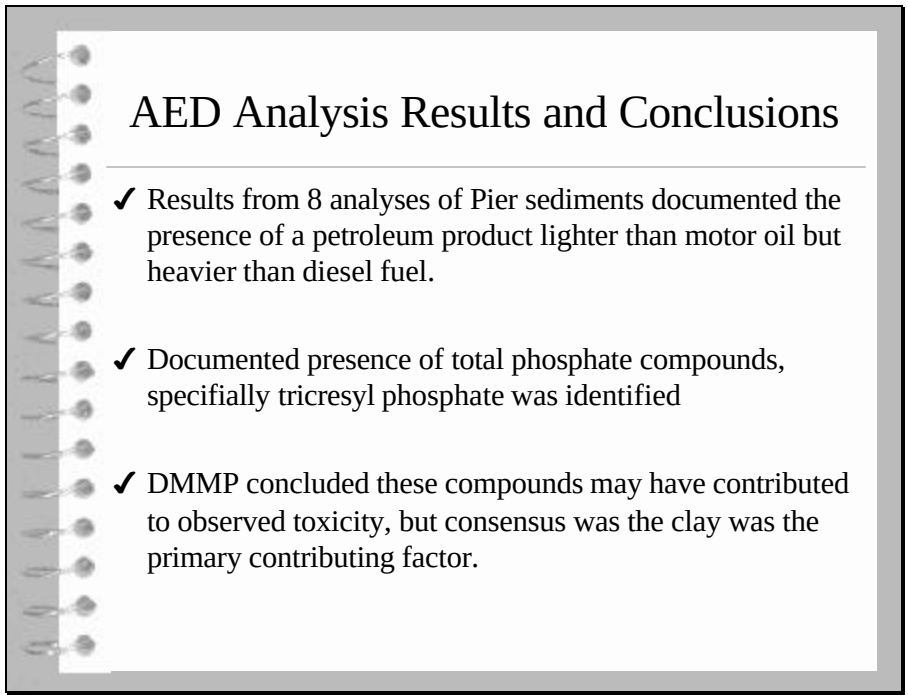
Ovrhd 9-19. Scatter Plot of *Eohaustorius* Mortality versus Clay Content.



Ovrhd 9-20. Bioassay Response Summary – Phase I and Phase II.



Ovrhd 9-21. Atomic Emission Detector (AED) Screen.



Ovrhd 9-22. AED Analysis Results and Conclusions.

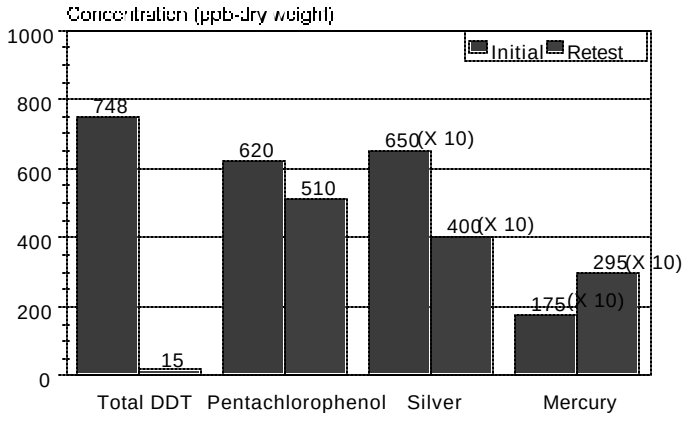
Analysis of TIC's (tentatively identified compounds)

- ✓ Analysis identified additional hydrocarbons at concentrations ranging from 370 - 800 ppb.
- ✓ Laboratory also acknowledged possibility of higher concentration compounds, which may have been eliminated during the GPC cleanup step.

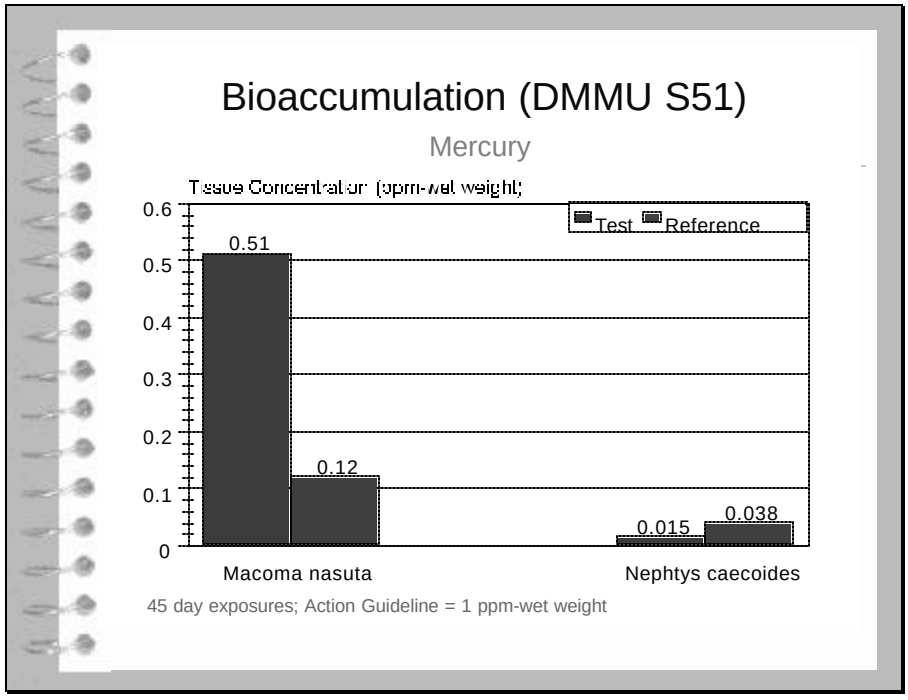
Ovrhd 9-23. Analysis of TIC's (tentatively identified compounds).

Sediment Retesting

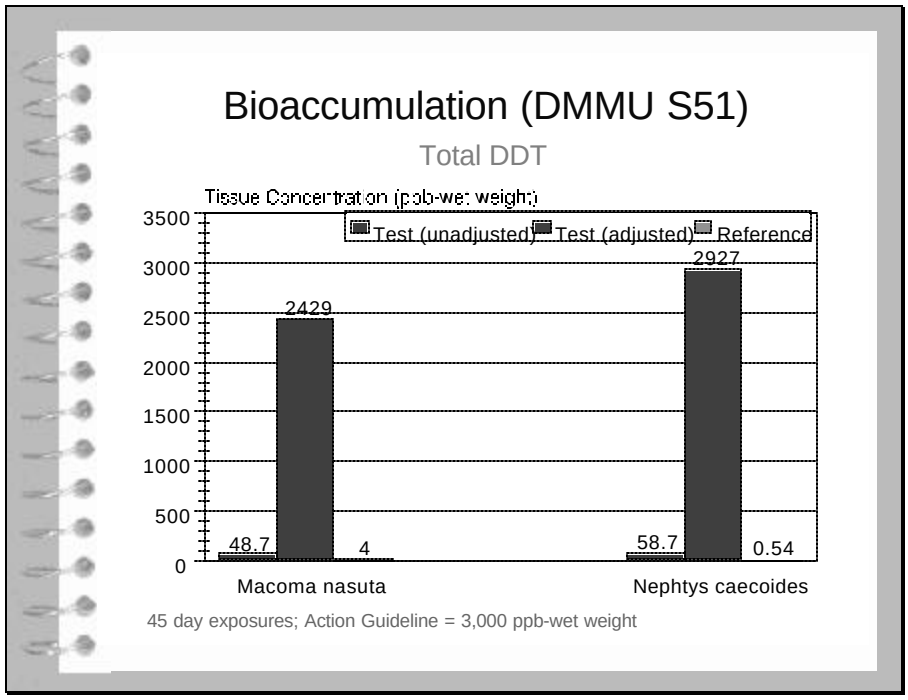
Bioaccumulation testing (S51)



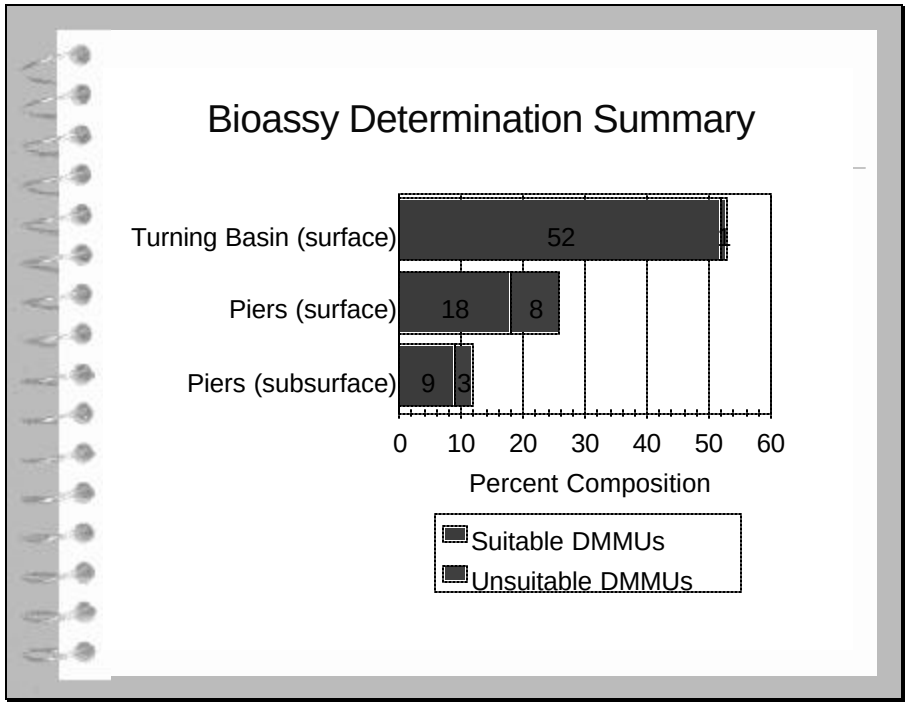
Ovrhd 9-24. Sediment Retesting – Bioaccumulation testing (S51).



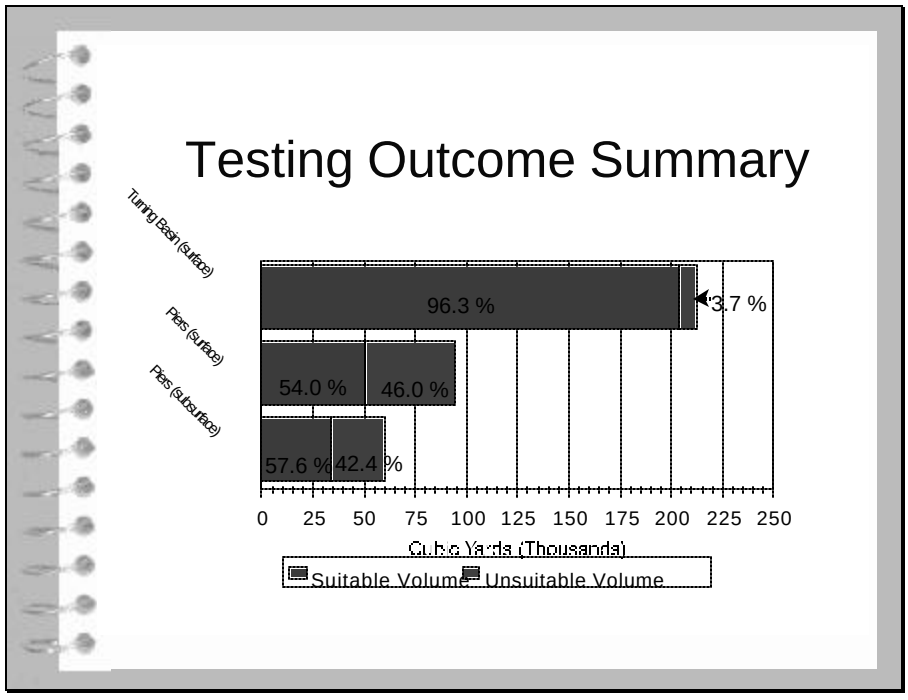
Ovrhd 9-25. Bioaccumulation (DMMU S51) – Mercury.



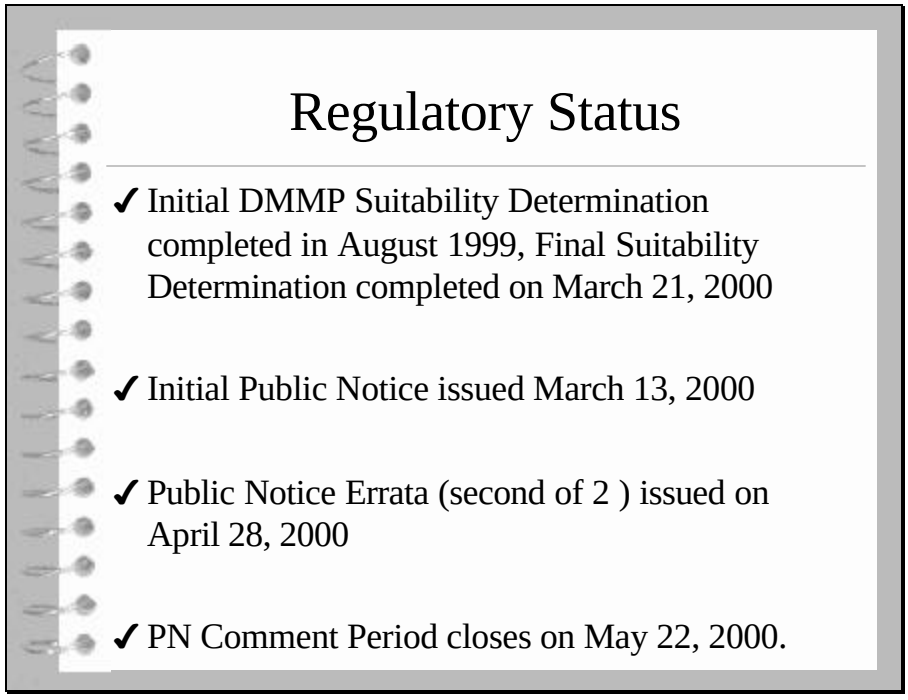
Ovrhd 9-26. Bioaccumulation (DMMU S51) – Total DDT.



Ovrhd 9-27. Bioassay Determination Summary.



Ovrhd 9-28. Testing Outcome Summary.



Ovrhd 9-29. Regulatory Status.

Sediment Management Standards - May 2000 Update

Ovrhd 10-1. Sediment Management Standards – May 2000 Update.

SMS Rule Amendments

- Decision to halt SMS Rulemaking based on:
  - Lack of rulemaking capacity/competing priorities
  - Clean Water Act/Endangered Species Act issues
  - Alignment with MTCA rule
  - Need for additional technical work
- Focus on Implementing the Current SMS Rule
  - Sediment Cleanup & Source Control Project Implementation
  - Regulatory Integration and Coordination
  - Reinvigorate Interagency Decision-making Processes
  - Improve Alignment of Current Monitoring Programs
  - Performance Tracking and Evaluation
- Rule Closure Activities

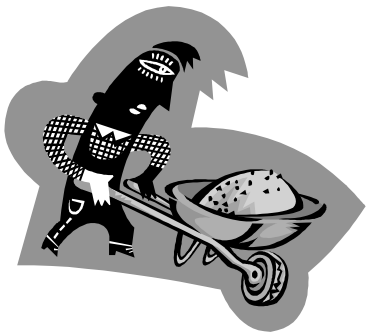
Ovrhd 10-2. SMS Rule Amendments.

Status of SMS Rule Closure Activities

- Draft Responsiveness Summary undergoing internal Ecology Review
- Updated Marine AET Values Posted on Ecology Web Page (post-SMARM)
- Final RWG Recommendations on Freshwater Sediments (post-SMARM)
- Benthic Reports distributed for Expert Peer Review

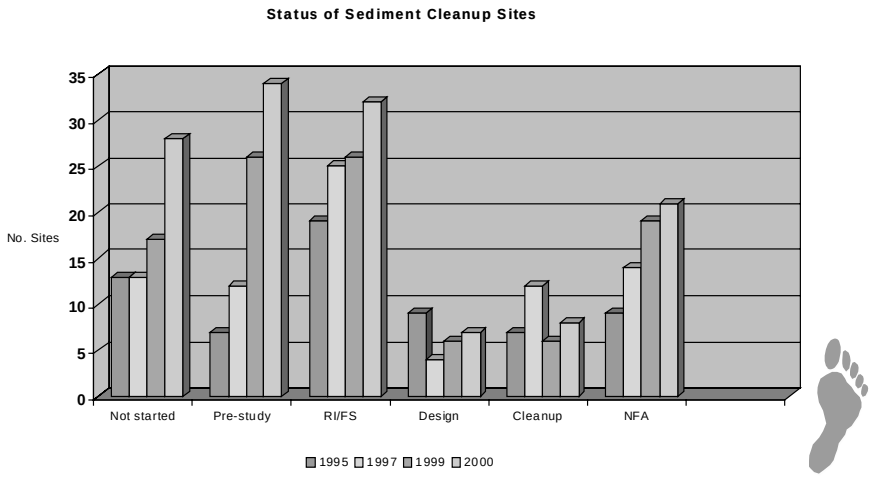
Ovrhd 10-3. Status of SMS Rule Closure Activities.

Regional Cleanup Site Status



Ovrhd 10-4. Regional Cleanup Site Status.

Site Status



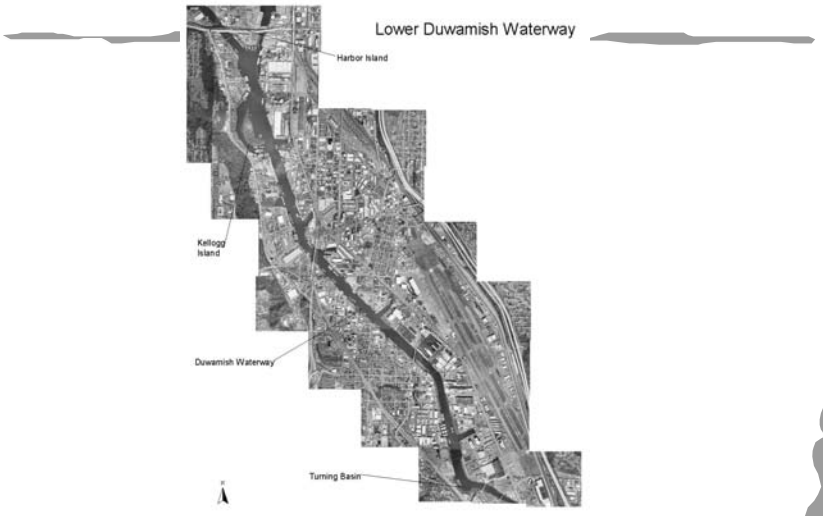
Ovrhd 10-5. Site Status.

Northwest Region
Lower Duwamish Waterway

- Waterway area of concern is approximately six river miles long
- Contaminants include PCBs, pthalate, metals, others
- EPA has determined that Waterway would score as a Superfund site
- A non-Superfund option is being pursued

Ovrhd 10-6. Northwest Region Lower Duwamish Waterway.

Northwest Region
Lower Duwamish Waterway



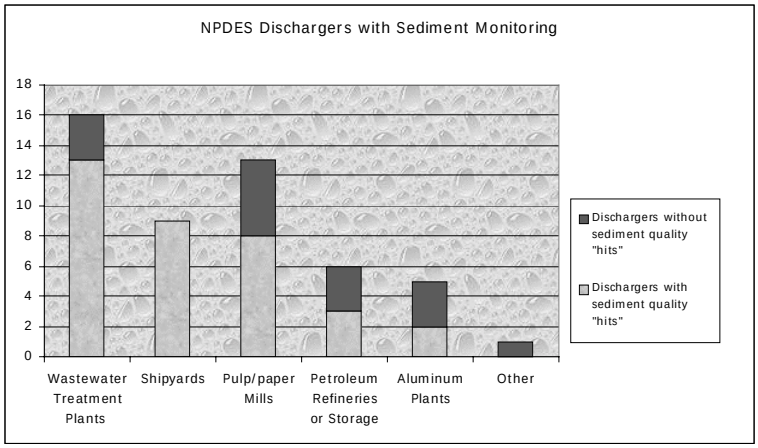
Ovrhd 10-7. Northwest Region Lower Duwamish Waterway (cont.) - Map.

Northwest Region
Lower Duwamish Waterway

- A Joint Ecology/EPA Administrative Order/Statement of Work is being negotiated with the Port of Seattle, King County, City of Seattle, and Boeing Co. for a Remedial Investigation/Feasibility Study
- An Early-Action approach to high priority contaminated sediments will be taken

Ovrhd 10-8. Northwest Region Lower Duwamish Waterway (cont.).

Sediment Source Control Update



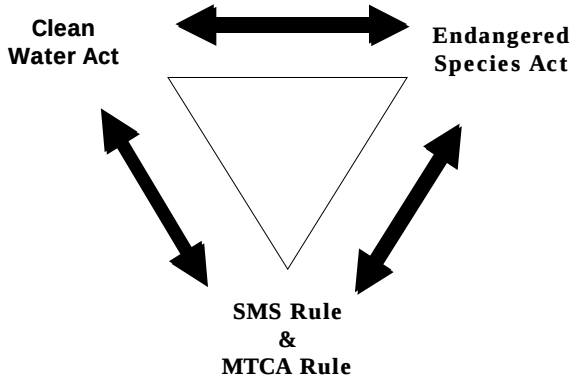
Ovrhd 10-9. Sediment Source Control Update.

Sediment Source Control Issues

- Second Round of NPDES monitoring
- Revised WQP Guidance for Identifying "Potential" Impacts
- Impacts of TMDL Requirements on Source Control Activities
- Sediment Quality Impacts Associated with Stormwater Discharges

Ovrhd 10-10. Sediment Source Control Issues.

SMS Implementation Integration & Coordination



Ovrhd 10-11. SMS Implementation Integration & Coordination.

SEDQUAL Information System Release Four

- Major Feature Improvements
  - Migration from MS Access to MSDE SQL Server
  - Automated remote update maintenance release files
  - Integrated GIS component
- Environmental Data Improvements
- GIS Data Improvements
- Projected 3rd Quarter 2000 Distribution

Ovrhd 10-12. SEDQUAL Information System Release Four.

Performance Tracking and Evaluation

- Sediment Cleanup Status Report (January 2000)
- Source Control Status Report (December 2000)
- Performance Measures
  - Number of Cleanup Action Plans
  - Acres of Cleaned-Up Sediments

Ovrhd 10-13. Performance Tracking and Evaluation.

SMS Implementation Planned Activities (2000-2001)

- Sediment Cleanup
- Source Control Activities
- Information Management
- Performance Tracking and Evaluation
- Technical Procedures and Policies

Ovrhd 10-14. SMS Implementation Planned Activities (2000-2001).

Northwest Region
Bellingham Bay Pilot

- Multi-organization effort to address sediment cleanup and disposal, pollution sources, habitat restoration and land use in Bellingham Bay
- Comprehensive Strategy for Bay integrates above elements and presents a range of near-term remedial actions for high priority sediment sites

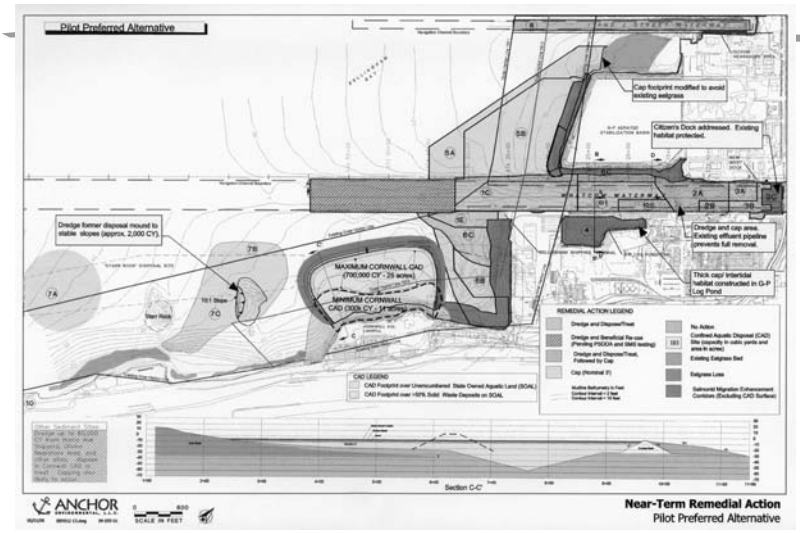
Ovrhd 11-1. Northwest Region Bellingham Bay Pilot.

Northwest Region
Bellingham Bay Pilot

- Comprehensive Strategy Final EIS will be issued in June with a preferred near-term remedial action alternative
- Preferred alternative addresses approximately 200 acres of contaminated sediments (most on state-owned aquatic lands), and includes dredging, Confined Aquatic Disposal (CAD), and capping outside navigation areas

Ovrhd 11-2. Northwest Region Bellingham Bay Pilot (cont.).

Northwest Region
Bellingham Bay Pilot



Ovrhd 11-3. Northwest Region Bellingham Bay Pilot (cont.) - Map.

Northwest Region
Bellingham Bay Pilot

- Preferred alternative provides treatment opportunity, should technologies be available within timeframe necessary for moving CAD forward, or if treatment becomes available after CAD construction
- Post-EIS completion, the Comprehensive Strategy can be used as a guidance for decision makers, and to select a near-term remedial action as a remedy under MTCA

Ovrhd 11-4. Northwest Region Bellingham Bay Pilot (cont.).

PCBs in Duwamish River Sediments:

Erika Hoffman (EPA)
Sandy Browning (Striplin)

Ovrhd 12-1. PCBs in Duwamish River Sediments.

Purpose

- Are dioxin-like congeners observed in sediments with known PCB contamination?
- Are dioxin-like congeners observed in sediments and tissues at toxicologically significant concentrations?

Ovrhd 12-2. Purpose.

Purpose (cont.)

- Comparison of results from traditional (Aroclor), comprehensive (HR GC/MS) and alternative (HPLC-screen, Cell-line) methods.
- Identify possible screening approaches for sediments to minimize costs of PCB analysis.

Ovrhd 12-3. Purpose (cont.).

Methods Used

- Method 8081 (total PCB by Aroclor)
- NMFS HPLC-screen (15 congeners -10 dioxin-like; total PCB)
- High Resolution GC/MS (14 dioxin-like congeners)
- P450 RGS - Cell line (TCDD TEQ)

Ovrhd 12-4. Methods Used.

Methods Used - Cost

- Aroclors - $120/sample (2-4 wks)
- HPLC-screen - $300/sample (2-3 wks)
- HR GC/MS - $1200 - 2000/sample (1-4 mos)
- P450 RGS - $200/sample (2 wks)

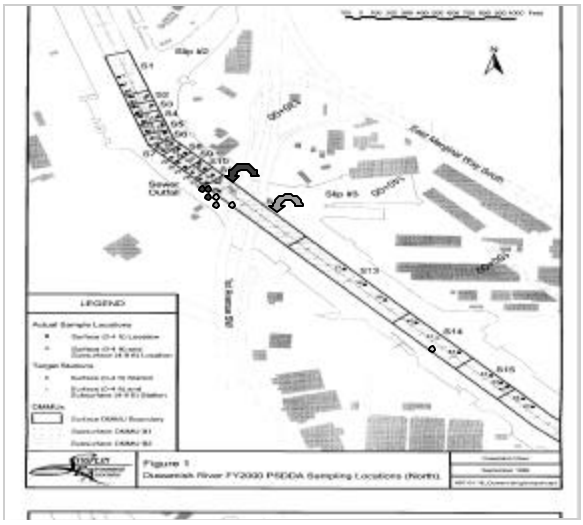
Ovrhd 12-5. Methods Used – Cost.

Sampling

- Sediments from Duwamish O&M testing
- Navigation channel area known for PCBs
- 3 sediment samples
- Composites of 4-ft cores
- Samples stored frozen

Ovrhd 12-6. Sampling.

Sampling locations: surface



Ovrhd 12-7. Sampling locations: surface.

Testing timeline

- Aroclor determination
- Select 3 samples with highest [Aroclor]
- HR GC/MS to determine if dioxin-like congeners present.
- HPLC-Screen and Cell-line testing performed on samples with dioxin-like congeners.

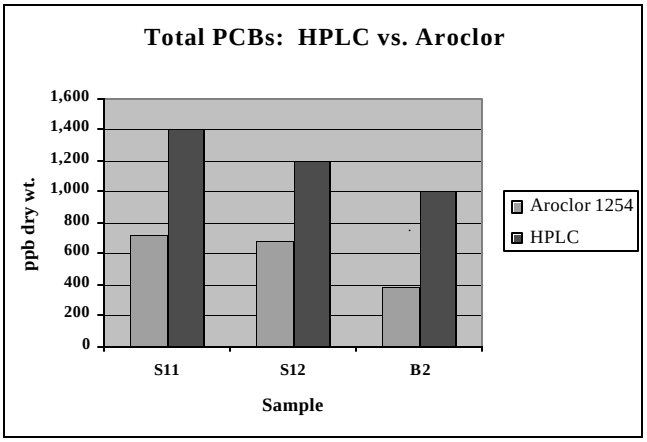
Ovrhd 12-8. Testing timeline.

Results

- Moderately contaminated sediments
  - total Aroclor PCBs = 380 - 720 ppb dry wt
  - Cell-line TEQ = 70-197 ppt
- Dioxin-like congeners observed in sediment samples using all 3 methods
- Non-ortho coplanar congeners #77 and #129 detected.
- Congener #169 not detected.

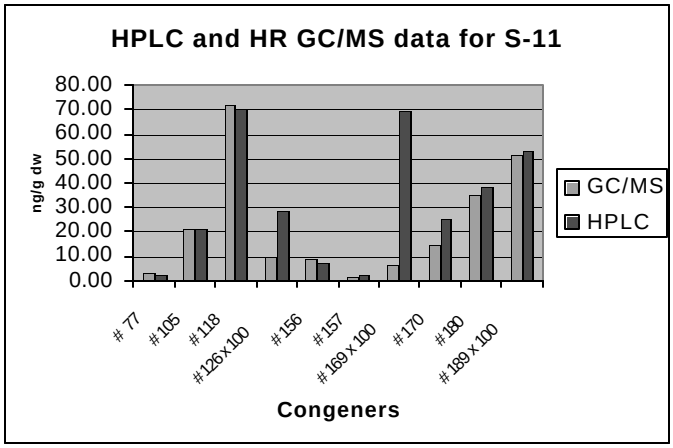
Ovrhd 12-9. Results.

Results: Total PCBs



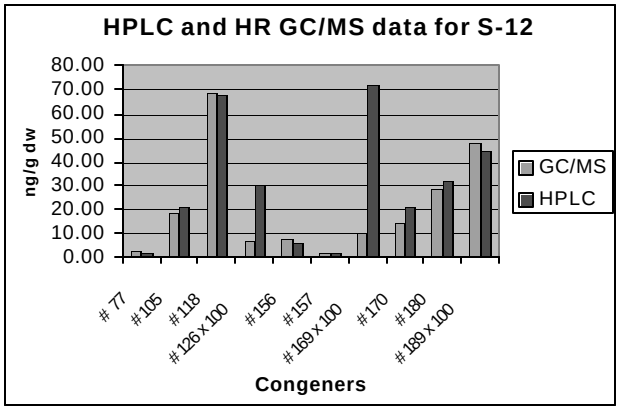
Ovrhd 12-10. Results: Total PCBs.

Results: Individual Congeners



Ovrhd 12-11. Results: Individual Congeners.

Results: Individual Congeners



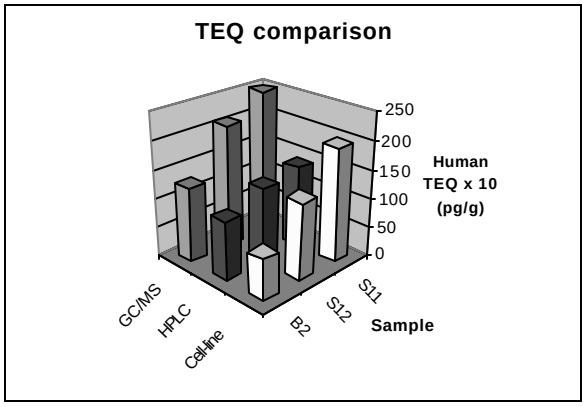
Ovrhd 12-12. Results: Individual Congeners (cont.).

TEQs Calculated from Congeners

- TEFs for sediments?
- Human and Avian TEFs from Van Den Berg *et al.* (1998)
- Highest based on HR GC/MS data for S11:
  - Human = 25 pg/g
  - Avian = 288 pg/g

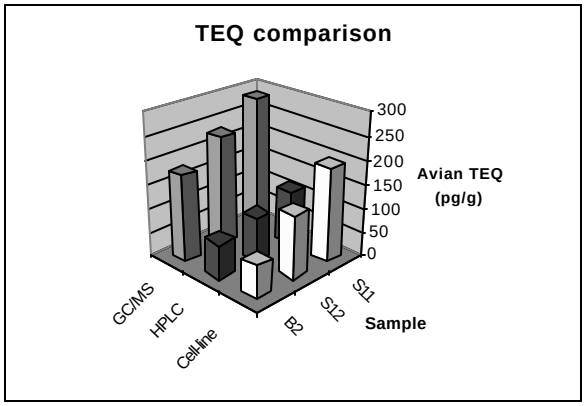
Ovrhd 12-13. TEQs Calculated from Congeners.

Results: Human TEQs



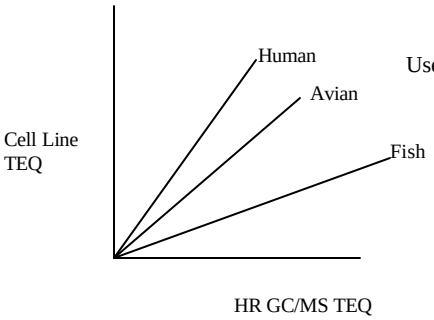
Ovrhd 12-14. Results: Human TEQs.

Results: Avian TEQs



Ovrhd 12-15. Results: Avian TEQs.

Developing a screening approach to congener testing



Use correlation to:

- predict receptor-specific TEQs
- focus HR GC/MS testing

Ovrhd 12-16. Developing a screening approach to congener testing.

Conclusions

- Dioxin-like congeners are present in Duwamish sediments and in toxicologically significant concentrations (particularly for avian wildlife).
- Estimate of total PCBs varies with method.
- Specific congener quantification largely consistent between methods (HR GC/MS and HPLC).

Ovrhd 12-17. Conclusions.

Conclusions: continued

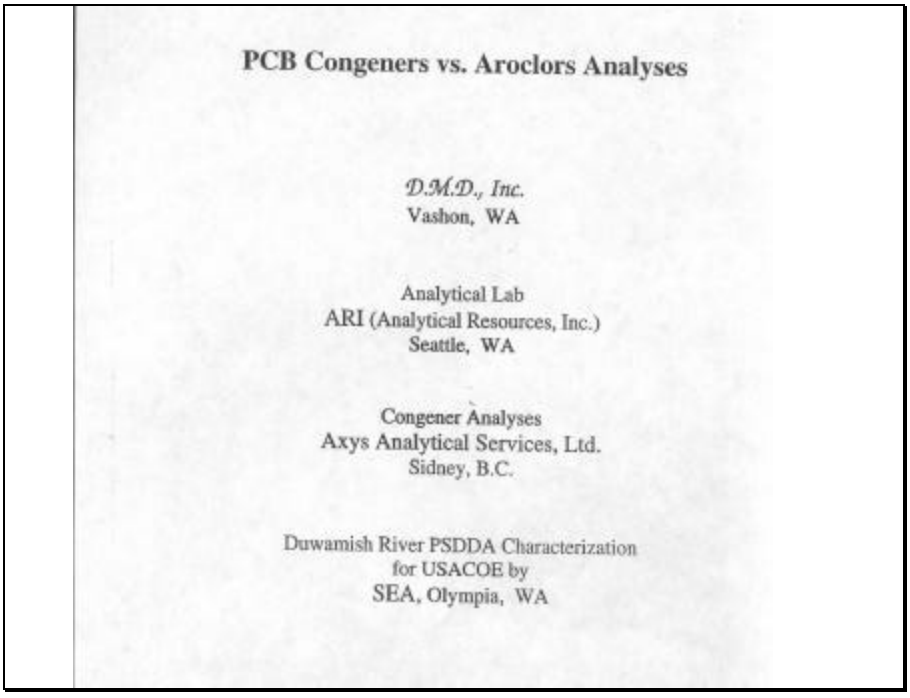
- Varying TEQs derived using different methods
- Potential for using correlations between TEQs derived using inexpensive methods and those derived using high resolution methods to develop trigger for congener testing.

Ovrhd 12-18. Conclusions: continued.

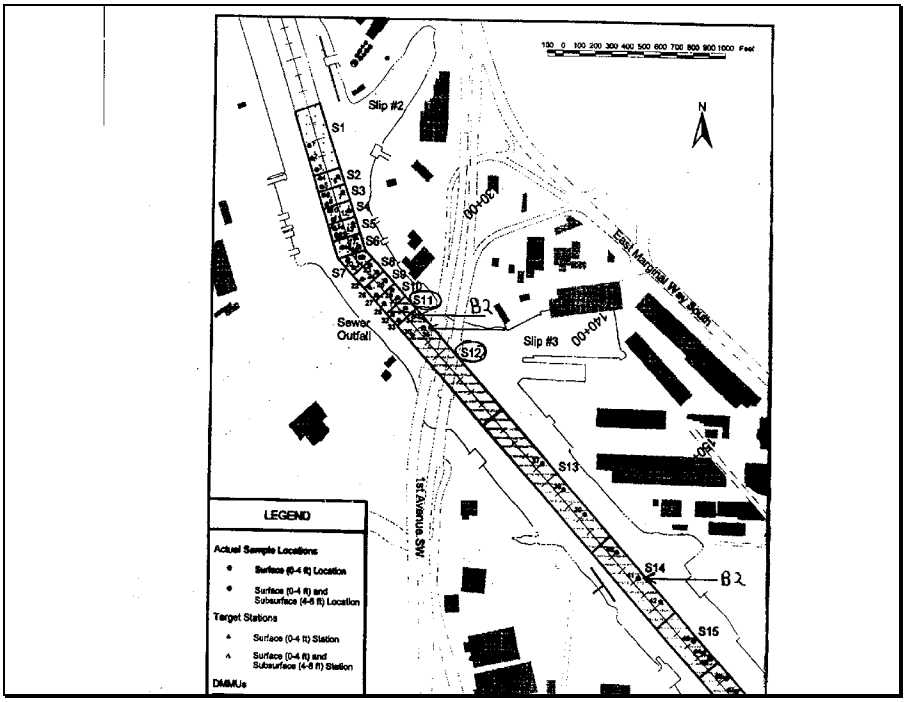
Recommendations

- Conduct more HR GC/MS in sediments *and tissues* to determine degree and extent of dioxin-like congener contamination
- Conduct more synoptic testing of sediments *and tissues* using cell-line, Aroclor and HR GC/MS methods
- Developing a cell-line or Aroclor TEQ "screen" in sediments to determine need for congener testing in tissues.

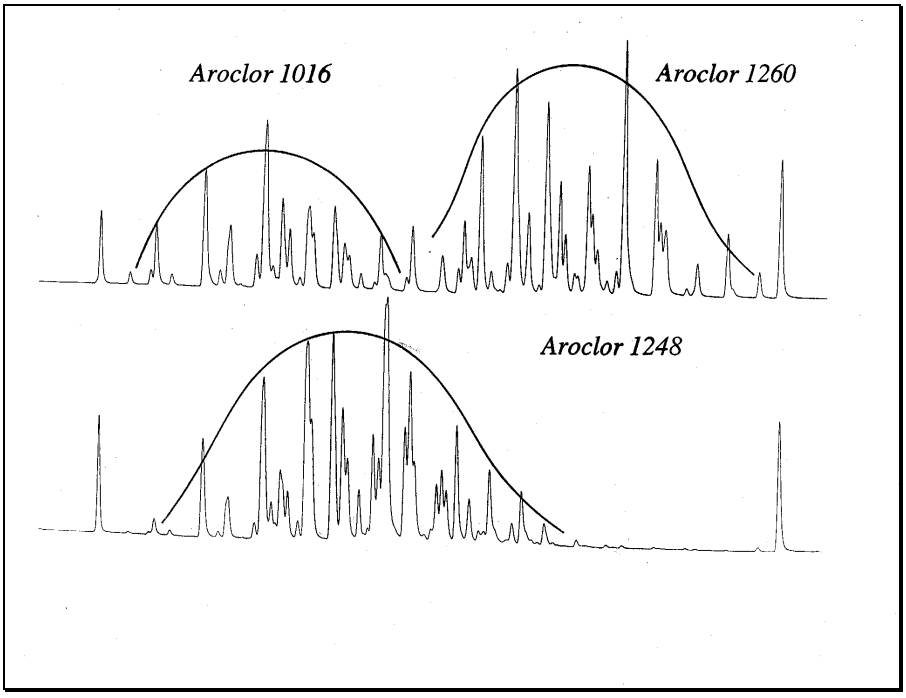
Ovrhd 12-19. Recommendations.



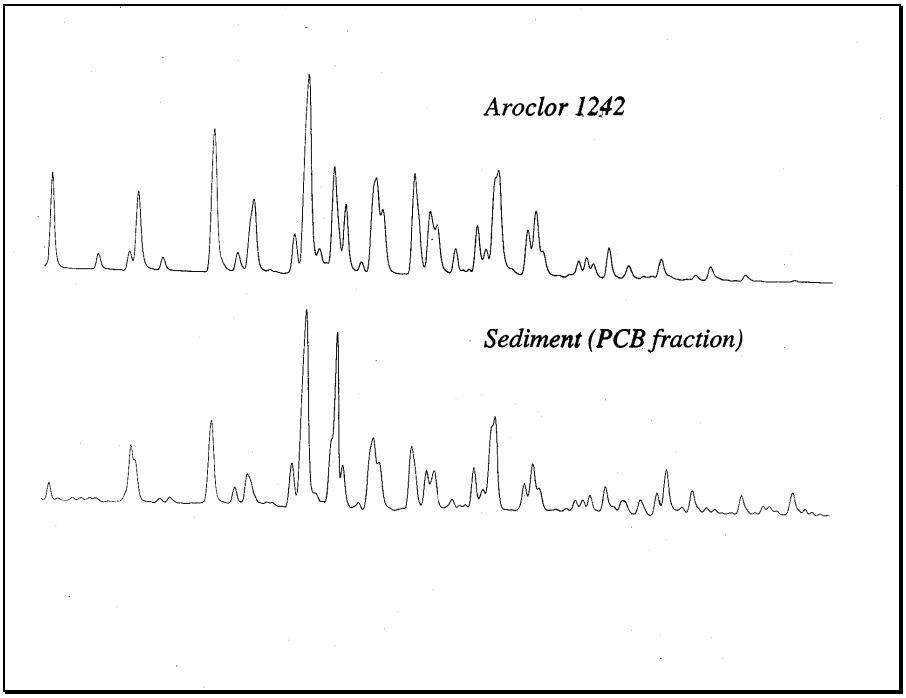
Ovrhd 13-1. PCB Congeners vs. Aroclors Analyses.



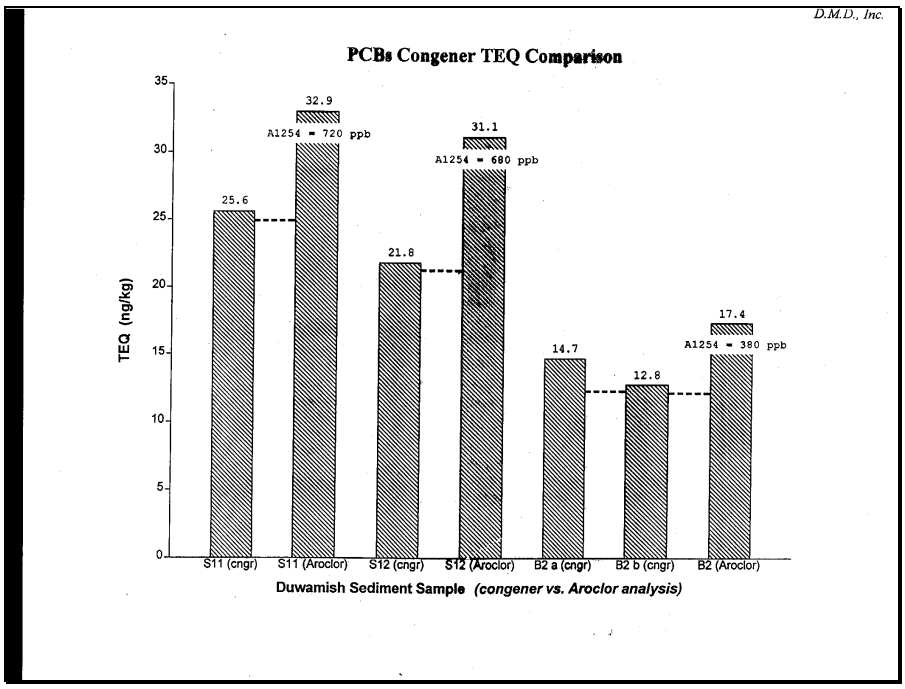
Ovrhd 13-2. Duwamish River FY2000 PSDDA Sampling Locations (North).



Ovrhd 13-3. Chromatogram of Aroclors 1016, 1260, and 1248.



Ovrhd 13-4. Chromatogram of Aroclor 1242 and Sediment (PCB fraction).



Ovrhd 13-5. PCBs Congener TEQ Comparison.

Factor	Congeners by HRGCMS	Aroclors by GC/ECD
# analytical parameters (df)	currently 12	up to ~ 100
focus or objective	toxicity	source material i.d.
universality of analysis	handful of labs	many labs
sensitivity	comparable	
applicability	toxicity characterization higher organisms / tissues	toxicity characterization nonbiotic & some organisms Aroclors reporting total PCBs reporting source identification assessment of alteration/weathering
	limited parameter fingerprinting	multiparametric fingerprinting
amount of information	less	more
cost	~ $ 1,000 or more	~ $ 100 with special cleanup, < $ 400

Ovrhd 13-6. Comparison Table – Congener vs. Aroclor Method.

Rationale & Methods for Combining Exposure & Effects Endpoints in a Single Bioassay: Revising Sediment Bioaccumulation & Toxicity Test Protocols

Michael H. Salazar & Sandra M. Salazar
Applied Biomonitoring
Kirkland, WA

SMARM Meeting - Seattle, Washington - 10 May 2000

Ovrhd 14-1. Rationale & Methods for Combining Exposure & Effects Endpoints in a Single Bioassay: Revising Sediment Bioaccumulation & Toxicity Test Protocols.

Purpose

To discuss

- Need to combine exposure & effects endpoints
- Weight of evidence suggesting TBT bioavailable
- Potential bias in laboratory *Macoma* tests

To make recommendations

- Methods for quantifying *Macoma* health
- Refinements to the *Macoma* bioaccumulation test
- Guidance & rationale for weight of evidence

Ovrhd 14-2. Purpose.

Revise Bioassay Protocols?

"The ultimate goal is the development of a single bioassay methodology, where the kinetics of bioconcentration to a given body or tissue level are linked with an understanding of the toxicological significance of that tissue residue level. Thus the nature and time course of external exposures can be linked with related processes in the body of exposed organisms."

McCarty (1991)

Ovrhd 14-3. Revise Bioassay Protocols?

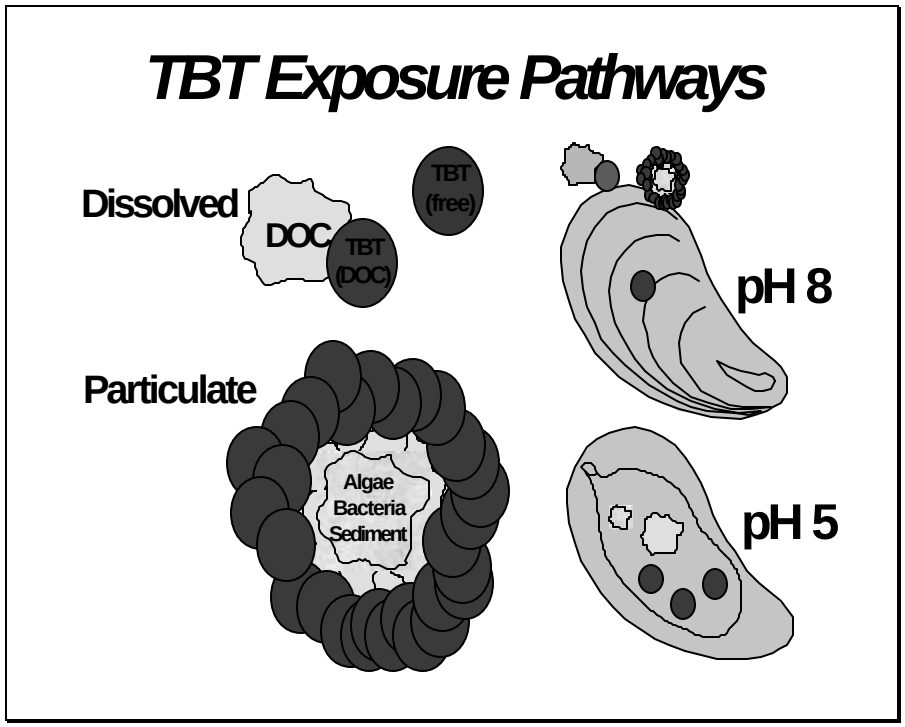
Weight of Evidence

Suggesting TBT bioavailable

- Natural *Scrobicularia* populations in UK
- Lab tests with San Diego Bay sediment
- Caged mussels in San Diego Bay
- Caged mussels at Harbor Island
- TBT desorbs from particles below pH 8

TBT is not unique in chemical behavior

Ovrhd 14-4. Weight of Evidence.



Ovrhd 14-5. TBT Exposure Pathways.

Food & Feeding Forgotten

"Feeding is such a universal and commonplace business that we are inclined to forget its importance. The primary driving force of all animals is the necessity of finding the right kind of food and enough of it."

Elton (1927)

Ovrhd 14-6. Food & Feeding Forgotten.

Test Organism Selection Criteria

ASTM Test Organism Criteria		Salazar & Salazar
Bioaccumulation	*Toxicity Testing*	*Ecotoxicological*
Sediment ingestion	**Sediment contact**	**Sediment ingestion**
Chemical resistance	**Chemical sensitivity**	**Resistant and sensitive***
No filter feeders	**No filter feeders**	**Filter feeders OK****
Facultative OK	**Facultative OK**	**Facultative OK, not OK****
Bivalves OK	**No bivalves******	**Bivalves OK*****

***** Mortality resistant; sublethal endpoints sensitive
****** Must ingest sediment
******* Must ingest sediment and measure sublethal endpoints
******** Close to avoid exposure

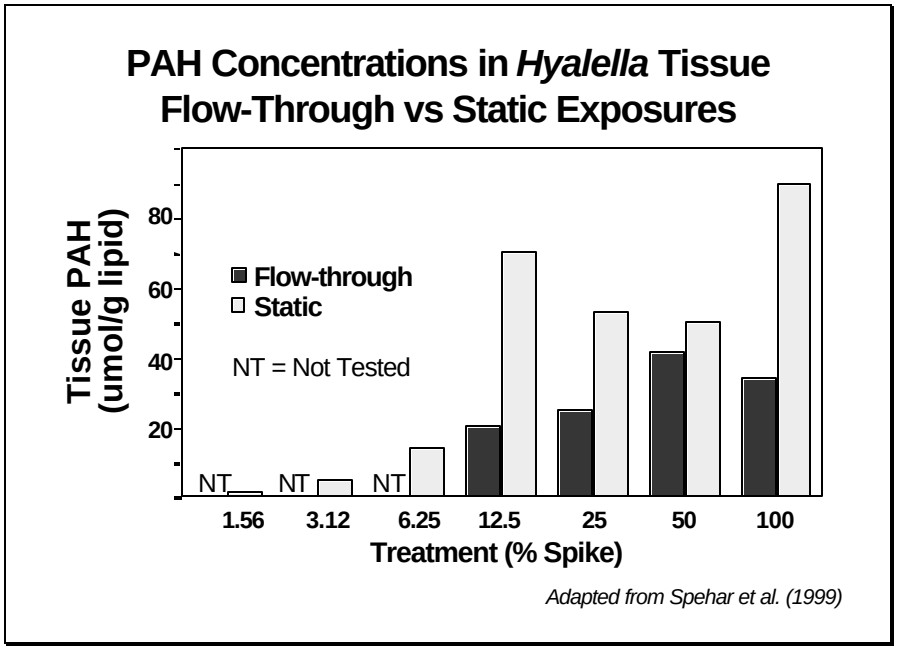
Ovrhd 14-7. Test Organism Selection Criteria.

Laboratory Artifacts

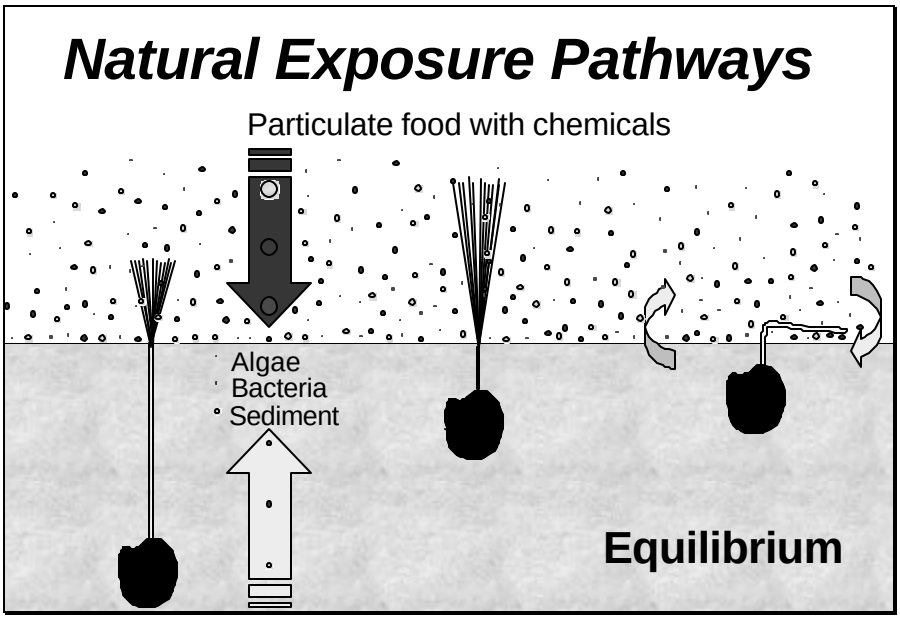
"The lesson to be remembered is that the response of organisms in bioassays can be shifted many orders of magnitude simply by altering test conditions."

White & Champ (1983)

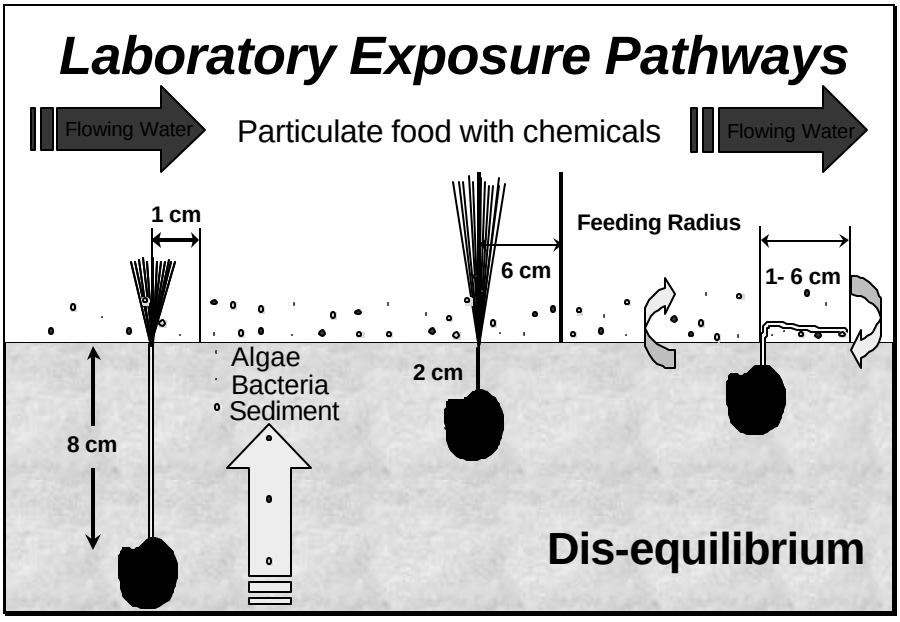
Ovrhd 14-8. Laboratory Artifacts.



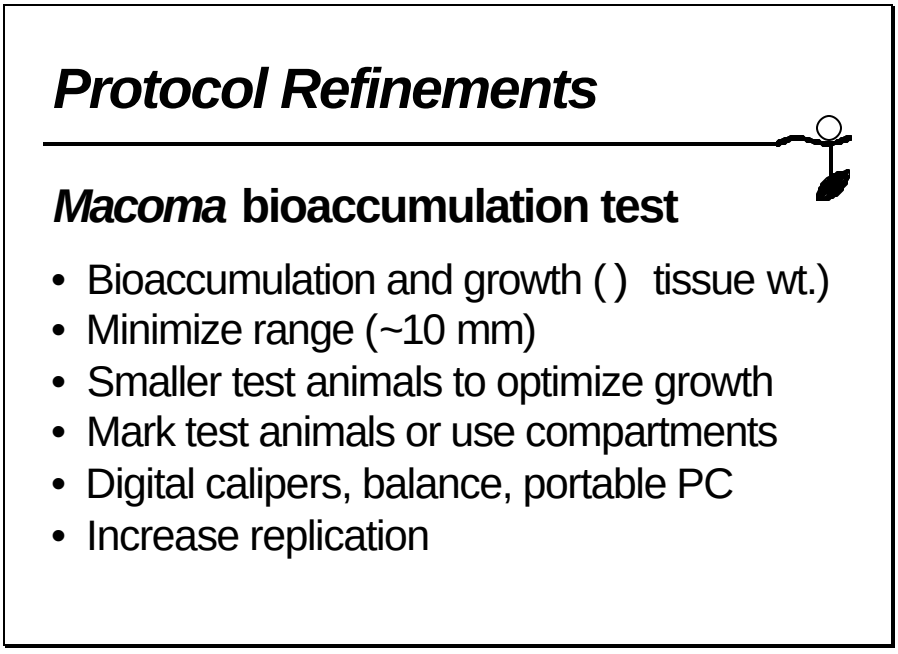
Ovrhd 14-9. PAH Concentrations in *Hyalella* Tissue Flow-Through vs Static Exposures.



Ovrhd 14-10. Natural Exposure Pathways.



Ovrhd 14-11. Laboratory Exposure Pathways.



Ovrhd 14-12. Protocol Refinements.

Effects Endpoints not Trivial

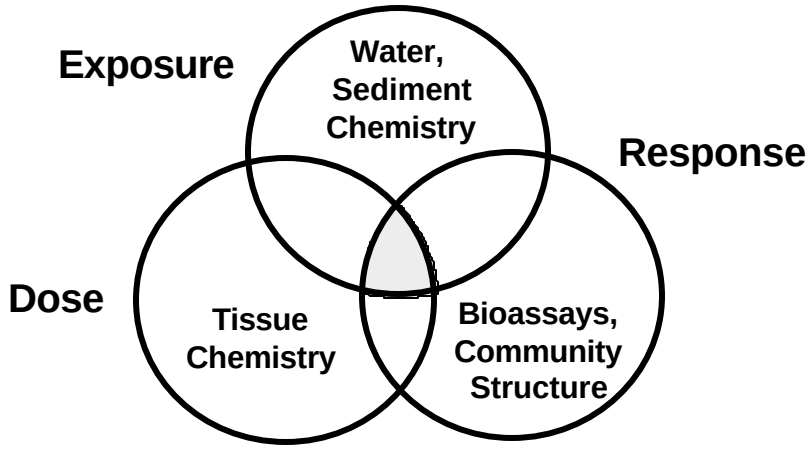
Weight-of-evidence approach

- Whole-animal wet weight (BOT-EOT)
- Shell length (BOT-EOT)
- Soft tissue weight (surrogate BOT-EOT)
- Shell weight (surrogate BOT-EOT)
- % lipids
- % water

Use traditional effects endpoints

Ovrhd 14-13. Effects Endpoints not Trivial.

Exposure-Dose-Response Triad



Ovrhd 14-14. Exposure-Dose-Response Triad.

Summary & Conclusions

Are the right questions being asked?

- What is the purpose of the test?
- What species are we trying to protect?
- Are exposure pathways important?
- Do lab exposures reflect natural exposures?
- Should toxicity and bioaccumulation test protocols differ?
- Is a weight of evidence approach necessary?

Ovrhd 14-15. Summary & Conclusions.

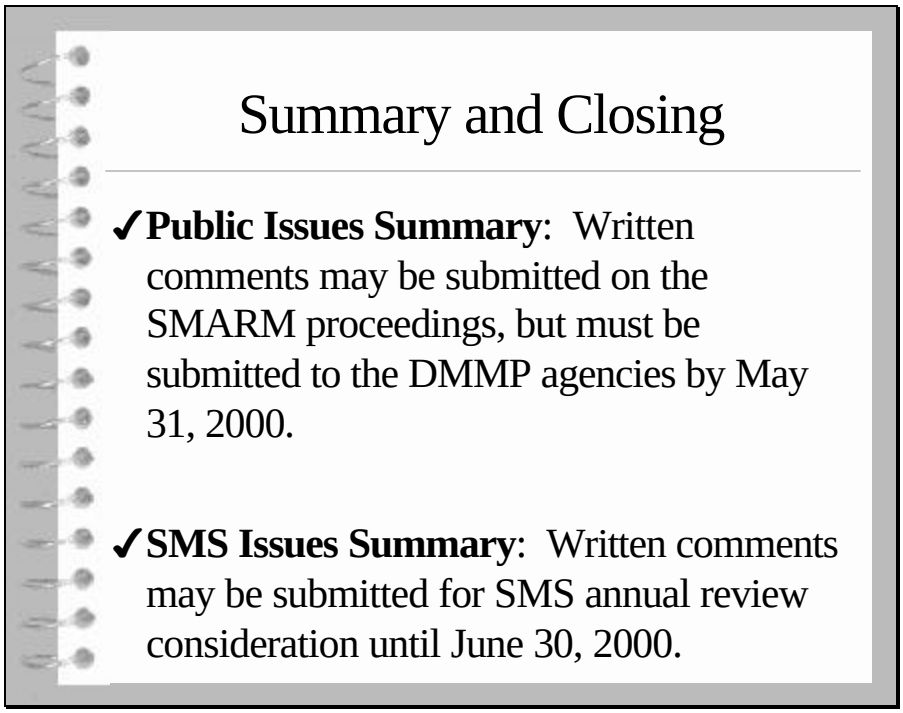
Overhead 15-1. DMMP ISSUES FOR CONSIDERATION
(See Appendix A for DMMP response)

1. Evaluate the use of Aroclor quantitation with special cleanup steps that would enable quantitating congeners (e.g., see recommendations of Raleigh Farlow) as an alternative to GC/MS Method 1668 as part of the Bioaccumulation Workgroup deliberations.

2. The DMMP bioaccumulation workgroup should evaluate bioaccumulation/toxicity assessment recommendations (see Salazar presentation) to improve test performance.

3. Regulatory performance limits for chemical analyses of sediments should be keyed to methods.

4. The DMMP agencies should revisit the timing for implementing the Phthalate clarification paper.



Ovrhd 16-1. Summary and Closing.