SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING

MAY 5, 2005

MEETING MINUTES

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August 2005

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LIST OF ACRONYMS AND ABBREVIATIONS

AET	Apparent Effects Threshold
AWA	Area-weighted average
BCOC	Bioaccumulative chemicals of concern
BMP	Best Management Practices
BT	Bioaccumulation trigger
CAD	Confined Aquatic Disposal
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
COC	Contaminant/Chemical of Concern
CSMP	Cooperative Sediment Management Program (Washington State)
cy	cubic yard(s)
DDT	Dichloro-diphenyl-trichloroethane
DL	Detection Limit
DMEF	Dredged Material Evaluation Framework
DMMP	Dredged Material Management Program
DO	Dissolved Oxygen
DOE	Washington State Department of Ecology
Ecology	Washington State Department of Ecology
EDC	Endocrine disrupting chemicals
EIS	Environmental Impact Statement
EMAP	Environmental Monitoring and Assessment Program
EPA	U.S. Environmental Protection Agency
ERDC	Environmental Resources Development Center (formerly known as WES)
ESA	Endangered Species Act
GP	Georgia Pacific Corporation
IDW	Inverse-Distance Weighted
IM	Information management
ISIS	Integrated Site Information System
LAET	Lowest Apparent Effects Threshold
MDL	Method Detection Limit
ML	Maximum level
MTCA	Model Toxics Control Act
MWAC	Middle Waterway Action Committee
NEPA/EIS	National Environmental Policy Act/Environmental Impact Statement
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
NPDES	National Pollutant Discharge Elimination System
NWRDT	Northwest Regional Dredging Team
ODEQ	Oregon Department of Environmental Quality
PAH	Polycyclic aromatic hydrocarbon

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

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING MINUTES

The Cooperative Sediment Management Program (CSMP) held its annual review of dredging, disposal and sediment management issues on May 4, 2005. The 2005 Sediment Management Annual Review Meeting (SMARM) hosted by WDNR and held at the Federal Center South in Seattle, Washington. The DMMP is an interagency cooperative program that includes the Seattle District U.S. Army Corps of Engineers (USACE); the U.S. Environmental Protection Agency (EPA), Region 10; the Washington Department of Natural Resources (DNR); and the Washington State Department of Ecology (Ecology). The public issues summary, meeting agenda, list of attendees, and the PowerPoint presentations of the speakers are included as Attachments 1, 2, 3, and 4 respectively.

WELCOME AND OPENING REMARKS

(Wayne Wagner, USACE, Seattle District). Mr. Wayne Wagner, USACE, Seattle District, convened the meeting by welcoming guests and speakers and by acknowledging contributions by Corps staff and staff from other cooperating agencies (DOE, DNR, and EPA). Mr. Wagner thanked DNR for hosting the 2005 SMARM and explained that USACE is the lead agency for the Dredged Material Management Program/Cooperative Sediment Management Program (DMMP/CSMP) and will be moderating the meeting. Mr. Wagner introduced Loren Stern, the DNR host, by presenting a biography highlighting his academic background, and business, technical, and policy roles with DNR and Washington State Department of Fish and Wildlife (WDFW) and his role in managing 2.5 million acres of aquatic DNR trust lands.

Loren Stern, DNR, thanked all for participating and made opening remarks summarizing the origins and accomplishments of SMARM and DMMP, emphasizing that DMMP has protected the environment while facilitating maritime commerce and navigation. He also said it is recognized internationally for its adaptive approach to dredged material management, and is seen as a model around the nation for promoting the use of best available science through its transparent review process. SMARM has provided a regular forum for DMMP technical staff to interact with the dredging community, local, state, and federal agency personnel, tribes, academia, and environmentalists and other concerned citizens. He described DNR's mission

and its role in DMMP, as steward to 2.4 million acres of state-owned aquatic lands, to promote commerce and navigation while providing a balance with environmental protection, public access, use of renewable resources such as sediment and geoduck, and giving preference to uses that rely on aquatic lands. He emphasized that DNR's role is closely aligned with that of DMMP when dealing with contaminated sediments and announced that $2.5 million for clean up of contaminated sites was recently approved in the 2005 legislature. Mr. Stern outlined DNR's growing role in the DMMP process, highlighting:

- participation in DMMP workshops;
- development and refinement of sediment evaluation disposal site monitoring guidelines through participation in RSET (Regional Sediment Evaluation Teams);
- site characterization and dredged material suitability determinations;
- management of open-water dredged material disposal sites on state-owned aquatic lands which includes administration for site authorization for disposal;
- direction of the disposal site environmental monitoring program;
- maintenance of shoreline development permits and of the dredge disposal site account.

The Commmencement Bay disposal site is approaching the theoretical site capacity of 9 million cubic yards per site that were defined in the 1988/1989 programmatic Environmental Impact Statements. DNR is working with DMMP partners to make sure that the necessary long-term studies are conducted to ensure that future dredged material disposal site needs in Puget Sound are met. He also mentioned derelict vessel removal and its timing with 2002 state legislature which recently created a program for custody and ownership and cost of removal and disposal. An additional $2 fee to vessel registration will help cover the costs. Eighty vessels have been removed since the program began.

Since 1988, DMMP agencies have worked together to balance diminishing resources with increasingly complex issues to continue the stewardship of ecological, cultural, and economic resources that society depends on from aquatic lands. In closing, Mr. Stern thanked the audience and stated that open lines of communication and cooperation are the key to the success of

cooperating agencies' future challenge of finding workable solutions to complex environmental issues.

Wayne Wagner outlined the purpose of the meeting which was to receive input from the public on proposed changes to DMMP management plans; discuss disposal site management actions and changes; summarize DOE and EPA clean-up activities; and provide opportunity for public input, comments, and discussion. Mr. Wagner introduced representatives from the four cooperating agencies: Kathryn DeJesus (Department of Ecology), Rick Parkin and John Malek (EPA), Loren Stern (DNR), and David Kendall (COE-DMMO). Announcements were made that anyone wishing to present comments should submit them to the agency panel now and those with issues or suggestions for DMMP to consider presenting at the next SMARM meeting should fill out blue cards in the back of the room. Individuals raising issues during the meeting should also fill out a card. He presented preliminaries such as location of the bathrooms and cafeteria, schedules breaks, question and answer periods. Mr. Wagner requested that comments be held until presentations are complete and when asking questions, speakers should stand and identify themselves. He then introduced Gwyn Puckett (DMMO, USACE, Seattle) to begin the Agency Reports segment of the meeting.

AGENCY SUMMARY REPORTS

1. DMMP Testing Summary (Gwyn Puckett, Corps).

Ms. Puckett gave a brief history of the DMMP program highlighting the 1984 NOAA studies that revealed contaminated sediment related to health concerns and the resulting closure of Puget Sound disposal sites that led to an interagency study, and eventually PSDDA. Now PSDDA is a national leader for interagency corporation in the management of dredged material. She briefly reviewed DMMP modifications since the last SMARM including *Neanthes* bioassay testing for ammonia and sulfide, phthalate screening levels and tier-one exclusions for testing (slide 6). Ms. Puckett reviewed DMMP activities over the last year, highlighting characterization of dredged material for suitability determinations (slides 8 & 9) and biological testing results (slide 10), and summarizing some of the large projects over 100,000 cy, reminding attendees that clean dredged material is always in demand for beneficial use. Projects updates included:

- the reuse of dredged material from Snohomish for capping in the Duwamish;

- the Port of Tacoma / Blair Turning Basin Cutback Project;
- Dakota Creek (Anacortes);
- Grays Harbor O&M, Port of Seattle - Terminal 46, Port of Seattle - Fishermen's Terminal;
- Port of Bellingham - Harris Avenue Shipyard MTCA Cleanup (slides 13–15).

Miss Puckett mentioned the 2004-2005 Biennial Report coming out this year and presented future issues regarding refinements of the requirements for Z samples based on recent projects, particularly in the lower Duwamish. She also highlighted the Beneficial Uses Workgroup, an interagency forum created to come to agreement on the definition of beneficial use and to develop a process by which projects will be identified and permitted for beneficial uses. Also upcoming is the Regional Sediment Evaluation Team (RSET) consolidation of existing regional guidance manuals into one document for consistent evaluation of dredging projects across the region.

She closed by mentioning that the programmatic biological evaluation document review (ESA) is ongoing and it was subsequently completed before June 15 and disposal sites were open on June 16. Anyone planning on dredging and disposal in June of 2005 should check with DNR to verify the status.

Slides

PP1.1 Sediment Management Annual Review Meeting
PP1.2 (photo)
PP1.3 Where Are We Now
PP1.4 The Big Picture
PP1.5 The Big Picture
PP1.6 Modifications since the last SMARM…
PP1.7 The Big Picture
PP1.8 Dredging Year 2005 Characterizations
PP1.9 Dredging Year 2005 Findings
PP1.10 Dredging Year 2005 Biological Testing Summary

PP1.11 2005 Big Ones

PP1.12 2005 Recency Extensions

PP1.13 Project Updates

PP1.14 Ongoing/Future Projects

PP1.15 MORE Ongoing/Future Projects

PP1.16 The Big Picture

PP1.17 Upcoming Issues

PP1.18 For more DMMP information

2. DNR 2005 Proposal and Monitoring (Peter Leon, DNR).

Mr. Leon made reflections on past presentations stating that this year's presentation was the same as the last ten years but with different numbers. He apologized for this but stated that he had added a sub-theme to this year's presentation: "What I Did Last Summer - Partial Monitoring of Commencement Bay."

He extended his thanks to John Nakayama of SAIC, Charlie Eaton of the Kittiwake, and the DMMP agencies. His presentation covered disposal site locations including eight disposal sites managed in Puget Sound, with over 1 million cubic yards of recently disposed material placed at Commencement Bay which prompted the 2004 partial monitoring study. The partial monitoring framework was designed to answer the following questions:

1. Does dredged material remain on site?
2. Have chemical concentrations increased over time?
3. Were biological conditions exceeded?

Mr. Leon presented a history of Commencement Bay studies and findings:

- 1988 - baseline with historic dredged material already present.
- 1995 - first full monitoring. Sediment vertical profile system (SVPS) images indicated that material remained on-site and all samples passed chemical and biological testing.
- 1996 - partial monitoring. Material remained onsite and samples passed chemical and biological testing.
- 1998 - physical monitoring only. SVPS indicated some dredged material had moved off site.

- 2001 - full monitoring with SVPS showing large excursions of dredged material off site (large area but not a large volume) with samples passing chemical and biological testing.
- 2003 – tiered study indicated a smaller dredged material footprint and all samples passed chemical and biological testing.

The 2004 study included modifications like digital SVPS; revised sampling with the intent to delineate footprints, and elimination of Bioaccumulative chemicals of concern (BCOC) analysis based on results from 2003. Sixty-four SVPS stations were visited and 189 images were collected. Recent dredged material was shown to have stayed on-site with a smaller footprint than in recent years and with only one off-site station having over 3 centimeter of dredged material present. Overall, Commencement Bay was found to be a healthy disposal site based on the following:

- Redox Potential Discontinuity (RPD) indicated active biogenic sediment mixing.
- Stage-III benthic benthic assemblage was present at most stations (except the center of the disposal zone and at 2 floating stations).
- Organism-Sediment Index (OSI) indicated a healthy benthic habitat.
- Sediment chemistry results had some organic chemicals but below criteria and also all metals detected were below criteria.
- Bioassay testing showed all stations passing all guidelines.

Peter presented an evaluation of the 2004 data by asking the following questions:

1. Does dredged material remain on site?
This hypothesis was rejected because a small amount of material had spread.
2. Did chemical concentrations increase over time?
This hypothesis was not rejected because chemical concentrations had generally decreased over time.
3. Has DM disposal caused biological effects conditions to be exceeded?
These hypotheses were not rejected because on-site chemical concentrations do not exceed guidelines.

Mr. Leon addressed a question about phenol regarding a spike in 2003 which may have been a seasonal signature. Phenol data plotted by month indicated a trend that supports that hypothesis

and more data will be gathered this summer. Commencement Bay has had another 950,000 cubic yards disposed and will be revisited this summer (2005) for physical monitoring and a phenol study. Other sites that need to be studied include Anderson-Ketron, which is a tiered study at a site that has not been monitored since the baseline study in 1988. A limited survey of the Elliott Bay site is planned to evaluate sediment quality concerns exposed during a post-dredging survey of East Waterway. Plans for 2006 are not yet finalized, but may include a tiered partial Commencement Bay monitoring (prompted by the disposal of over 1 million cubic yards of dredged material), or a monitoring of the Port Gardner site, which is overdue. Future plans also include long-term studies initiated by reaching the 1988 EIS benchmark of 9 million cubic yards of volume. Mr. Leon closed by summarizing 2005 dredged material disposal volumes for DNR sites.

Slides

PP2.1 2004 Partial Monitoring: Commencement Bay Disposal Site

PP2.2 Thank you

PP2.3 Agenda

PP2.4 (photo)

PP2.5 (map)

PP2.6 (map)

PP2.7 Monitoring Framework

PP2.8 Monitoring Framework

PP2.9 Partial Monitoring Tools

PP2.10 Summary of Previous Conditions

PP2.11 Summary of 1988 Baseline Conditions

PP2.12 Summary of 1995 “Full”

PP2.13 Summary of 1996 “Partial”

PP2.14 Summary of 1998 SVPS

PP2.15 Summary of 2001 “Full”

PP2.16 Summary of 2003 “Tiered”

PP2.17 2004 Modifications

PP2.18 2004 Modifications

PP2.19 2004 Results

PP2.20 (map)

PP2.21 Sediment Vertical Profile System (SVPS)

PP2.22 2003 v. 2004 Distribution

PP2.23 SVPS Analysis

PP2.24 Sediment Chemistry: Conventionals and Metals

PP2.25 Sediment Chemistry: Organics

PP2.26 Sediment Chemistry: Field Variability

PP2.27 Bioassays

PP2.28 2004 Evaluations

PP2.29 Evaluation of 2004 Data

PP2.30 Future Activities & Disposal Summary

PP2.31 Phenol question…

PP2.32 Future Activities: Summer 2005

PP2.33 Future Activities: Summer 2006

PP2.34 Future Activities: Long Term

PP2.35 DNR Disposal Volumes DY 2005

PP2.36 Thank You

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

Ms. DeJesus started by saying she would go over Ecology's role in sediment management, review their internal program structure, and talk about new technology developments, source control and clean-up highlights.

She described the sediment management program structure and geographic groups, detailing the Sediment Management Unit group at headquarters as the group responsible for the development Washington's Sediment Management Standards and for continued guidance and assistance on the implementation of those standards. Kathryn also covered SMU's role in:

- Fresh water sediment guidelines (Kathryn noted that the existing criteria from 2002 was reviewed and new 2003 guidelines were developed for fresh water quality values and apparent effects threshold values).

- Wood waste guidelines. (They intend to develop these but it is a work in progress. An internal rough draft was inadvertently released to the public, and she asked that they not be used if anyone happens upon them).
- Risk Range for sediment cleanups under Washington law. (The resolution reached with EPA last year clarifies the relationship between MTCA and SMS rules and states that MTCA risk range targets do apply to sediment human health risks).
- SEDQUAL version R5.1 is to be released in late summer or early fall. (An important note: Ecology prefers that QA2 data be submitted on CD-ROM).
- "Sediment-only" sites are being added to Facility Site list for entry into the Toxic Cleanup Program's (TCP) Integrated Site Information System (ISIS).
- Water Quality and Source Control
    - Ecology's final Water Quality and Contaminated Sediment 303d list will be submitted to EPA in Spring 2005 for approval.
    - SMU technical support for NPDES permitting and increased coordination with DNR.

Kathryn continued with a summary of specific sediment clean-up sites, highlighting good progress at Gas Works Park and the challenges of the Skykomish River Burlington Northern Railroad Fueling Facility site (slides 11-18). Ms. DeJesus made a note regarding the best management of voluntary cleanup program sites and stated that she does not want to discourage voluntary cleanup but it should be noted that sediment sites are more complicated than the upland components because permits are needed and sediment plans need to be reviewed. Kathryn concluded her presentation by listing helpful web sites (slide 19).

Slides

PP3.1 Sediment Management in the Toxics Cleanup Program

PP3.2 SMU aka . . .

PP3.3 Sediment Management within Ecology's Toxic Cleanup Program, Jim Pendowski

PP3.4 Sediment Management within Ecology's Toxic Cleanup Program (cont.)

PP3.5 Freshwater Sediment Guidelines

PP3.6 Wood Waste Guidance

PP3.7 Risk Range for Sediment Cleanups Under Washington Law

PP3.8 SEDQUAL Information System: R5.1

PP3.9 Contaminated Site Information... or mud matters, too

PP3.10 Sediment Source Control

PP3.11 some… Sediment Site Status

PP3.12 Jackson Park Housing Complex Naval Hospital Bremerton

PP3.13 Bellingham Bay Demonstration Pilot

PP3.14 Whatcom Waterway - Bellingham

PP3.15 Gas Works Park

PP3.16 Skykomish River

PP3.17 Spokane River Basin

PP3.18 Upriver Dam Site

PP3.19 Web Sites. . .

PP3.20 That's All Folks…

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

Ms. Eckman introduced herself as relatively new to sediment community and "…out of the mines and into the mud." She is currently the director of Superfund's Sediment Cleanup Program and is looking forward to continuing her relationship with the sediment folks. She stated that EPA does not work in a vacuum and works in cooperation with others who have done a lot of good work with CERCLA clean-ups – federal and state agencies, PRP's, and consultants. Sheila presented site overviews (slides 2-19) from last year and the coming year with highlights including:

- Hylebos Waterway - dredging to be complete 2005/2006.
- Occidental – a joint EPA and Ecology project with CERCLA and RCRA oversight as a holistic approach with an agreement to perform a comprehensive investigation including sediment and upland components.
- Thea Foss Waterway - to be completed in 2006.
- Middle Waterway – complete.
- East Waterway –removal action completed (260,000 cubic yards dredged) with a sand layer placed over 14 acres of contaminated sediment, to be followed by a focused supplemental RI/FS.
- Lockheed Shipyard – complete, with 70,000 cubic yards dredged, 5 acres capped, and increased intertidal zone to about 3 acres at a total cost of just over $20 million.

Ms. Eckman presented before and after photos of the Lockheed site (9-12), noting the extensive piling removal. She continued with summaries of the following sites:

- Todd Shipyard, with 130,000 cubic yards dredged, construction of a habitat bench, and pier reconstruction for increased light.
- PSR - Puget Sound Resources (to be presented in greater detail later in the day).
- Lower Duwamish Waterway – Phase I activity completed; Phase 2 data collection and Ecology upland early action areas/source control work in progress, with the final RI/FS due 2008.
- T117 –expect cleanup to be complete by 2006.

Other sites outside Puget Sound include Portland Harbor and McCormick and Baxter (a PAH and DNPL site), both on the Willamette River in Oregon. Sheila made emphasis on an interesting technical note that DEQ Oregon used organo-clay and articulated concrete blocks for sediment capping (slides 20-21). Ms. Eckman concluded by listing contacts and encouraged people to contact them with any questions.

Slides

PP4.1 EPA Region 10 Superfund Puget Sound Sediment Cleanup
PP4.2 2004-2005 Puget Sound Cleanup Update
PP4.3 Hylebos Waterway
PP4.4 Occidental
PP4.5 Thea Foss Waterway
PP4.6 Middle Waterway - Complete!
PP4.7 East Waterway - Harbor Island
PP4.8 Lockheed Shipyard - Complete!
PP4.9 (photo)
PP4.10 (photo)
PP4.11 (photo)
PP4.12 (photo)
PP4.13 Todd Shipyard
PP4.14 (photo)
PP4.15 (photo)

PP4.16 PSR - Complete!

PP4.17 Lower Duwamish Waterway

PP4.18 T-117 Early Action

PP4.19 Other Sediment Projects

PP4.20 (photo)

PP4.21 (photo)

PP4.22 EPA Contacts

Wayne Wagner announced 20 minutes for questions before the break, and reminded audience members to stand and introduce themselves when asking questions or making comments.

Questions/Comments

Question: Peter Rude (Landau and Associates) asked Kathryn DeJesus what is the constituent and concentration for the groundwater cleanup level?

Response: Kathryn said that Pete Adolphson is lead on that site and the person to contact. She believes that it is 200 mcg TPH.

Comment: Maggie Dutch (DOE) made a comment to Peter Leon about phenol concentrations. In the ambient monitoring program, they tended to see those at high levels all around the sound and she was wondering if DOE data from 1997 through 2004 could be compared with the DNR data.

Comment: Tom Gries said he had asked Ecology's PSAMP staff if there were any notable trends in sediment phenol concentrations at monitoring stations near disposal sites (Commencement Bay). He said that no discernable trend in phenol was found at the nearest Ecology sampling site.

Comment: Gail Colburn (Ecology) made a comment regarding phenol as a by-product of wood waste.

Comment: Maggie Dutch responded that there could be biological and industrial sources.

Comment: Tom Gries (Ecology) wanted to clarify Peter Leon and Sheila Eckman's comments regarding East Waterway sediment. He wanted them to note that post-dredge sampling still exceeded SMS to a surprising extent, especially in areas where the overlying sediment was clean.

He discussed DMMP guidance about whether testing needs to be done below clean sediment, saying that perhaps this guidance needs to be revisited. He emphasized that there were no concerns about whether or not the approximately 60,000 cy of East Waterway dredged material was suitable for disposal at the Elliot Bay site, but that the DMMP agencies still need to verify that the disposal site is in good condition. He also made a second comment that little emphasis was put on source control and he would like to see it addressed more by all agencies in the future.

Comment: Doug Hotchkiss (Port of Seattle) made a comment regarding values exceeding SQS in East Waterway. He mentioned that pre-dredging studies included bioassay and sediment chemistry. After dredging to the agreed depth, the initial sampling results were higher than expected. The areas with highest post-dredging chemistry results were characterized to an exposed subsurface depth of 1 foot, and they subsequently went back and dredged deeper in those areas. Prior to capping, they received the data that indicated levels were lower in areas dredged to a deeper level and that follow-up sampling is designed to evaluate levels for the overall site.

Comment: Jim Reese (COE, Portland district) says he drives along the Columbia for 25 miles on his way to work everyday but does not hear anything in this group about what is being done with the Columbia River. The colonies would like to hear more and asked that agencies pay a little more interest to the Columbia River and to please specify the water body (referring to comments made about the Willamette).

Question: Gail Colburn (Ecology) asked a question for Sheila Eckman regarding the McCormick and Baxter interlocking blocks used for capping and whether it was used as a type of armor to hold the cap in place?

Response: Sheila said yes.

BREAK

Wayne announced the next group of presentations on DMMP Clarification and Status papers and introduced Tom Gries as the first speaker.

DMMP/SMS CLARIFICATION AND STATUS PRESENTATIONS

5. Future of the SMARM Process – Reducing Levels of Effort Clarification (Tom Gries, Ecology).

Mr. Gries began by explaining that the normal process is to submit papers to be posted on-line one month prior to SMARM so people have time to look them over, but that some papers were posted late. He made a request that clarification papers, whether they are presented or not, be printed and be placed at the back of the room.

Tom Gries described the overall SMARM process, stating that the early PSDDA documents emphasize the importance of this public review process.

SMARM planning occurs mostly during routine monthly meetings and via email communicaitons. No contractors are used except for preparation of meetingminutes. The number of staff days required to prepare for and conduct each SMARM is substantial. The typical SMARM requires an estimated 80 staff days, which is one work month per agency for planning topics, discussions, and developing outlines and papers, but does not include budgeting. Tom said that there is consensus among DMMP staff that resources are stretched to the point that and adjustments are necessary to improve efficiency and streamline the process. The cost of developing the Puget Sound Dredged Disposal Analysis Program, now the DMMP program is estimated at 3 – 4 million dollars (David Kendall interjected that it was actually 4.5 million dollars). There have been no significant changes in overall staffing while responsibilities, e.g., number of suitability deteminations, has doubled and the average project has increased in complexity. Mr. Gries presented graphs that plotted the number of projects reviewed each year and dredged material volume evaluated each year, and both had roughly doubled (slides 7-8). There are more open water disposal events and other responsibilities that he did not present (e.g., the number of tests, the amount of monitoring, etc). He also presented a graph showing an estimate of DOE's SMS program cleanup and source control staffing (slide 11). It appears that staff FTE has remained stable or slightly decreased since the start of the program while the number of cleanup and source control sites has tripled . Tom said he was trying to emphasize that the DMMP agencies may have relatively stable resources collectively, resources dedicated to the DMMP by individual agencies may be decreasing with increasing workloads. He suggested cutting back the effort for SMARM and presented the following options for reducing efforts:

- No Action
- Scaling back
  - Have an annual meeting, but alternate short meetings (for comments and clarification) with longer meetings (for presentation of clarification papers and status reports).
  - Have contractors and outside entities plan and present alternate year SMARMs as per the current process.
- 100 percent web-based process with no actual meetings
- Find more resources to maintain the SMARM process.

Mr. Gries said that the options were still being discussed and that the DMMP has no preference at this time. A decision on how to restructure and cut back should be reached this summer and will be posted online. In closing, Tom presented several well-received alternative acronyms for SMARM.

Slides
PP5.1-17 Future of the SMARM Process

Comment: Bill Gardiner commented on staff time for clarification papers to modify and update the sediment evaluation and review process and sees value in having that as an annual process.

Response: Tom Tom Gries agreed with the value of the annual process and said that if the agencies decide to scale back, then they would likely prepare papers every year, but focus on major changes only every other year.

Comment: Joe Germano had a word of warning about the graph showing the amount of work. He suggested that the agencies might have more work responding to the issues raised, changes proposed and additional comments made during alternate year SMARMs planned and conducted by outside entities. ***Response:*** Tom Gries agreed that was important to note. He added that in his paper there was also an option involving additional resources. EPA Superfund and DOE Ambient Monitoring Program groups have presented at SMARM but have not assisted with planning the meeting. These programs could also contribute to staffing and planning, he said.

6. Evaluation for Sediment Quality for Navigational Dredging, Contaminated Cleanup, or Both Clarification (Tom Gries, Ecology).

Mr. Gries explained that the inspiration for this paper is project based, where navigational dredging projects are complicated by the needs of cleanup and vice versa, and whether or not to

follow the sediment quality guidance of the DMMP and SMS Programs.. In the early years of the PSDDA Program, there were many gray areas with respect to implementation of the guidelines and not as much experience among staff. Now, there is greater staff experience but the projects are increasingly complex (for instance, more dredging in contaminated area and heterogeneous sediment quality). The specific sites that are being presented are multipurpose projects complicated by both navigational and clean-up needs.

- Dakota Creek Industries, Anacortes - a navigation project in an area actively being investigated for contaminated sediment cleanup
- East Waterway, Seattle - a hybrid project that evolved from navigation dredging to cleanup.
- Fisherman's Terminal, Seattle – another navigation project in a potential cleanup area, but in this case there are no cleanup studies planned for the near-term.
- Glacier Northwest and South Park Marina, both small sites in the greater Lower Duwamish Super Fund site, which led to coordination with Superfund and SMS staff to develop a hybrid sampling and analysis plan.
- Haris Avenue Shipyard, Bellingham – a hybrid project involving areas being evaluated for both navigation and cleanup purposes.
- Manke Lumber, Tacoma - MTCA wood debris clean up site with navigational needs, evaluated under both DMMP and MTCA/SMS.
- Puget Sound Naval Ship Yard, Sinclair Inlet – a major project with simultaneous evaluations of dredging and cleanup, in an area of historically heterogeneous sediment quality.

Mr. Gries highlighted the Haris Avenue shipyard as a substantial shipyard site with known contamination. Tom extended his apologies to those in the room who may have worked on the project because his may not be an entirely accurate description of the project but rather is presented as a hypothetical scenario. He showed an example of existing data collected at different times and for different purposes (navigational dredging and clean-up) and the influence these data had on the sediment evaluation process. He suggested making distinctions in the evaluation by asking why sediment is being evaluated. Distinctions would include:

- Authority
- Purpose

- Sampling and analysis plan
    - DMMP SAP for navigation needs.
    - CERCLA and/or MTCA/SMS for in situ risk and cleanup needs.
    - "Hybrid" SAP for both navigation and cleanup needs (recommends combining for one SAP).

Tom closed by describing the common ground in planning for navigation and cleanup evaluations and listed specific items in a SAP that can address the needs for both types of evaluation, but cautioned that the frequency and density of sampling may differ and composite samples may not be suitable in all cases.

Slides
PP6.1-17 Evaluating Sediment for Cleanup and/or Navigation Dredging

7. Overview of other DMMP Clarification and Status Papers (David Kendall, Corps).

Dr. Kendall started by extending his apologies to the authors if there is any mischaracterization of the four papers he would be summarizing, which are clarification and status papers submitted for DMMP changes, but not being presented at this year's annual meeting. The first paper he summarized, Sediment Larval Test Species Recommended by the DMMP Program, was his own and addressed reaffirming what has been in practice for many years: species recommended for routine use for the Sediment Larval Bioassay are *Mytilus galloprovincialis* (bivalve) and *Dendraster excentricus* (echinoderm). Approval may be granted for other species in special cases.

The second paper, Clarification of the Role of Detection Limits and Reporting Limits in the DMMP (Gwyn Puckett and John Wakeman), presented the following reporting requirements for labs:

- Estimated concentrations between Method Detection Limits (MDLs) and Reporting Limits (RLs)
- RLs and MDLs for any COC with a "U" qualifier code

In addition, labs should be provided with information required to meet project data requirements. Dr. Kendall reaffirmed that biological testing is required when one or more COC has a DL

greater than the SL, and that DL's for non-detects and "J" values between the DL and the RL would be used as the basis for summing Total Aroclors .

The third paper, Dredging Quality Control Plans and Pre-Dredge Meetings (Stephanie Stirling and Peter Leon), stated that QC dredging plans must be reviewed and approved prior to pre-dredge meetings and be submitted to DMMP/DMMO for review 7 days prior to pre-dredge meetings. The pre-dredge meetings will be scheduled after the QC plans have been submitted and approved, and all four DMMP agencies are asked to attend pre-dredge meetings.

The fourth paper, Summary of Site Use Authorization (SUA) Requirements of Washington Department of Natural Resources' Dredged Material Management Program Office (Peter Leon, Robert Brenner, Ted Benson), addresses the site use authorization application process, reporting requirements, dredged material disposal fees, dredging project status and modifications to plans, and other concerns including responsibility for meeting SUA requirements when subcontractors are used.

Dave closed by explaining the navigation of the recently redesigned Corps website and how to access the SMARM papers presented.

Slides

PP7.1	Summary of Proposed DMMP Changes not being presented at SMARM
PP7.2	Sediment Larval Test Species Recommended by the DMMP Program
PP7.3	Proposed Clarification
PP7.4	Clarification of the Role of Detection Limits and Reporting Limits in the DMMP
PP7.5	Proposed Clarification:
PP7.6	Proposed Clarification
PP7.7	Dredging Quality control Plans and Pre-Dredge Meetings
PP7.8	Proposed Clarification
PP7.9	Summary of Site Use Authorization Requirements of Washington Department of Natural Resources' Dredged Material Management Program Office
PP7.10	Proposed Clarification
PP7.11	Proposed Clarification
PP7.12	DMMP/DMMO Public Website

***Question (for Tom Gries)*:** John Herzog, Port of Anacortes, commented that he has seen no hand-shake between DM representatives from DOE and MTCA. If a DMMU failed and a project needed to include upland component, can MTCA inform the dredging and disposal project manager rather than stop work and recharacterize, especially considering resource limitations? How strong is the hand-shake between DMMP and MTCA?

Response: Tom Gries said that this might require a separate discussion, but one of the things he remembered about the project was at least one DMMU was so contaminated that the upland component was not questioned.

Comment: John Herzog said that MTCA will not let go because the site was not characterized relative to MTCA.

Response: Tom Gries said that he coordinated with MTCA staff in the DOE regional office in development and finalization of the SAP for sediment evaluation under the DMMP. But he added that he was not aware of the subsequent requirements made by MTCA staff.

Tom Gries said that he was not completely informed about what they did or did not agree to. The concern was contaminants that had not been measured, so not as much a concern from a MTCA perspective, but a legitimate concern from a solid waste disposal perspective. The major concern was that certain contaminants that had not been measured during a previous DMMP evaluation but that this would not be as much a concern from a MTCA perspective as it would be from a solid waste disposal perspective. Another key concern in this particular case is that there were some high surface sediment chemistry values reported by cleanup investigationsthat caused the DMMP staff to be more cautious in developing a new SAP. The danger in getting a DMMP-type characterization proposal that does not include some surface chemistry in a clean-up area, is that you're lacking information you could use to at least more carefully design your sampling plan. The benefit of the discussion was that surface sediment characterization was used to redesign the DMMU. Regarding the handshake, he does not know if Ecology DMMP staff coordinated well enough with MTCA staff, but they did raise timely concerns that led to additional MTCA/DMMP sampling and he hasn't had a lot of follow up discussion on it.

Comment: John Herzog said he recognizes the hard work of the group. Regarding the graph of increasing complexity in projects, we need to address and plan for complexity before the data is

collected. Tom Gries mentioned the possible development of a decision diagram that assists in better coordination between navigation dredging and clean-up between planning and clean-up.

Response: Question: Dina Ginn (US Navy) commented about combining DMMP and clean-up plans and asked if DOE is looking at a formalized process for both DMMP/ and MTCA approval when a combined SAP is submitted?

(Wayne Wagner directed the question to John Malek, USEPA).

Response: John Malek said that this is not an issue confined to Washington and said that later in the day, Jim Reese will be talking about RSET efforts and suspects that will be the forum to address cooperation between agencies.

Question: Allen Chartrand, Parsons, presented a technical question for David Kendall asking for clarification of COC MDL's less than SL for biological testing. He commented that it seems like a very sensitive trigger. Another approach might be to use evidence that some low level SVOC or mercury with a very low SL is not present in the mixture as empirical evidence that the COC is not there and the biological testing would not be necessary.

Response: David Kendall said this has been a defacto requirement. Labs need DL's low enough, below SL's, otherwise they are forced into biological testing to get the answer needed. Background information is considered and there are exceptions to the general rule, but it is not universal. Achieving low DL's can be problematic but usually if one DL is too high some other detected co-ocurring value would confirm the trigger exceedance for biological testing.

Comment: Tom Gries said that Ecology has shared, collaborated, and submitted comments on detection and reporting limits for some sites that include both DMMP and clean-up needs but the guidance may need to be formalized.

Comment: Tim Thompson commented that clarification papers get a formal response but that comments do not. There needs to be some mechanism for dealing with comments. If you go to a biannual meeting, it would be important to have a response process.

Response: David Kendall inquired whether Mr. Thompson had read the meeting minutes online and mentioned that formal responses to comments are presented in the summary in a comments response section.

Response: Tim Thompson stated that he always reads the minutes but he's never seen the papers themselves change to include response.

The meeting was adjourned for lunch.

BREAK FOR LUNCH

DMMP/SMS CLARIFICATION AND STATUS PRESENTATIONS (CONTINUED)

8. Grain Size Analysis and the Reporting of Contaminant Concentrations Normalized to Dry Weight of Sediment Clarification (David Sternberg and Brett Betts, Ecology).

Dave Sternberg introduced himself as being from one of the Washington State colonies (Spokane). He said his topic for clarification regarding the reporting of contaminated sediments was initially created in terms of freshwater systems where fines are often mixed with cobble and gravel. He explained that this approach was also applicable to marine sites and presented graphs illustrating the inverse correlation between grain-size and contaminant levels, between organic carbon and contaminants, and between organic carbon and grain-size. His clarification was to focus on the proper handling and analysis of sediment samples by considering the fraction to be analyzed.

For instance, although it is common sense, clarification might need to be made in order to avoid sample collection in areas or at depth intervals with large grain-size such as gravel. He looked at the way USGS handles freshwater sediment samples and found that contaminants are usually associated with finer grain materials and silt fractions and that not many contaminants are associated with heavier, denser sand fractions. He also explained that, in carbon-starved areas, PCB's will bind to the available carbon on degraded plant matter which will be the finer grain material. His proposed actions suggest a framework that will clarify sampling and reporting guidelines. They include removing large debris in sample collection, sieving in a lab, using a standard protocol for sieving and removal of gravel, reporting sediment chemistry for grain size < 2 mm (sand) and smaller, and continuing to require sediment chemistry data to be reported on a dry-weight basis (with data for non-polar organic compounds organic carbon-normalized for comparison to SMS). RSET may be able to look at this and establish a regional method. He emphasized that this is the common way USGS handles freshwater sediments.

Slides

PP8.1 Reporting of Sediment-Bound Contaminants: Standardization of Sieving and Analytical Procedures

PP8.2 Applicability

PP8.3 Introduction

PP8.4 Problem Identification

PP8.5 Which fraction is analyzed for COPCs?

PP8.6 Grain-size exclusion: Common sense & literature-based conclusion

PP8.7 Proposed Action/Modification

PP8.8 Specific recommendations

Comment: Tad Deshler (Windward Environmental) made a comment that in his experience with sediments in Puget Sound, samples are not sieved prior to chemical analysis with the exception of field crew removing chunks. Is that being done on a regular basis in the lab?

Response: Greg of Columbia Analytical said that clients request samples be sieved to 2mm and that the smaller fraction is used for analysis and seems to work well.

Question: Tad Deshler asked if the labs sieve samples in the absence of instruction.

Response: Greg said that in absence of instruction, they homogenize the sample using common sense, like leaving large rocks out.

Comment: Susan Dunnihoo (Analytical Resources) made a comment about receiving sample jars containing only three large rocks. She looked at the most recent grain-size analysis they had done and site samples from this area are typically 95-100% sands and fines so she thinks this is not a big issue, but reference sites were usually less than 70% sands and fines.

Question: Hiram Arden (COE) asked what would be considered a representative sample?

Response: Dave Sternberg said it varies and that a common sense approach should be used with sampling including Van Veens, driver cores, etc and recommended reporting rocks and gravel because it is representative of the habitat but you don't want bias (and bias can be avoided by adopting USGS standardized approach).

Comment: Hiram Arden commented that even an experienced sampler may be releasing fines as the sample rises through the water column.

9. Identification and Assessment Techniques for Wood Waste Clean-up Sites (Brett Betts, Ecology).

Mr. Betts started by giving a brief history of Puget Sound's 100-plus years of wood processing activities and presented photos from the state archives. Consultants and agency staff have been requesting wood waste guidance to identify and assess clean-up sites. Wood waste impact to benthic organisms includes smothering, direct toxicity, reduced DO, and degradation issues over time. Most of the pressure for wood waste guidelines has been for marine sites, which have become the priority, but freshwater sites are a concern and guidelines will be addressed in the future.

Authority for case-by-case decision making to develop recommended methods comes from a SMS rule regarding a category of contaminants classified as "other toxics" or unknowns. He said the guidance for wood waste would identify impacts, address best available science, and recommend methods for identifying sites and clean-up levels. A draft was unintentionally released and was complete except for a review of case studies, and he commented that there is not a lot of recent commendable work on wood waste sites to be included as case-studies in his opinion. The new criteria will include SVPS field validation, correlating qualitative SVPS observations to actual quantitative benthic endpoints.

Slides

PP9.1 Woodwaste Site Assessment and Cleanup Guidelines Port Gamble 1899

PP9.2 (photo)

PP9.3 (photo)

PP9.4 (photo)

PP9.5 Woodwaste Site Assessment and Cleanup Guidelines

PP9.6 Woodwaste Site Assessment and Cleanup Guidelines

PP9.7 Woodwaste Site Assessment and Cleanup Guidelines

10. Sediment Management Programs: Consistent Interpretation of Toxicity Test Results Clarification (Tom Gries/Russ McMillan, Ecology).

Tom began by introducing the problem that has been discussed for many years and was also pointed out at the 2004 SMARM: means of comparing how agencies interpret toxicity tests. PSDDA toxicity test interpretation guidelines were set in 1988, and after workshops and discussions, SMS test interpretation standards were established in 1991. Last year, the problem of potentially important differences was identified at SMARM.

DMMP/SMS toxicity test interpretations guidelines that are protective of disposal sites might limit viable cleanup alternatives, while MTCA/SMS toxicity test interpretations that are more protective of *in situ* benthic community, might lead to authorization of disposal sites as Sediment Impact Zones under the SMS. Mr. Gries presented a summary of programmatic differences (slides 5-7) and recommended that DMMP make changes because they can make them more easily, but he added that recommendations could also be made for SMS (slides 9-13). He suggested the use of hundreds of reference samples over many years as a basis for guidelines. In conclusion, he added that he was not sure of the ramifications this might have, particularly on current projects.

Slides

PP10.1 Toxicity Interpretation Consistency

PP10.2 Introduction

PP10.3 Evaluating Benthic Risk: Future Clarifications?

PP10.4 Problem Statement

PP10.5 DMMP and SMS interpretations

PP10.6 Toxicity Interpretation Consistency (Amphipod test graph)

PP10.7 Toxicity Interpretation Consistency (Sediment Larval test graph)

PP10.8 (photo)

PP10.9 Recommendations

PP10.10 Recommendations

PP10.11 Recommendations

PP10.12 Recommendations for DMMP

PP10.13 Recommendations for SMS

PP10.14 (graph)

11. Regional Sediment Evaluation Team Update (Jim Reese, Corps).

Mr. Reese started his presentation by thanking David Kendall and Wayne Wagner, for authorizing the temporary duty of Stephanie Stirling, who will be working in their division office for 6 months to support the RSET effort of getting a draft manual out by September. He described regional initiatives and RSETS role, and added that they were using good work from SMARM and DMMP as their foundation. He said they are trying to get DMMP efforts installed in the colonies. NWDRT (Northwest Regional Dredging Team) formed about two years ago with

six federal agencies within the EPA Region 10 boundary, with John Malek of EPA acting as the driving force for NWRDT. Regional relationships among agencies and teams are being used to combine two processes: the "pre-NWRDT group" processes and the RSET processes. Mr. Reese detailed the relationships, roles, and responsibilities of each component of the regional teams and agencies through a series of organizational diagrams (slides 5-11). He added that RSET, a multi-agency group, has been formed under the Regional Dredging Team (RDT) to revise the existing regional Dredge Material Evaluation Framework (DMEF) to be used by NW Corps Districts, EPA Region 10, NMFS, USFWS, and other federal and state agencies that require sediment quality evaluation procedures. The RSET will expand and replace the Regional Management Team (RMT) defined in the existing DMEF. He added that all are invited to the big public meeting being held in September when the new manual will be completed and released. Processes were borrowed from 1998 Columbia River, Grays Harbor, PSDDA, and others, and will address sediment quality, freshwater guidelines, bioaccumulation evaluation issues, and biological testing issues. They are still working on sublethal impacts on juvenile salmonids, which will not be included in the September manual. RSET has been given status of a permanent sediment experts group represented by federal and state sediment quality and regulatory experts to assist in preparation of DMEF, review SAPs and data, and to develop and support the regional sediment comprehensive database (SEDQUAL), which will be included in the manual.

Slides

PP11.1 Regional Update

PP11.2 Regional Initiatives

PP11.3 (Charter)

PP11.4 Introduction

PP11.5 Regional Relationships

PP11.6 (Organizational chart)

PP11.7 (Organizational chart)

PP11.8 Regional Dredging Team Executive Steering Committee- Tier 4

PP11.9 Regional Dredging Team Operational Management Committee-Tier 3

PP11.10 Regional Dredging Team Navigation Steering Committee-Tier 2

PP11.11 Regional Dredging Team Local Management Groups-Tier 1

PP11.12 Next Steps for RDT

PP11.13 (photo)

PP11.14 Regional Dredging Team Regional Sediment Evaluation Team (RSET)

PP11.15 (photo)

PP11.16 Regional Sediment Evaluation Team (RSET)

PP11.17 Regional Sediment Evaluation Team Responsibilities

PP11.18 Regional Sediment Evaluation Team (RSET)

PP11.19 Regional Sediment Evaluation Team (RSET)

PP11.20 (Organizational Chart)

PP11.21 (Organizational Chart)

PP11.22 Sediment Quality Guideline Issues

PP11.23 Bioaccumulation Evaluation Issues

PP11.24 Biological Testing Issues

PP11.25 Where Do We Go From Here?

PP11.26 (photo)

PP11.27 Questions?

Comment: Lawrence McCrone commented that the RSET manual will have ramifications for the regulated community. Could Jim speak about the expectations for public review and comment?

Response: Jim Reese explained that the manual planned for release in September will be a draft and will be up for public and agency review and comment for 45 days.

Response: John Malek added that decisions will be made after comments are reviewed. Considerations and questions to evaluate the manual will include:

- Who will use it and how?
- How good is it?
- What is unfinished or needs refinement?

He specifically mentioned the bioaccumulation section which will require additional studies.

Response: Jim Reese added that the new RSET manual would replace the 1998 DMEF.

Response: John Malek commented that other sediment programs (like remediation) may not use it, but will probably use parts of it. Each program in the next few years will be putting information into a database that can be used for development of future standards and protocols.

Question: Joe Germano asked Brett Betts about public review and comments for the wood waste guidelines document. The draft has already been out so will there be an opportunity for public comments before it is finalized?

Response: Brett replied that, yes, they could do that.

Comment: Clay Patmont of Anchor made a comment regarding recent findings and their bearing on wood waste guidelines. He said there's a lot of new information on freshwater environments based on current work that may pose significant consequences and emphasized that this document should be sent for public review before being finalized.

Comment: Doug Hotchkiss, Port of Seattle, made a comment for Tom Gries on bioassay interpretation guideline changes. The dredging community needs to evaluate the proposed changes before they are made to consider and understand the impacts and future effects.

BREAK

REALLY COOL PROJECTS

12. Pacific Sound Resources Superfund Project (Miriam Gilmer, Corps).

Ms. Gilmer introduced herself as the Project Manager for the Corps working with Sally Thomas, the EPA Project Manager. Miriam described the Wyckoff East Superfund site, a Pacific Sound Resources Environmental Trust site where Wyckoff assets were administered by the EPA. The site was a wood treatment facility where adequate site characterization helped in saving money on design and construction because there were no "surprises". The COC's (PAH, dioxin, and PCB) were in groundwater and ended up in marine sediment through erosion. The ROD was completed and signed in 1999 and the cap is now complete six years later. The design criteria for the five remediation areas of the site included chemical isolation, stabilization of sediment and slopes, improved habitat, and erosion prevention from currents and prop wash. The design challenges included a near-shore transition area with an unstable 20% slope. Cost control: Sally Thomas (EPA) wanted the Corps to place a cap designed by URS and the Corps was brought in early in the design process which helped in cost control. And, the design team was involved throughout the construction process. All parties involved did not diverge, but progressed forward with clear objectives, she said. The agility of the team made it easy for modifications during construction and allowed cost savings opportunities regarding capping materials, beneficial-use materials, and new construction monitoring. For instance, the organic carbon chemical isolation material criteria was modified, which would pose an increased expense, but models were recalculated to reassess the original assumptions about the site and the organic carbon material criteria was re-evaluated. The initial model was found to be overly conservative and the criteria for chemical isolation material was modified and the cost reduced. Beneficial Reuse Material was used at the site and construction monitoring like mapping the bucket placement, GPS tracking of the barge and material placement, and cap thickness calculations using pre-cap and post-cap elevations also helped in efficiency and cost savings. Miriam concluded by emphasizing that the lessons learned at this site were communication, contractor selection, and continuity.

Slides

PP12.1 Pacific Sound Resources: Capping Project

PP12.2 (map)

PP12.3 Background Information

PP12.4 Site Characterization

PP12.5 RA4: Slope Issues

PP12.6 Record of Decision - 1999

PP12.7 Sediments Unit Project Overview

PP12.8 Design Issues

PP12.9 Remedy Implementation

PP12.10 Cost Control

PP12.11 RD/RA Team Continuity

PP12.12 Right People for the Job

PP12.13 Opportunities to Reduce Costs

PP12.14 Cost Saving Opportunities

PP12.15 Material cost greater than expected

PP12.16 Beneficial Use – Federal Navigation

PP12.17 Beneficial Use – Federal Navigation

PP12.18 Placement events 1-32

PP12.19 Placement events 1-83

PP12.20 Beneficial Use – Non-Federal Projects

PP12.21 Construction Monitoring

PP12.22 Bucket Placement

PP12.23 Bottom-dump Barge RA4

PP12.24 Placement Monitoring

PP12.25 Placement Monitoring

PP12.26 Total (MSU) Project Cost

PP12.27 Incremental Costs

PP12.28 Lessons Learned

13. Bellingham Bay Pilot Project (Lucy McInerney, Ecology & Mike Stoner, Port of Bellingham).

Ms. McInerney started by explaining that her presentation was based on a presentation by Anchor and the pilot project was crafted by a consortium of 14 organizations. She presented a background of the pilot project, which was an initiative of cooperative sediment management programs and policies. The concept was to partner state and federal agencies with local entities,

and the process began by pulling team members together with a memorandum of agreement, emphasizing that agencies would not forfeit their regulatory authority or treaties. Then, data was gathered, including water quality (coliform and nutrients), sediment (hazardous substances), and habitat data, and multiple clean-up sites and nineteen habitat restoration opportunities were identified. The Bellingham Bay Comprehensive Strategy was to address clean-up sites, habitat sites and land use. She highlighted sites in the project and their components:

- Holly St Landfill: clean-up, habitat and public access
- Weldcraft Steel and Marine: clean-up involving sediment, piling, and railway removal and habitat restoration through construction of a habitat bench using beneficial reuse material.
- Georgia Pacific Log Pond: Highly contaminated with mercury from direct discharge, clean-up included capping with seven feet of beneficial reuse material, creosote piling removal, and habitat restoration.
- Marine Park: habitat restoration and public access.

Lucy concluded by summarizing the Bellingham Bay Pilot Project as Ecology funded and co-managed by the Port, accomplishing habitat restoration in conjunction with clean-ups, eel grass seeding, and creation of mixed-use land from heavy industrial use from 137 acres acquired by the Port from Georgia Pacific, including contaminated land.

Slides

PP13.1 Title Slide

PP13.2 Bellingham Bay Demonstration Pilot Presentation Outline

PP13.3 Bellingham Bay Demonstration Pilot Background

PP13.4 Bellingham Bay Demonstration Pilot Background

PP13.5 Team Members

PP13.6 Bellingham Bay Demonstration Pilot Background

PP13.7 Bellingham Bay - Environmental Summary

PP13.8 Bellingham Bay

PP13.9 Bellingham Bay Cleanup Sites

PP13.10 Habitat Restoration

PP13.11 Land Use

PP13.12 Bellingham Bay Comprehensive Strategy

PP13.13 Bellingham Bay Demonstration Pilot Status

PP13.14 Holly Street Landfill Site Location

PP13.15 Holly Street Landfill

PP13.16 Holly Street Landfill Managers – Lucy McInerney (Ecology)/Sheila Hardy (City)

PP13.17 Holly Street Landfill Managers – Lucy McInerney (Ecology)/Sheila Hardy (City)

PP13.18 Integrated Cleanup/Restoration Plan

PP13.19 North Bank - before

PP13.20 North Bank – after

PP13.21 South Bank bulkhead - before

PP13.22 South Bank bulkhead - after

PP13.23 South Bank refuse - before

PP13.24 South Bank refuse - after

PP13.25 Boardwalk and viewpoint

PP13.26 The newly completed project Viewed at low tide – March 2005

PP13.27 Weldcraft Steel and Marine Site Location

PP13.28 (photo)

PP13.29 Weldcraft Steel and Marine Managers – Mary O'Herron (Ecology)/Mike Stoner (Port)

PP13.30 Weldcraft Steel and Marine Managers – Mary O'Herron (Ecology)/Mike Stoner (Port)

PP13.31 Weldcraft - Before

PP13.32 Weldcraft - Before

PP13.33 Weldcraft - Before

PP13.34 Weldcraft - Before

PP13.35 Weldcraft - After

PP13.36 Weldcraft - After

PP13.37 Weldcraft - After

PP13.38 Weldcraft - After

PP13.39 Weldcraft Steel and Marine Habitat Bench

PP13.40 Habitat Bench

PP13.41 G-P Log Pond Site Location

PP13.42 G-P Log Pond Managers – Lucy McInerney (Ecology)/Chip Hilarides (G-P)

PP13.43 G-P Log Pond Managers – Lucy McInerney (Ecology)/Chip Hilarides (G-P)

PP13.44 G-P Log Pond – Before G-P Log Pond - After

PP13.45 Marine Park Site Location

PP13.46 Marine Park Shoreline Restoration Manager – Adam Fulton (Port)

PP13.47 Marine Park - Before

PP13.48 Marine Park - After

PP13.49 Bellingham Bay Demonstration Pilot Future

PP13.50 Bellingham Bay Demonstration Pilot Future - continued

PP13.51 Bellingham Bay Demonstration Pilot Future - continued

PP13.52 Bellingham Bay Demonstration Pilot Further Information and Contacts

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

Ted Benson joked that everyone awake had already left the room. He also offered disclaimers on his presentation on the Puget Sound Naval Shipyard and Sinclair Inlet RCRA site, adding that no animals were harmed. As an overview, he explained that CAD disposal material had migrated to public lands referred to as the "slosh area," a topic covered at last year's meeting. The site was characterized using SPI with discreet sample placement followed by IDW interpolations of the data. Since last year, the lessons learned were: be explicit and make contingency plans! To elaborate, he explained that an explicit description of pollutants and distribution is invaluable for a precise clean-up. CAD results presented last year in Operable Unit B revealed total Aroclors present at detectable levels in each 500 square foot grid cell. In addition, the area-weighted average (AWA) was higher than pre-remedial action area-weighted average, indicating that clean-up goals were not met. Possible reasons for a higher post-remedial AWA include improved sampling methods and/or better detection limits. He wondered if composite samples were better when considering AWA versus hotspot delineation for removal decisions. Ted moved on to issues with dredging and dredge material disposal, mentioning the race against the clock, noting that bucket losses may go up by a factor of 16 if you cut the cycle time in half. He also brought up the fact that environmental dredging had stricter rules than navigational dredging. He suggested that there be more coordination between environmental firms and dredging firms, perhaps as part of dredging contracts.

He mentioned the importance of knowing where you're going but added that knowing where you're starting from is equally important and suggested that site knowledge be considered a

valuable investment. He also recommended that protocols not be changed in the process of a site characterization unless you can ensure that old and new data will be comparable.

Ted presented a history of his experience with dredging and sediments through work with the military and agency work. He emphasized the importance of sediment, citing the geoduck as an important natural resource, the sale of which contributes to creating and maintaining public access to Puget Sound. On an ending note, Ted presented his statistical summary of problems with the PSNS site and offered his experience as guidance for others.

Slides

PP14.1 Sediment Cleanup at the Puget Sound Naval Shipyard

PP14.2 Remedial Actions and Lessons Learned

PP14.3 Disclaimer

PP14.4 PETA Statement

PP14.5 PSNS and Sinclair Inlet

PP14.6 Last Year

PP14.7 Discovery of the "Mud Wave" Deposition - Sediment Profile Imagery

PP14.8 Characterization of State-owned Aquatic Lands for ENR

PP14.9 That was last year…

PP14.10 But first,

PP14.11 When I was younger, I said:

PP14.12 I should have been more explicit!

PP14.13 How Is That Relevant to PSNS?

PP14.14 Monitoring Events

PP14.15 Results of Monitoring

PP14.16 Operable Unit B

PP14.17 WHY? Why weren't cleanup goals met?

PP14.18 Influences from Characterization

PP14.19 More Issues

PP14.20 Other Potential Problems

PP14.21 An Inherent Conflict

PP14.22 A Business Opportunity?

PP14.23 Speaking of weddings …

PP14.24 ARARs

PP14.25 "If you don't know where you're going…"

PP14.26 "A foolish consistency…"

PP14.27 Another Small Digression

PP14.28 Military Experience

PP14.29 Military Diving Experience

PP14.30 State Employment

PP14.31 State Diver

PP14.32 Involvement with PSNS

PP14.33 This Presentation Is Not Intended To Assign Blame

PP14.34 Does Correlation Imply Causality?

PP14.35 I have some small degree of comfort

PUBLIC ISSUE PAPERS

15. The Use of Screen Tube Larval Tests for Evaluating Woody Debris in Sediment (Bill Gardiner, Weston Solutions).

Bill Gardiner started his presentation by offering acknowledgements to Manke Lumber Company; Clay Patmont, Kim Magruder, Dan Hennessy (Anchor Environmental); Jack Word and Matt Zinkl (MEC/Weston); Tom Gries, Russ McMillan (DOE); and David Kendall (USACE).

He continued by identifying the problems with larval tests in woody debris, stating that larval are often trapped in the light surface layer with samples containing low density sediment, flocculent, and woody debris that may cause physical effects in bioassays, particularly the PSEP larval test, and added that these types of samples are difficult to match with reference sites. Using Manke Lumber as a case study, Mr. Gardiner explained there were little or no COC's present but there was woody debris and that TVS values exceeded 15% dry weight in 10 DMMUs. The standard suite of PSDDA/PSEP bioassay tests were run with surprisingly poor results possibly explained by poor larval recovery (normal development, but not many recovered), the presence of light flocculent layer throughout the samples, a long settling time in larval test, or the presence of fine woody debris. There were no ammonia/sulfide issues present so it appeared to be caused by some physical interaction. DOE and USACE-Seattle were consulted and the screen tube test was modified to separate larvae from the flocculent layer. He added that the method was based on sediment-water interface tests developed in 2000. The screen tube tests appear to be sensitive to treatment effects, while reducing the physical effects of woody debris and flocculent and offer an alternative for testing sediment with fine wood debris and flocculent material. He concluded by saying that this was a positive experience and was a good example of an interactive process to address technical issues with DMMO.

Slides

PP15.1 The Use of Screen Tube Larval Tests to Evaluate Woody Debris in Sediment (Low Density Sediment)

PP15.2 Acknowledgements

PP15.3 Problem Identification

PP15.4 Manke Lumber Site

PP15.5 10 DMMU Locations

PP15.6 Sediment Chemistry

PP15.7 TVS Distribution

PP15.8 Bioassays

PP15.9 (chart)

PP15.10 (figures)

PP15.11 What's going on in Larval Test

PP15.12 Screen Tube Tests - Methods

PP15.13 Screen Tube Tests

PP15.14 (chart)

PP15.15 Results of Screen Tube Test

PP15.16 Conclusions

16. Sulfide as a Marine Toxicant (Dick Caldwell, NW Aquatic Sciences).

Dr. Caldwell began by expressing thanks to Tom Gries and appreciation to Brett Betts for his comments about woody debris disposal and rafting buoys which can lead to anaerobic conditions. He added that this was an appropriate topic with the current issues being addressed at SMARM. In his personal experience, he has observed "black water" with dead corophium which led to his interest in sulfides. He presented a series of slides summarizing issues with ammonia, the production and fate of sulfides through volatilization, oxidation, and precipitation. He emphasized the point that most assume that sulfides don't persist due to volatilzation, but perhaps biological conditions are the key factor, using natural areas high in organic content as an example. Sulfide tolerance and toxicity in larval organisms has largely been inferred as there has not been a lot of data specifically collected on sulfide toxicity. Dr. Caldwell pointed out that the rate of loss of sulfide in sediment is higher than in porewater and that little information is available on the rate of sulfide toxicity. Referring to charts and graphs, he indicated there is a correlation between sulfides and mortality along with the correlation between ammonia and mortality. He addressed the effects of aeration on sulfide and ammonia and how it relates to toxicity. Dr. Caldwell concluded that sulfide may be as or more toxic than ammonia and needs more attention in studies. He recommended studying the disappearance rates for sulfides in sediment more closely, characterizing pore water toxicity rates for sulfide, performing lab

studies with otherwise unpolluted sediments to characterize pore water sulfide/amphipod mortality relationships, and monitoring bioassays where sulfide toxicity is indicated.

Slides

PP16.1 Sulfide as a Marine Sediment Toxicant
PP16.2 Introduction
PP16.3 Production of Sulfide
PP16.4 Fates of Sediment Sulfides
PP16.5 Sulfide in Marine Sediment Porewater (Bagarinao, 1992)-1
PP16.6 Sulfide in Marine Sediment Porewater (Bagarinao, 1992)-2
PP16.7 Sulfide Tolerance of Adult or Juvenile Marine Organisms
PP16.8 Sulfide Tolerance of Larval Marine Organisms
PP16.9 Recent NAS Project Site Pore Water Sulfides
PP16.10 What Conditions are Required for Sulfide Toxicity in Bioassays?
PP16.11 Summarizing
PP16.12 *Eohaustorius* and Petroleum Site 718
PP16.13 *Eohaustorius* and Wood Waste Site 719
PP16.14 Rate of Sulfide Toxicity (Caldwell, 1975)
PP16.15 Survival Affected by Mortality & Sulfide Loss Rates
PP16.16 *Rhepoxynius* and Wood Waste Site 569
PP16.17 *Eohaustorius* and Transportation Site 717
PP16.18 *Eohaustorius* and Petroleum Site 718
PP16.19 *Eohaustorius* and Wood Waste Site 719
PP16.20 Results of Sediment TIE
PP16.21 Effect of Aeration on Sulfide, Ammonia & Toxicity
PP16.22 Summary
PP16.23 Conclusion
PP16.24 Recommendations

Question: Brett Betts asked Dr. Caldwell if he had any advice on relating bulk sediment concentrations to porewater concentrations.

Response: Dr. Caldwell said no, but that perhaps there was some correlation.

Comment: Bill Gardiner mentioned that sulfide is a routine test for bulk sediments so there is data available.

17. Contaminated Sediment Residuals: Recent Data and Management Implications (Clay Patmont, Anchor Environmental).

Mr. Patmont acknowledged that many people have been working on this issue collectively, including John Malek and Jeff Stern, to gather information on contaminated sediment residuals over the past five years.

Mr. Patmont began his presentation by explaining the definition of residual contaminated sediment as the material that remains after dredge or spread from dredge, a 1-5 centimeter "fluff" layer or "nepheloid layer" which, in the past, has not been extensively sampled and is often washed away in a Van Veen. He explained that it is not a distinct layer – its either a high solid liquid or a high liquid solid and that the average residual concentration is just about equal to the average dredged material concentration. Using Hylebos Waterway as an example, he compared pre- and post-dredge PCB concentrations and mentioned that the physics involved in the near, intermediate, and far field processes were the primary sources of sediment residuals. He added that slope and current are also factors. Slide 8 illustrated the East Waterway turbidity plume by hydrostatic acoustic field signature.

Controlling factors include dredge operator skill, sediment physical characteristics, site characteristics, the magnitude of chemical exceedance, underlying geology, current or propeller wash, and slopes. Equipment selection and precision and the use of BMPs (operational & specialized equipment) can also influence residuals. A suggested approach to characterize contaminated sediment residuals includes detailed pre- and post-dredge characterization data, post-dredge data collection, mass-balance calculations, and transport modeling. EPA sought out datasets that had thorough characterizations with enough pre- and post- chemistry data for mass-balance calculations. Three out of seven sites with sufficient data for use in case studies are in Washington. Mr. Patmont made references to Hylebos, Duwamish/Diagonal, and Middle Waterway while discussing the various residual issues with dredging and stating that most sites average 5 - 6% residuals with 0.7% to 2% contributed to resuspension. He emphasized the type of equipment, speed of dredging, and geology as factors contributing to the residuals. Mr. Caldwell emphasized that we should recognize that residuals happen and that we be flexible,

plan for contingency, and consider capping as an option. Referring to slide 21, he reviewed management recommendations making reference to the good data collected at Hylebos. In closing Mr. Patmont acknowledged the national cooperation for these studies, and concluded by saying that immediate future plans included compiling the information and drafting the paper, with the intent to publish and submit it for peer review.

Slides

PP17.1 Contaminated Sediment Residuals: Recent Monitoring Data and Management Strategies

PP17.2 Sediment Residuals Defined

PP17.3 Residual Sediment Characteristics

PP17.4 Pre- and Post-Dredge Sampling Data Hylebos Waterway Middle – PCB Deposit

PP17.5 Primary Sources of Sediment Residuals

PP17.6 Primary Sources of Sediment Residuals

PP17.7 Other Residuals Sources

PP17.8 Hydroacoustic Signature of Far-Field Turbidity Plume During Dredging

PP17.9 Sediment Residuals: Probable Controlling Factors

PP17.10 Suggested Approach to Characterize Contaminated Sediment Residuals

PP17.11 Suggested Approach to Characterize Residuals Thickness

PP17.12 Case Study Examples

PP17.13 Residuals Case Study Examples

PP17.14 Residuals vs. Resuspension Measurements

PP17.15 Typical Residuals Management Sequence and Contingency Dredging Actions

PP17.16 Wide Range of Possible Contingency Actions

PP17.17 Lower Fox River Dredge Residual Management

PP17.18 Duwamish/Diagonal Site

PP17.19 Duwamish/Diagonal Natural Recovery of Off-Site Post-Dredge Residuals

PP17.20 Duwamish/Diagonal Thin-Layer Cover of Off-Site Post-Dredge Residuals

PP17.21 Management Recommendations

Meeting was Adjourned

PANEL DISCUSSION

Wayne Wagner began the panel discussion by stating that time was limited to ten minutes and introducing the speakers as Clay Patmont (Anchor), Brad Helland (Ecology), John Malek (EPA), and Jeff Stern (King County).

Ted Benson (to Clay): Do you know of any cases where there has been original prism removal by clamshell followed by hydraulic dredging? It seems like a good possibility for clean-up, although expensive.

Clay Patmont: He was not aware of any but knew of some cases that went the opposite way.

Jeff: He said it was not clear if the hydraulic dredge was good at getting the thin layer in the first pass.

Tom Gries: Did you try to control for the cycle time on mechanical dredging and use best management practices (BMP)? How do they compare across the board? Is there still 5% residual left? There were other factors in other columns that were not controlled for.

Clay: With the exception of one, most of the projects used in this study have strict BMP's.

Tom Gries: Good BMP's probably vary a lot by site, slope, material, and site conditions.

Clay: Cycle time can't be identified as the master variable. Most BMPs for dredgers dictate that they don't just plunge down to the bottom, pull it out slowly, pause as you break the surface and bring it up slowly.

Jeff: Referring to the Duwamish, he commented that there is no data to support a correlation between short cycle times and high residuals or to identify specific factors. He added that there are probably a site-specific mix of many factors that contribute to residuals. What is being suggested is that if you're doing clean-up at a contaminated site with concentrations high enough to require removal, whether it's 2, 4, or 8 cm, are always going to create some post-dredge residual problems.

John Malek: He agreed with a caveat to Jeff's statement, where at Middle Waterway they had the opportunity to experiment with different levels of removal to find relationships between pass size and residuals. It seems that how big your pass is has a relationship to how big the residual. Immediately digging to depth and adjacent to a slope (which was not dredged) tends to leave high residuals. We need to find more information and reassess dredge options and design.

John Malek: On the remedial side, he has noticed five times fairly consistently that recently "cleaned" areas have lumps of loose material if heavy vessel traffic passes immediately after the dredge. Considering all the different factors, it seems that multi layer dredging would be an improvement. It has been observed that larger buckets sometimes leave more residual and sometimes leave less residual.

Clay Patmont: They have an Excel spreadsheet showing the correlation between bucket size and residual showing a significant correlation that probably doesn't mean anything. It showed the larger the bucket the less residual.

Tom Gries: A few weeks ago, Tom asked national experts about the influence of bucket size and type on amount of residual and they claimed that this was likely a site specific issue.

Clay Patmont: Hylebos used a big bucket and took a four to five foot depth bite into sand with large bucket and it did really well.

John Malek: But, they started dredging at the mouth and worked in and with that movement, where does the material go? "Away." We have not gone back but with more money we could look at what's just outside the waterway.

John Ryan (Retec): He was wondering if anyone had looked at the standard deviation of the projected dredge volume versus actual dredged material volume. An upland example yielded a 70% larger standard deviation than expected and marine sites may be as high as 140%.

Clay Patmont: Some examples include Hylebos, where the dredge plan was set up without considering the visual indicators because there was so much sand. 80% of what was planned to be dredged was actually dredged. Middle Waterway was about 5%. Fox River funding defined the project end by a maximum of 50,000 cubic yards dredged. Most are pretty close.

Anne Fitzpatrick (Retec): In the Northwest, we have over-dredge potential where the east coast has a hard-pan bottom and residual is less likely. Is there an intentional design to dredge only within so many inches of bedrock? Do you see a change in emphasis on chemical concentrations in the residuals with mass removal?

Clay Patmont: He described a site with two to three feet of silt on top of bedrock and it did not look like a good place to dredge. The decision was not to dredge. There has been a recognition that sites like Hylebos are at one end of the spectrum while the Fox River has clay deposits which are easy to dredge. He noticed more emphasis, through a workgroup on the east coast, on a trend towards mass removal and Europe uses mass removal technique with large buckets followed by capping.

Malek: Agreed it is widely accepted.

Unidentified man: One thing we found in BMPs in East Waterway when comparing it with other maintenance dredging is that cycle time is a factor because you can always dredge fast enough to make a mess. There were areas in East Waterway where it was easy to manipulate the cycle time to reduce turbidity and other areas where the sediment type was very loose, very organic and when it gets in the water column it stays suspended and disperses. Although it may not be a large percent of material, but it's the type of material that disperses.

Jeff: One factor to remember was illustrated by the cumulative frequency plot showing the resuspension rate for hydraulic and mechanical dredging versus the residuals.

David Schuckardt (Integral): That turbidity we were looking at probably did not have much impact on residual.

Jeff : A lot of the data points from that came from production dredging sites where cycle time was not the issue at all and they were dredging as fast as they could, but the rates were no way near the residuals they were seeing. Cycle time is a factor but by no means the only one.

David Schuckardt (Integral): Regarding over-dredging, the production rate goes up whether you're using a hydraulic dredge or clamshell if you're trying to dig deeper. Your production rate goes up but you make a big mess.

Ann (to Clay): Found it interesting what Clay said about water quality monitoring and asked if the analysis included silt curtains or high pile walls?

Clay: Most of the projects, with the exception of Hylebos, the (Maceta project) used sheet piles and it was an elaborate undertaking but our take on the data was that the residuals were going to occur - you can get residuals behind the curtain or behind the sheet pile wall.

Tom: One thing to consider is a multiple pass cut if you're going to dredge 8 or 10 feet and not all in one pass. If you have a profile of sediment chemistry like you did at Hylebos, he didn't think you'd expect the average prism concentration to be what it is because you would have some portion of residual from the first pass joining the concentrations of the bottom half of the pass and that could be included in your model.

Clay: Unfortunately, that was not a typical profile. The most common profile is to have your highest concentrations right above the nepheloid layer.

Tom: A critical thing is to answer how carefully you sampled the interface that's left behind prior to dredging and after dredging and how many of these projects did that well? There a lot of Z layer data with core compaction from after dredging and whether it was the top cm or more - how you set up your sampling is important.

Clay: He recalled Mike Palermo saying that they used to always blow that stuff off. He said that to a national audience. The sequence is to siphon down to that layer and then there's a judgment call as to when you are out of water and into sediment and there will be a certain amount of resuspension. Most of these projects like Hylebos took a lot of care in knowing that.

Wayne introduced David Kendall to provide the summary of the panel/meeting and reminded everyone that the deadline for comments for DMMP is June 6.

SUMMARY

David Kendall summarized the highlights of the meeting including the recommendation that next years SMARM have (1) A more balanced emphasis on projects outside Puget Sound; (2) More emphasis on source control; (3) A clear hand-shake between MTCA/CRCLA activities and DMMP is needed at the front end before sampling occurs; (4)An implications analysis of the

bioassay interpretation changes is needed before they are implemented; and (5) Sulfides as a marine toxic needs more investigation and will probably lead to the recommendation that aeration should be continued for the amphipod bioassay.

CLOSING

Wayne thanked everyone for coming and thanked the DNR for refreshments and hard work in putting together and conducting the SMARM.

ATTACHMENT 1: SUMMARY OF PUBLIC ISSUES

Public Issues Raised at the 2005 SMARM and Agencies Responses

Comment;

1. The DMMP should try to provide a more geographically balanced SMARM, with some emphasis on Columbia River dredging and cleanup projects.

Response: The DMMP agencies agree that at the 2006 SMARM, they will try and provide a more geographically balanced agenda, with added emphasis on the Columbia River dredging and cleanup issues.

Comment:

2. The Ecology SMS cleanup summary and overall SMARM should provide more emphasis on Source Control progress.

Response: Ecology agrees and is moving in that direction. The Sediment Management Unit will dedicate more resources to source control over the next biennium and has recently improved internal procedures to proactively address source control issues. In addition, Ecology and DNR continue to coordinate on ways to best reduce adverse impact to sediments on State managed aquatic lands. Progress in these areas will be reported on at the next SMARM.

Comment:

3. The handshake between the DMMP and MTCA/CERCLA, when dredging projects are in cleanup areas, must be clearer at the front end before sampling/testing commences.

Response: The Agencies agree that dredging projects in cleanup areas must have a clear understanding on data needs and uses before sampling/testing commences. This will insure that both dredging and cleanup agencies are provided with the necessary data to complete their determinations and avoid additional data collection efforts that delay dredging and cleanup projects.

Comment:

4. An implications analysis needs to be performed by DMMP to evaluate how proposed amphipod bioassay interpretation changes would affect past maintenance/construction dredging projects.

Response: The DMMP agencies will perform an implications analysis to evaluate proposed changes to amphipod bioassay interpretation before implementing those changes.

Comment:

5. The role of sulfides as a potential marine sediment toxicant needs more investigation for the amphipod bioassay. As an interim measure, bioassay testing labs should ensure that the aeration protocol is followed to ameliorate the effects of sulfide on amphipod survival.

Response: We agree that the role of non-treatment toxicants such as sulfides needs more investigation. The DMMP agencies reaffirm the aeration protocol for the amphipod bioassay, to help ameliorate the effects of sulfide on this bioassay.

Comment:

6. All of the final papers posted to the Corp's web site should not just reflect comments but also contain those comments and responses.

Response: Final papers posted on the DMMO/DMMP website will contain comments and responses to issues raised during review as an appendix to the paper.

ATTACHMENT 2: AGENDA

2005 Sediment Management Annual Review Meeting

May 4, 2005

Federal Center South, Seattle

Hosted by the Washington State Department of Natural Resources

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Registration and Coffee 8:30

Welcome to SMARM 2005 9:00

Loren Stern, Aquatic Lands Division Manager, WA Department of Natural Resources

Agency Reports 9:15

- DMMP Testing Summary - *Gwyn Puckett, Corps*
- DNR 2005 Disposal and Monitoring - *Peter Leon, DNR*
- SMS Cleanup/Source Control Activities - *Kathryn DeJesus, Ecology*
- Regional CERCLA Activities - *Sheila Eckman, EPA*

BREAK 10:45

DMMP/SMS Clarification and Status Presentations 11:00

- Future of the SMARM Process--Reducing Levels of Effort (Clarification) - *Tom Gries, Ecology*
- Evaluation of Sediment Quality for Navigational Dredging, Contaminated Sediment Cleanup, or Both (Clarification) - *Tom Gries, Ecology*
- Overview of other DMMP Clarification and Status Papers - *Dave Kendall, Corps*

LUNCH (on your own) 12:00

DMMP/SMS Clarification and Status Presentations, cont. 1:00

- Grain-Size Analysis and the Reporting of Contaminant Concentrations Normalized to Dry Weight of Sediment (Clarification) - *David Sternberg/Brett Betts, Ecology*
- Identification and Assessment Techniques for Wood Waste Cleanup Sites – *Brett Betts, Ecology*
- Sediment Management Programs: Consistent Interpretation of Toxicity Test Results (Clarification) - *Tom Gries/Russ McMillan, Ecology*
- Regional Sediment Evaluation Team Update - *Jim Reese, Corps*

BREAK 2:15

Really Cool Projects 2:30

- Pacific Sound Resources Superfund Project - *Miriam Gilmer, Corps*
- Bellingham Bay Pilot Project - *Lucy McInerney, Ecology*
- Puget Sound Naval Shipyard - *Ted Benson, Ecology*

Public Issue Papers 3:30

- The Use of Screen Tube Larval Tests for Evaluating Woody Debris in Sediment – *Bill Gardiner, Weston Solutions*
- Sulfide as a Marine Sediment Toxicant – *Dick Caldwell, NW Aquatic Sciences*
- Contaminated Sediment Residuals: Recent Data and Management Implications – *Clay Patmont, Anchor Environmental*
    - this presentation will be followed by a short panel discussion

Summary and Closing 4:45

ADJOURN 5:00

Deadline for written comments on SMARM 2005: June 6, 2005

April 29, 2005

ATTACHMENT 3: LIST OF ATTENDEES

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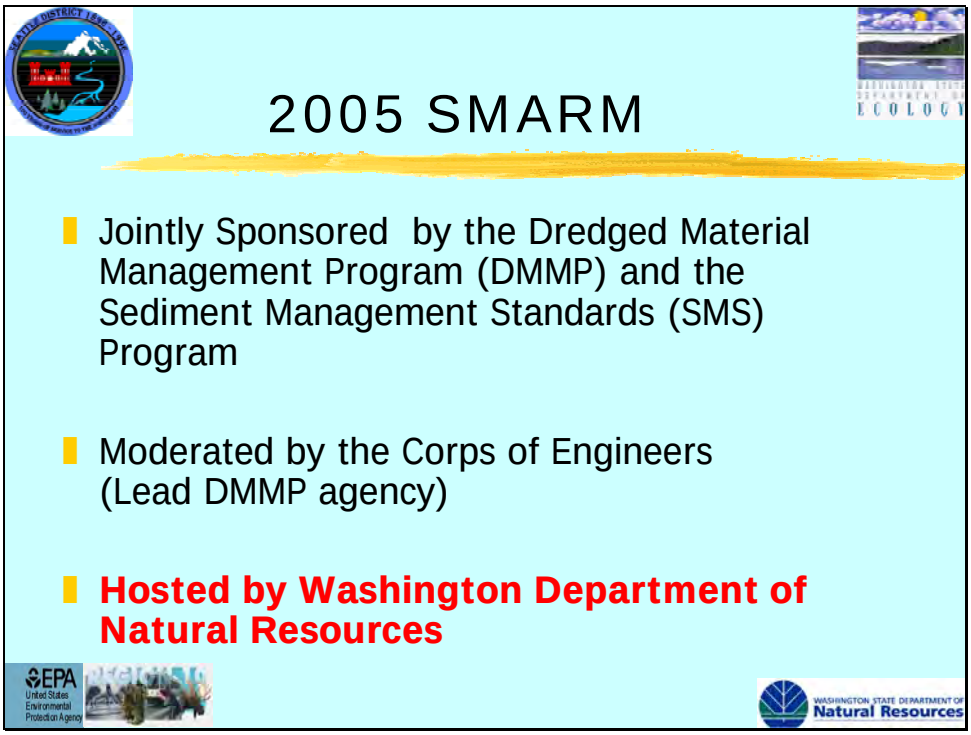
ATTACHMENT 4: POWERPOINT SLIDES FOR EACH SMARM SPEAKER


SEDIMENT MANAGEMENT
ANNUAL REVIEW MEETING
May 4, 2005
Wayne Wagner, Seattle District
Meeting Moderator
EPA
Natural Resources

0.1


2005 SMARM
Jointly Sponsored by the Dredged Material Management Program (DMMP) and the Sediment Management Standards (SMS) Program
Moderated by the Corps of Engineers (Lead DMMP agency)
Hosted by Washington Department of Natural Resources
EPA
Natural Resources

0.2

MEETING OBJECTIVES AND PURPOSE

- Obtain public input on proposed changes to the DMMP Management Plans through **Issue Papers** and **Clarification Papers** posted on the Corp's Public Website on the Dredged Material Management Office's Homepage: (http://www.nws.usace.army.mil) **select Civil Works/Dredged Material Management**
- Discuss disposal site management actions and changes.
- Summary of Ecology Cleanup Activities
- Summary of EPA Regional Cleanup Activities

0.3

MEETING OBJECTIVES AND PURPOSE (continued)

- Obtain public input on proposed changes to the DMMP.
- Presentation and discussion of Public Issue Papers.
- Comments and discussion on Status Reports of ongoing actions of DMMP and SMS Program.

0.4

Really Cool Projects

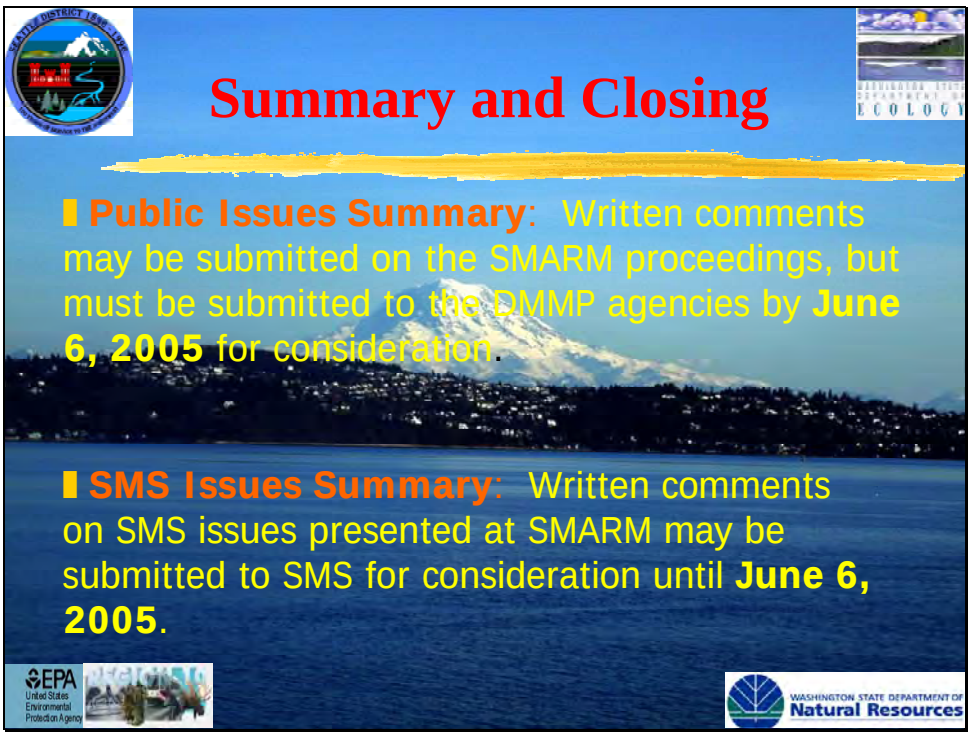
- Pacific Sound Resources Superfund Project (Miriam Gilmer, Corps)
- Bellingham Bay Pilot Project (Lucy McInerney, Ecology)
- Puget Sound Naval Shipyard (Ted Benson, Ecology)

0.5

Public Issue Papers

- The Use of Screen Tube Larval Tests for Evaluating Woody Debris in Sediment (William Gardiner, MEC-Weston Solutions)
- Sulfides as a Marine Sediment Toxicant (Dick Caldwell, NW Aquatic Sciences)
- Contaminated Sediment Residuals: Recent Data and Management Implications (Clay Patmont, Anchor Environmental; Jeff Stern, Metro)

0.6


Summary and Closing
Public Issues Summary: Written comments may be submitted on the SMARM proceedings, but must be submitted to the DMMP agencies by June 6, 2005 for consideration.
SMS Issues Summary: Written comments on SMS issues presented at SMARM may be submitted to SMS for consideration until June 6, 2005.
EPA
United States Environmental Protection Agency
WASHINGTON STATE DEPARTMENT OF
Natural Resources

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING

May 4, 2005

Dredging Year 2005

DMMP Testing Activities Summary

1.1


TIMES SPECIAL REPORT

JUNE 10, 1984

he

MPERILED SOUND

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

1.2

Where Are We Now

- We still lead the nation in interagency coordination on sediment issues
- State of the Sound Report

1.3

The Big Picture

1. DMMP modifications since last SMARM
2. 2005 Testing & Evaluation
3. Future challenges

1.4

The Big Picture

1. DMMP modifications since last SMARM
2. 2005 Testing & Evaluation
3. Future challenges

1.5

Modifications since the last SMARM...

- Neanthes Bioassay – Guidance for Ammonia and Sulfide
- Screening Level Phthalates
- Tier 1 Exclusions from Testing

1.6

The Big Picture

1. DMMP modifications since last SMARM
2. 2005 Testing & Evaluation
3. Future challenges

1.7

Dredging Year 2005
Characterizations

- June 16, 2004 – June 15, 2005
- 14 Suitability Determinations completed (3 pending)
- 1 Recency Evaluation completed
- 5.7 million cy completed the evaluation process

1.8

Dredging Year 2005
Findings

- 44,451 cy (0.8 %) unsuitable material
- Other sediment passed suitability requirements
- One project had recency extension approved without additional sampling
- NO bioaccumulation testing this year

1.9

Dredging Year 2005
Biological Testing Summary

- 23 DMMUs underwent biological testing
- **Amphipod bioassay**: No toxicity expressed
- **Sediment larval bioassay**:
  Mytilus galloprovincialis: 5 – 1-Hit, 3 – 2-Hit Responses
- **Juvenile polychaete growth bioassay**:
  Neanthes arenaceodenta: 1 – 2-Hit Response

1.10

2005 Big Ones

- Projects over 100,000 cy:
  - Lower Snohomish Turning Basin (272,000 cy)
  - Blair Inner Reach Cutback and Turning Basin Expansion (2.6 million cy)
  - Blair Bridge Reach Widening (265,000 cy)
  - Upper Snohomish Turning Basin (425,000 cy)
  - Grays Harbor O & M (1.9 million cy)
  - Dakota Creek (246,000 cy)
- Clean material in demand for beneficial uses

1.11

2005 Recency Extensions

- Curtis Wharf, Port of Anacortes

1.12

Project Updates

- Pacific Sound Resources Project used dredged material from Duwamish and Snohomish for capping
- Projects in Lower Duwamish Superfund area getting extra coordination and oversight

1.13

Ongoing/Future Projects

- Port of Tacoma / Blair Turning Basin Expansion Project (2.6 million cy)
- Port of Tacoma/Blair Waterway SW Corner Cutback (105,000 cy)
- Dakota Creek, Port of Anacortes (246,000cy)
- Grays Harbor O&M (1.86 million cy)

1.14

MORE
Ongoing/Future Projects

- Port of Seattle, Terminal 46 (27,000 cy)
- Port of Seattle, Fishermen's Terminal (33,000 cy)
- Port of Bellingham, Harris Avenue Shipyard MTCA Cleanup (15,000 cy)
- Tidewater Cove (12,000 cy)

1.15

The Big Picture

1. DMMP modifications since last SMARM
2. 2005 Testing & Evaluation
3. Future challenges

1.16

Upcoming Issues

- Biennial Report
- Z samples (future refinements to z-sampling requirements will be forthcoming based on recent projects, e.g., Port of Seattle/Terminal 103, Lakeside Industries)
- Beneficial Uses Interagency Forum
- Regional Sediment Evaluation (RSET)

1.17

For more DMMP information

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

Click on "Civil Works" then "Dredged Material Management"

1.18

2004 Partial Monitoring: Commencement Bay Disposal Site

Peter Leon

DNR DMMP Manager

EPA United States Environmental Protection Agency REGION 10

U.S. Army Corps of Engineers Seattle District

WASHINGTON STATE DEPARTMENT OF Natural Resources

Department of Ecology

2.1

Thank you

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

2.2

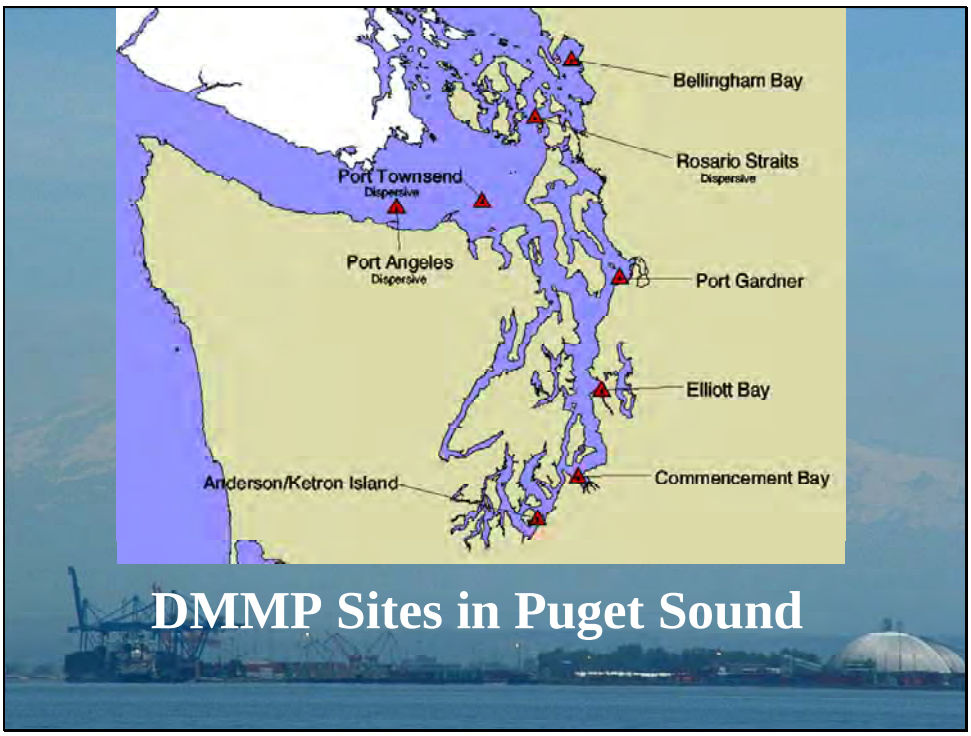
Agenda

- Disposal Site Location
- Monitoring Framework
- Summary of Previous Conditions
- 2004 Modifications
- 2004 Results
- 2004 Evaluations
- Future Activities & Disposal Summary

2.3

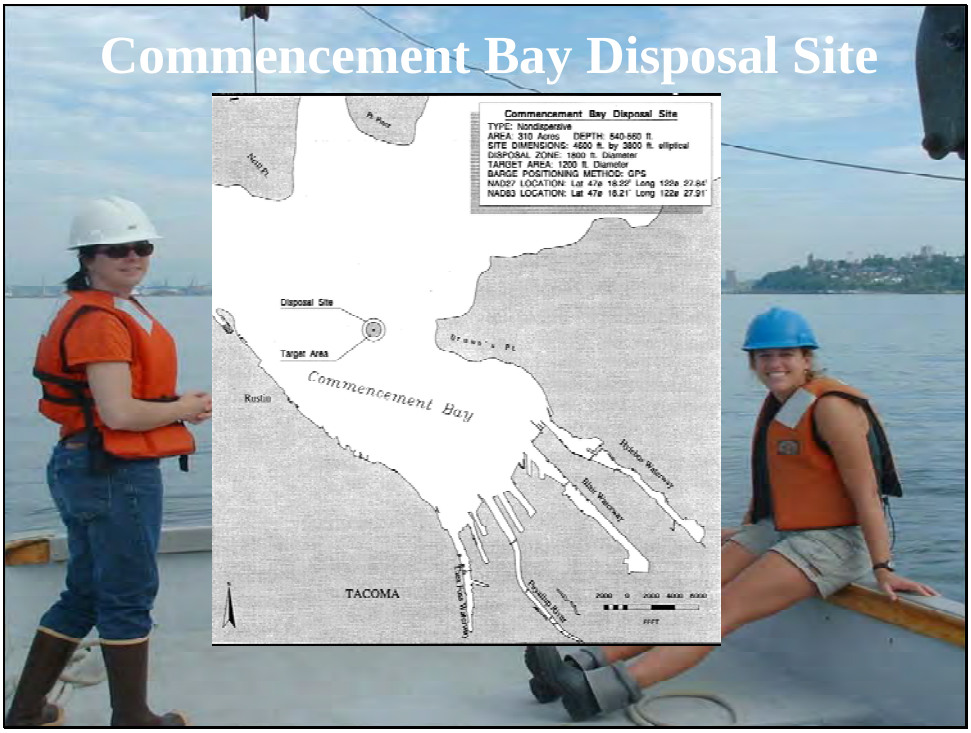
Disposal Site Location

2.4



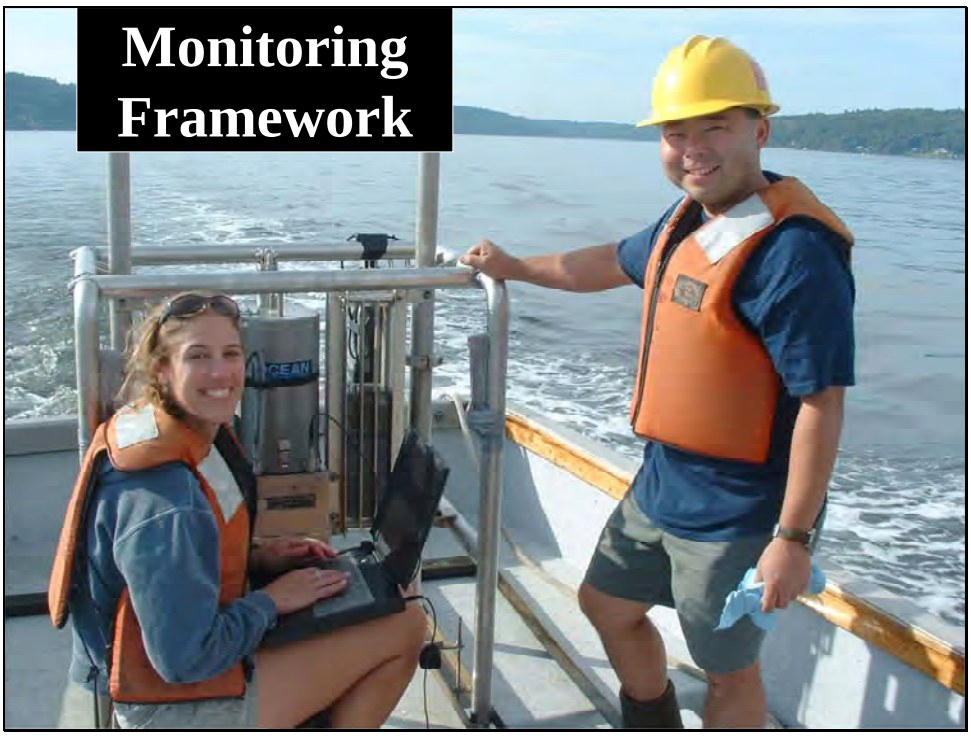
DMMP Sites in Puget Sound

2.5



2.6

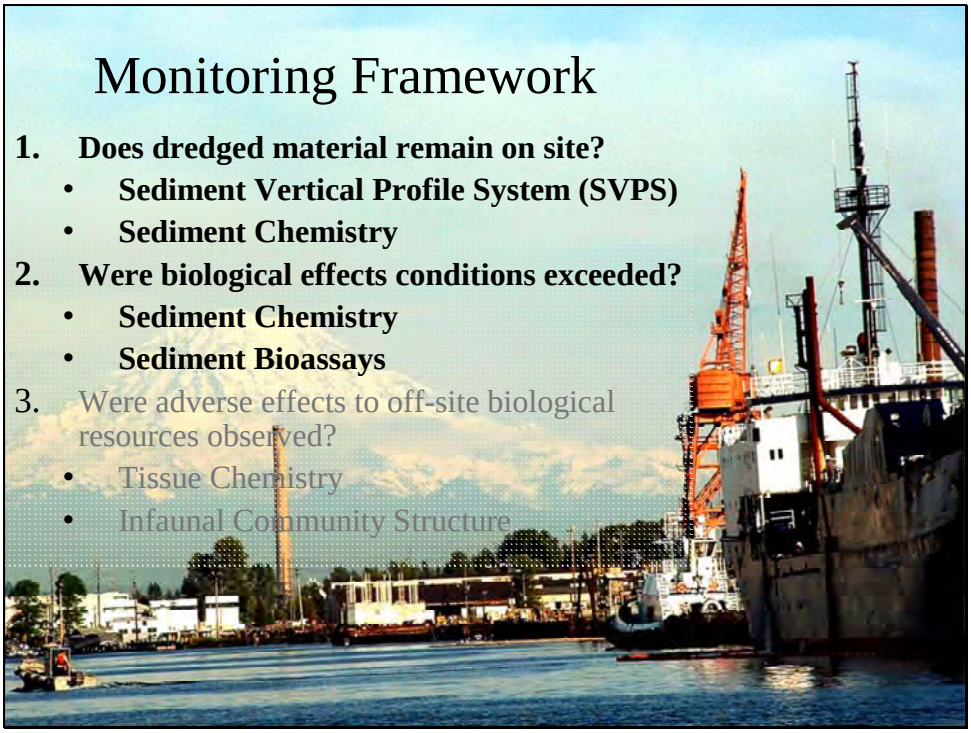
Monitoring Framework



2.7

Monitoring Framework

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

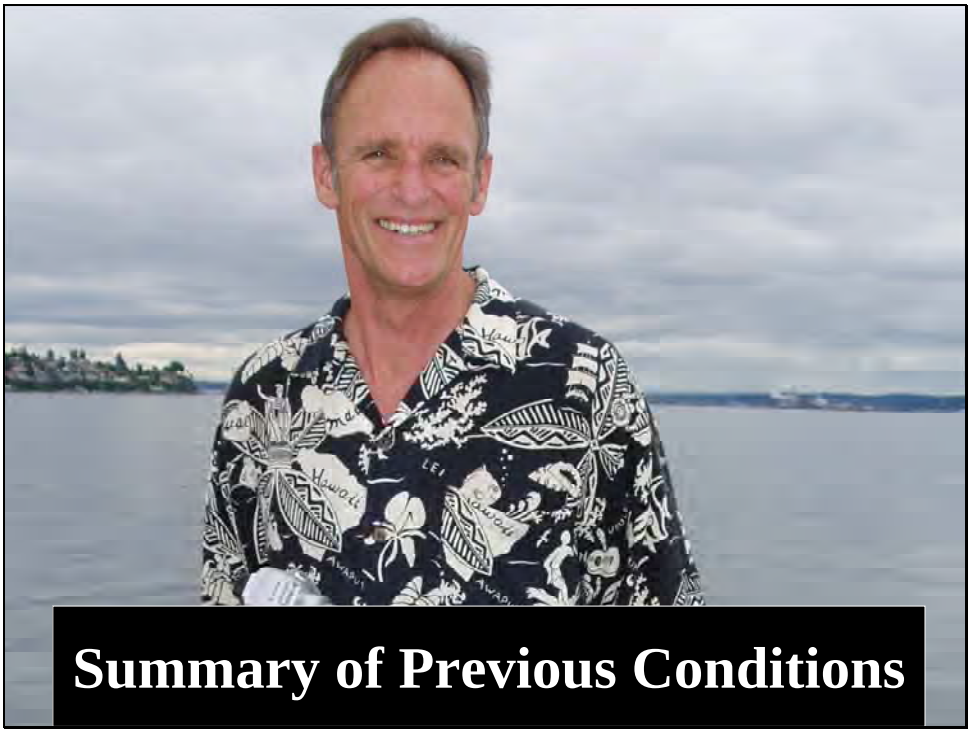


2.8

Partial Monitoring Tools

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

2.9



2.10

Summary of 1988 Baseline Conditions

- Historic DM present in Southeast
- SL exceedances: HPAH, LPAH, phenol, 4-methylphenol, dibenzofuran, hexachlorobutadiene, Sb, & Hg
- Bioassay failures: 1 on-site & 1 benchmark
- Benthic infauna were abundant

2.11

Summary of 1995 "Full"

- SVPS – All material remained on site
- On-site stations passed chem. & bioassay
- High PAHs and Metals
- Increase in percent fines at southern end
- Molluscan taxa showed a significant decrease at the farthest transect station, unrelated to DM

2.12

Summary of 1996 “Partial”

- SVPS - Dredged material remained on site
- No effects beyond minor adverse biological effects
- On-site chemistry and bioassays passed
- Benchmark results used to represent baseline: All metals and several PAHs detected; Pb >SLs in all reps; indeno(1,2,3-c,d)pyrene, 4,methylphenol, benzyl alcohol, and benzoic acid > SL @ CBB02

2.13

Summary of 1998 SVPS

- Thin band of DM present beyond the site boundary to the NW (fine sands and sandy silts)

2.14

Summary of 2001 “Full”

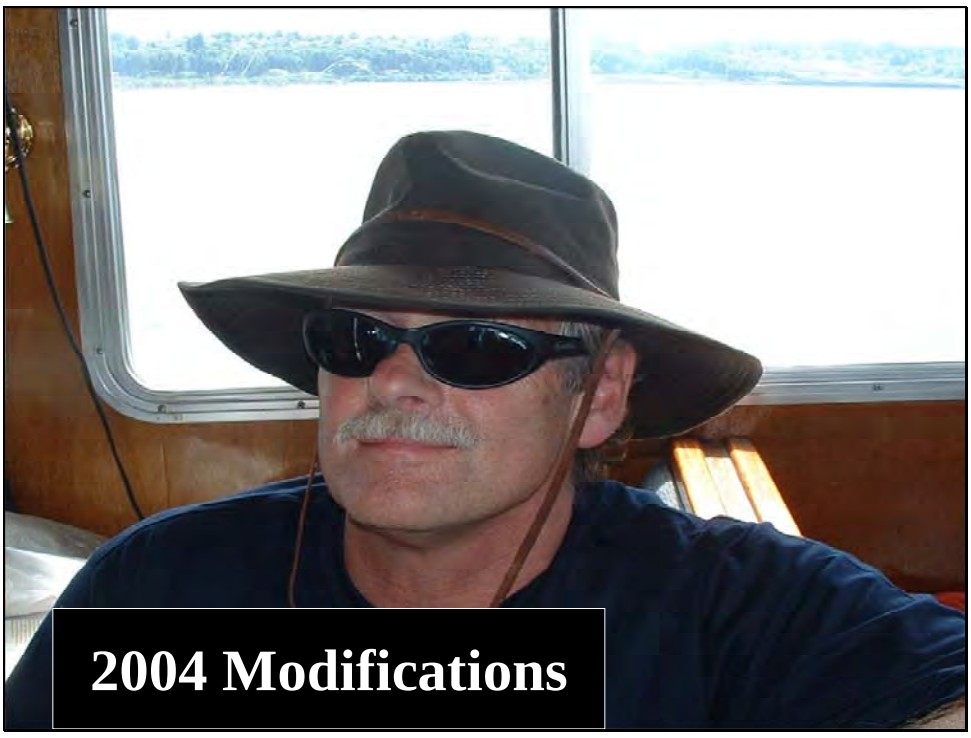
- SVPS – Large excursions (areal, not volumetric) to the NNW and SW
- On-site stations passed chem. & bioassay
- No chemical concentration increase offsite
- Bay-wide decrease in infauna

2.15

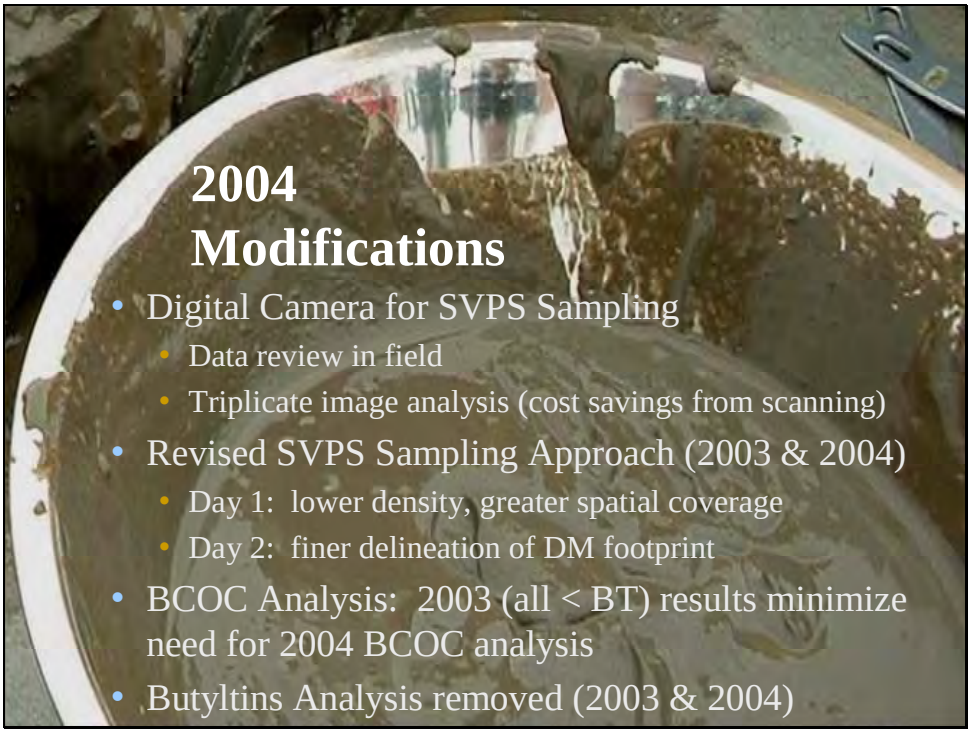
Summary of 2003 “Tiered”

- SVPS – Significantly smaller footprint than 2001 (small excursions NNW and SW)
- On-site stations passed chem. & bioassay
- Chemical concentrations generally do not increase offsite
- Bay-wide increase in dominant infauna

2.16


2004 Modifications

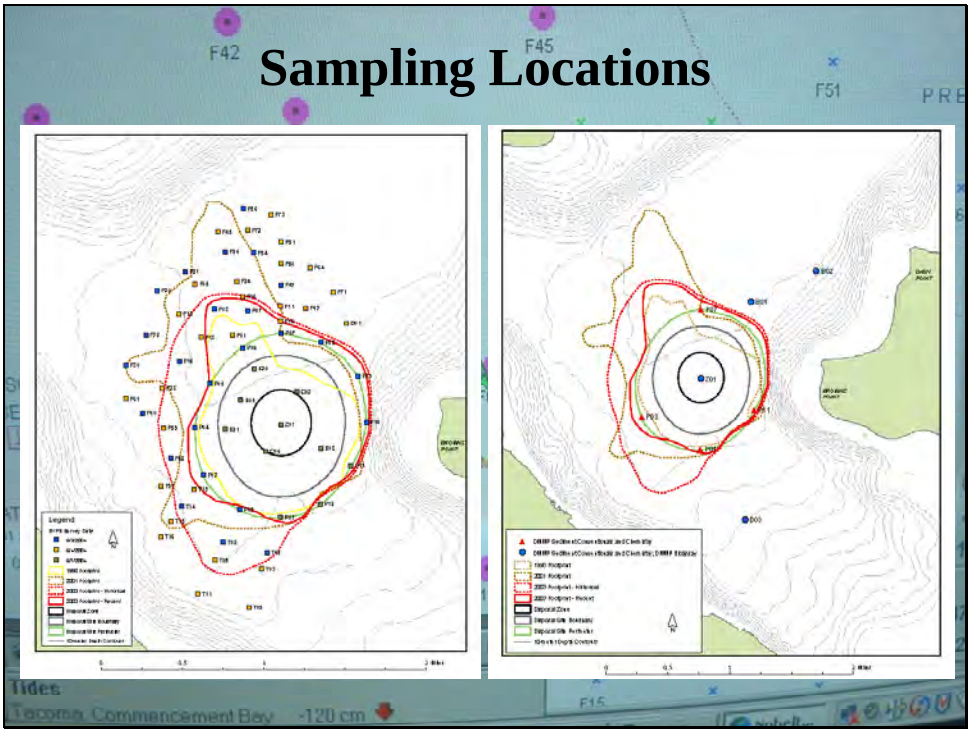
2.17


2004
Modifications
• Digital Camera for SVPS Sampling
• Data review in field
• Triplicate image analysis (cost savings from scanning)
• Revised SVPS Sampling Approach (2003 & 2004)
• Day 1: lower density, greater spatial coverage
• Day 2: finer delineation of DM footprint
• BCOC Analysis: 2003 (all < BT) results minimize need for 2004 BCOC analysis
• Butyltins Analysis removed (2003 & 2004)

2.18

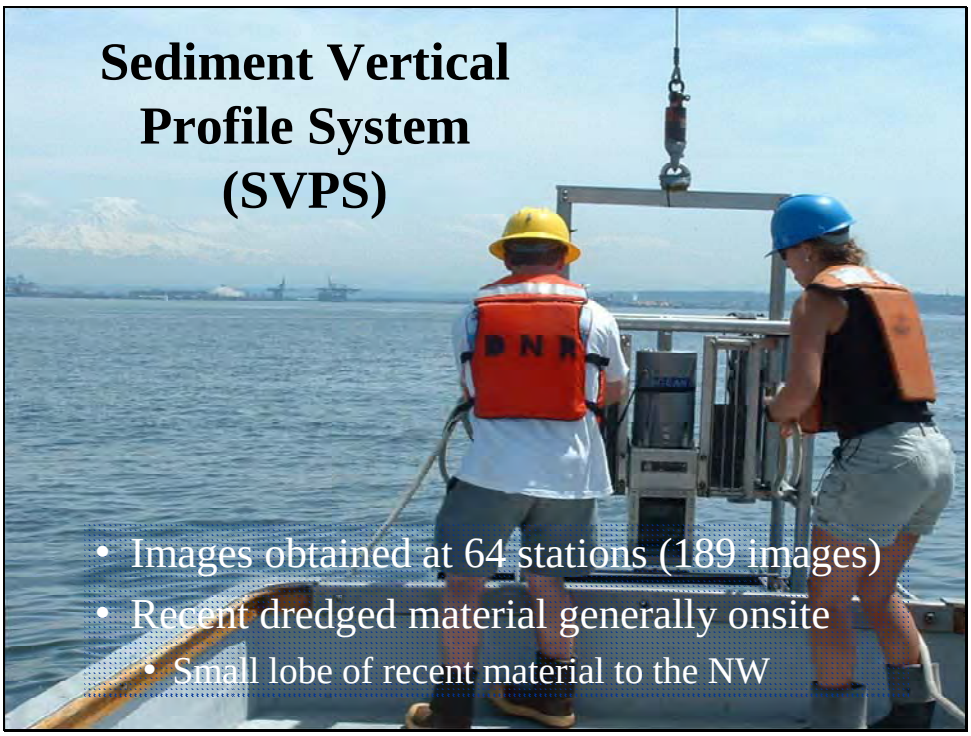

2004 Results
• SVPS
• Site Chemistry
• Site Bioassays
• Benchmark Stations

2.19


Sampling Locations
F42
F45
F51
Tides
Tacoma, Commencement Bay
-120 cm

2.20

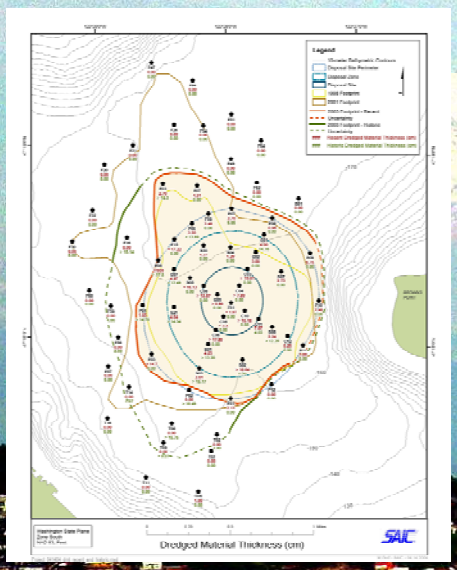
Sediment Vertical Profile System (SVPS)



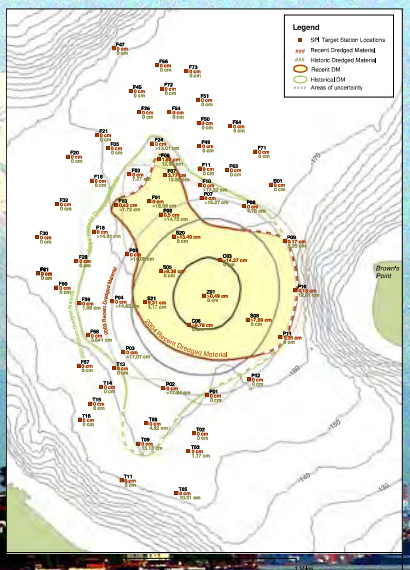
- Images obtained at 64 stations (189 images)
- Recent dredged material generally onsite
  - Small lobe of recent material to the NW

2.21

2003 v. 2004 Distribution

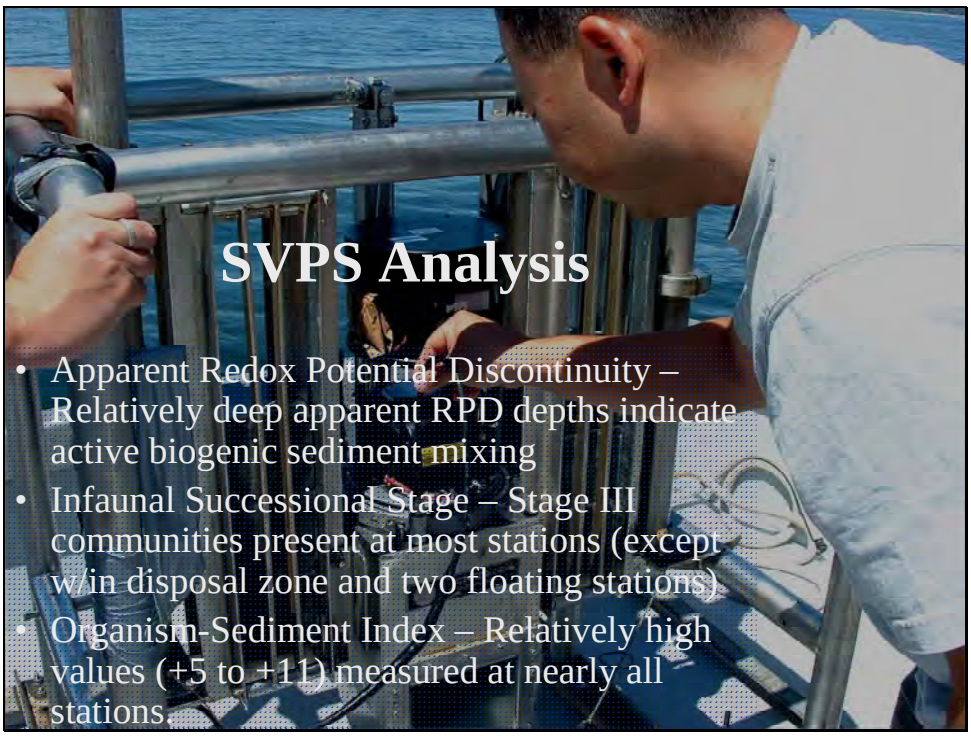


2003



2004

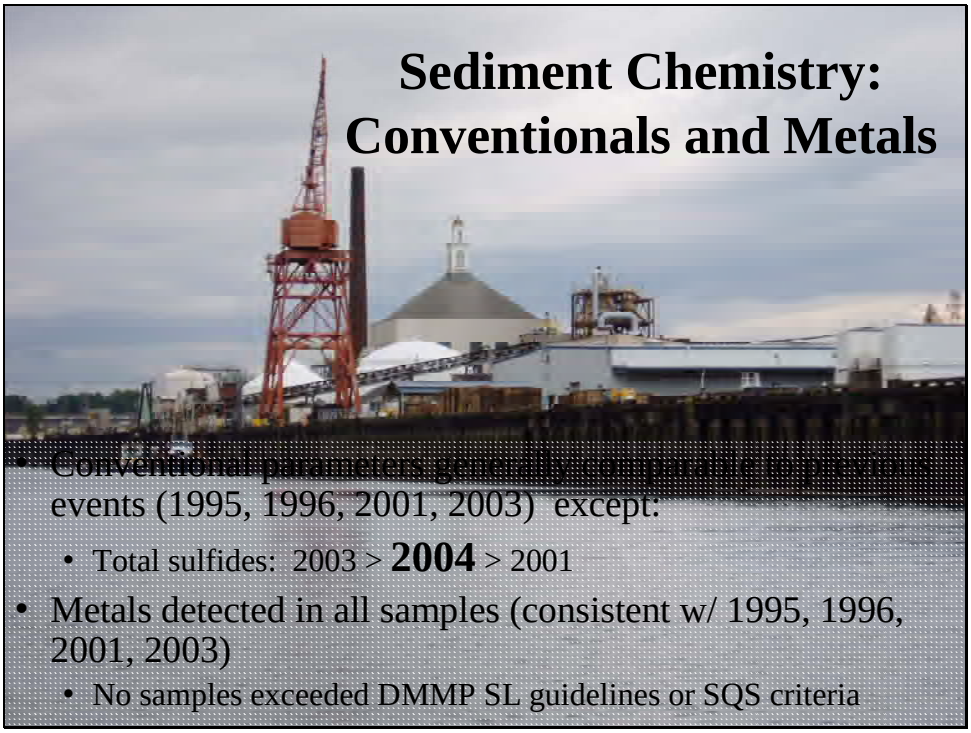
2.22



SVPS Analysis

- Apparent Redox Potential Discontinuity – Relatively deep apparent RPD depths indicate active biogenic sediment mixing
- Infaunal Successional Stage – Stage III communities present at most stations (except w/in disposal zone and two floating stations)
- Organism-Sediment Index – Relatively high values (+5 to +11) measured at nearly all stations

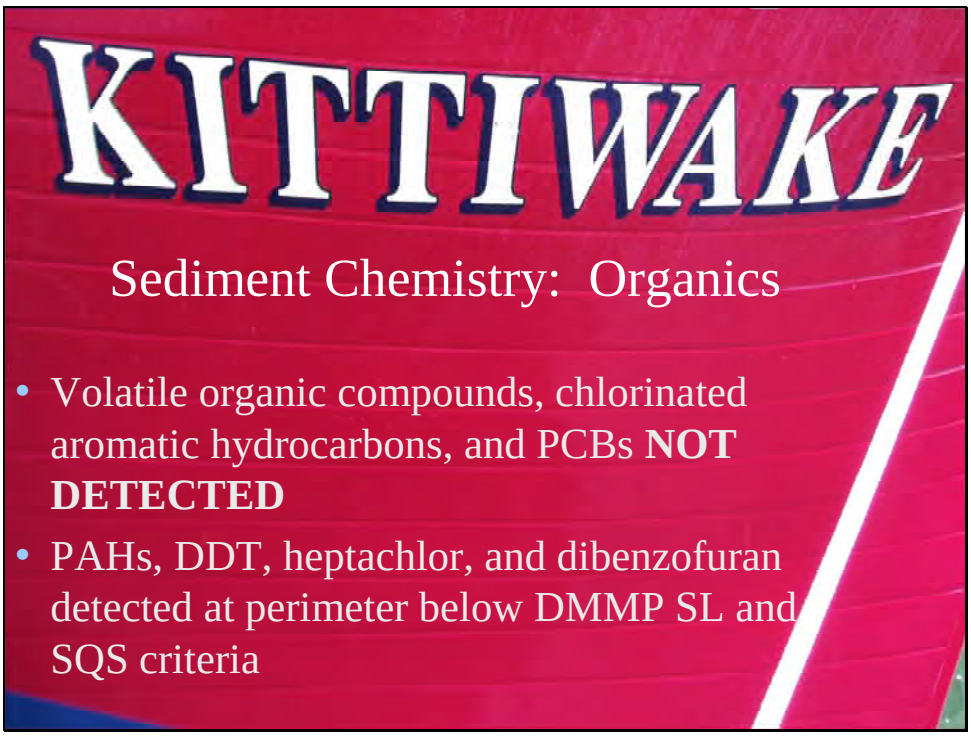
2.23



Sediment Chemistry: Conventionals and Metals

- Conventional parameters generally comparable to previous events (1995, 1996, 2001, 2003) except:
  - Total sulfides: 2003 > **2004** > 2001
- Metals detected in all samples (consistent w/ 1995, 1996, 2001, 2003)
  - No samples exceeded DMMP SL guidelines or SQS criteria

2.24



Sediment Chemistry: Organics

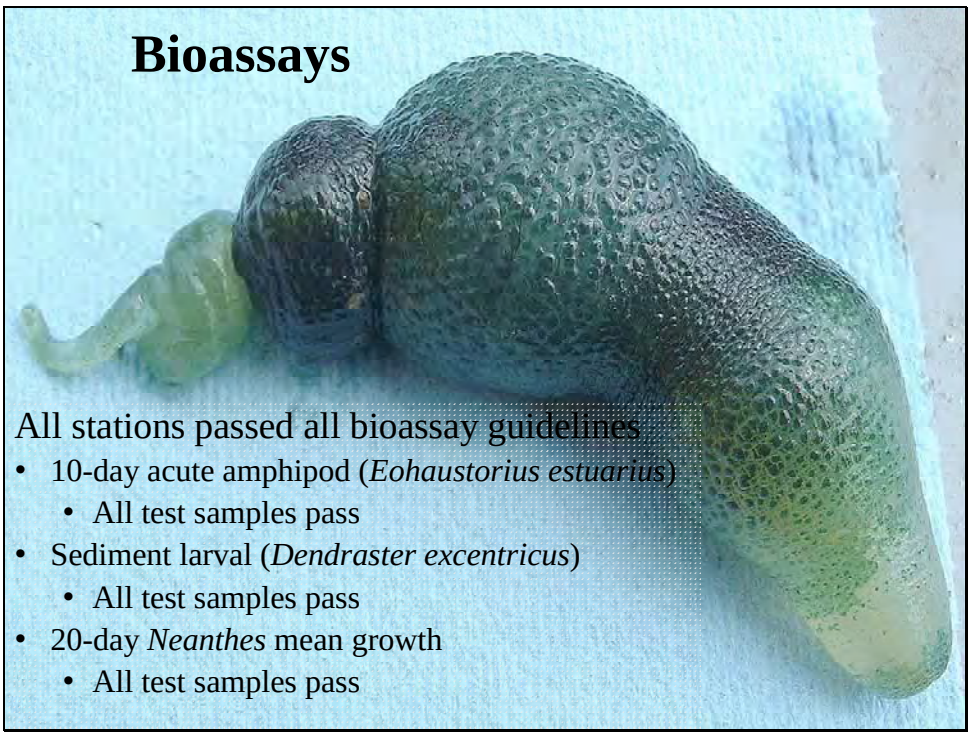
- Volatile organic compounds, chlorinated aromatic hydrocarbons, and PCBs **NOT DETECTED**
- PAHs, DDT, heptachlor, and dibenzofuran detected at perimeter below DMMP SL and SQS criteria

2.25

Sediment Chemistry: Field Variability

- In general, field variability acceptable for all samples (RSD < 50%), except:
  - P07: anthracene (86.6%), bis(2-ethylhexyl)phthalate(69.9%), phenol (75.6%), and total DDT (59.7%)
  - P11: total sulfides (158.7%), total fluoranthenes (58.5%), phenanthrene (53.2%), total LPAHs (77.8%), and phenol (52.9%)
- Concentrations for organics generally low or "J" qualified, which can explain higher variability.

2.26


Bioassays
All stations passed all bioassay guidelines
• 10-day acute amphipod (*Eohaustorius estuarius*)
• All test samples pass
• Sediment larval (*Dendraster excentricus*)
• All test samples pass
• 20-day *Neanthes* mean growth
• All test samples pass

2.27

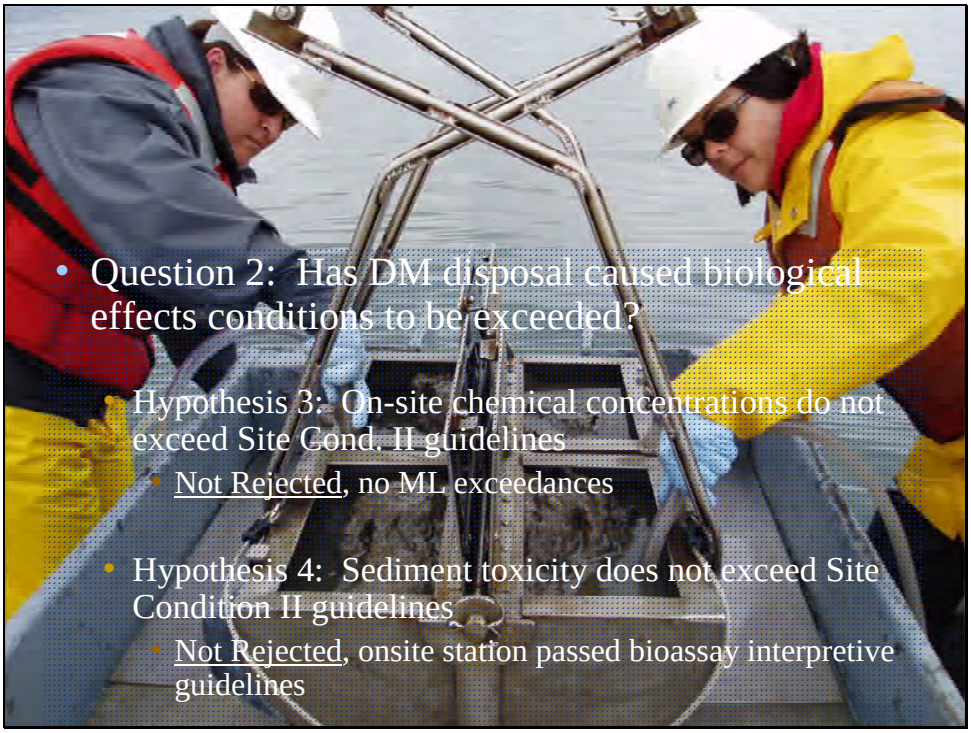

2004 Evaluations
SAIC

2.28

Evaluation of 2004 Data

- Question 1: Does dredged material remain on-site?
  - Hypothesis 1: Dredged material remains within the site boundary
    - Rejected, based on SVPS Survey
    - However, only one station outside disposal site perimeter exceeded 3cm interpretive criteria (3.77 cm)
  - Hypothesis 2: Chemical concentrations offsite do not increase due to disposal
    - Not Rejected, CTS time-trend analysis of all chemical groups show decreases in COCs

2.29



- Question 2: Has DM disposal caused biological effects conditions to be exceeded?
  - Hypothesis 3: On-site chemical concentrations do not exceed Site Cond. II guidelines
    - Not Rejected, no ML exceedances
  - Hypothesis 4: Sediment toxicity does not exceed Site Condition II guidelines
    - Not Rejected, onsite station passed bioassay interpretive guidelines

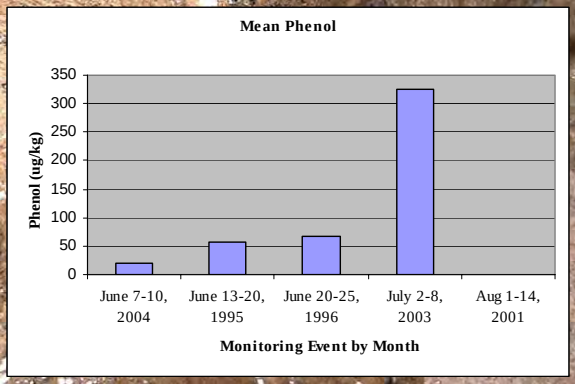
2.30

Future Activities & Disposal Summary

2.31

Phenol question…

How to explain mean phenol concentrations at perimeter stations measured during Commencement Bay site monitoring from 1995 – 2004?



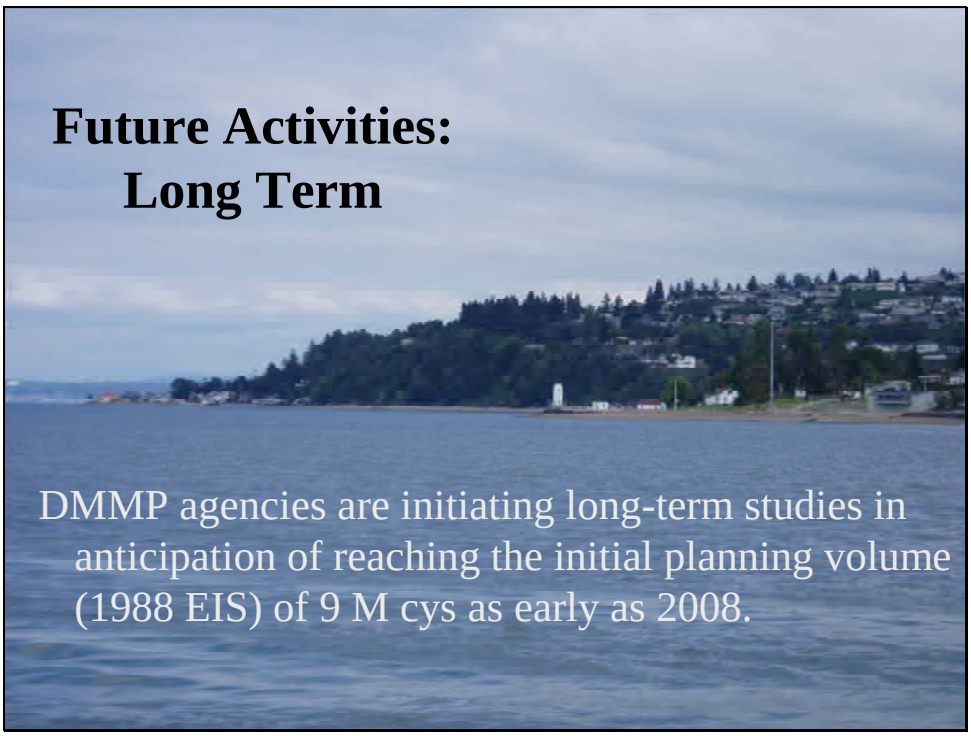
2.32


Future Activities:
Summer 2005
• Physical monitoring and phenol study at Commencement Bay (950,000 cys)
• "Tiered" monitoring at Anderson/Ketron
• Potentially occupy "Z" and "S" stations at Elliott Bay in response to post-dredge surfaces

2.33


Future Activities: Summer 2006
• "Partial" monitoring at Commencement Bay (~1,000,000+ cys anticipated for DY06)
• "Tiered" monitoring at Port Gardner

2.34


Future Activities:
Long Term
DMMP agencies are initiating long-term studies in anticipation of reaching the initial planning volume (1988 EIS) of 9 M cys as early as 2008.

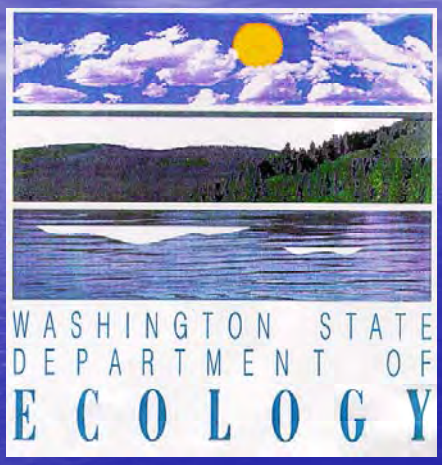
2.35


Anderson/Ketron: 8,180 cys
Commencement Bay: 949,642 cys
Elliott Bay: 77,353 cys
Rosario Straits: 18,420 cys
Bellingham Bay, Port Angeles, Port Gardner, Port Townsend: 0 cys
DNR Disposal Volumes
DY 2005

2.36


Thank You

Sediment Management
in the Toxics Cleanup Program



Still Kathryn DeJesus
Sediment Management Unit, TCP-HQ

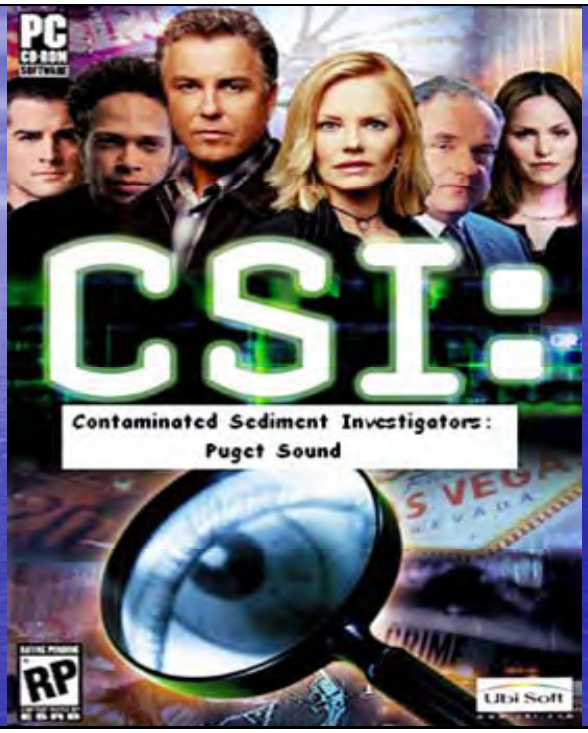
3.1

S

M

U

aka . . .



3.2

Sediment Management within Ecology's Toxic Cleanup Program, Jim Pendowski

HQ Section, Tim Nord
- Sediment Management Unit – Kathryn DeJesus
- Federal Site Cleanup & UST Unit
- Policy & Technical Support Unit
- Information Communications Unit

NWRO Section, Steve Alexander
- Uplands Unit
- Aquatics Unit – Gail Colburn
- Expedited Cleanups and Tank Unit
- Operational Support Unit

3.3

Sediment Management within Ecology's Toxic Cleanup Program (cont.)

SWRO Section, Rebecca Lawson
- Urban Bay Action Team
- Technical Support Unit
- Site Management and Tank Unit

ERO Section, Flora Goldstein
- Preremedial Unit
- Site Management Unit – John Roland

CRO Section, Don Abbott
- Units? They don't need no stinking units…

3.4

Freshwater Sediment Guidelines

Phase I 2002 – Review of freshwater guidelines

Reliability analyses identified none preferred

Phase II 2003 – Freshwater guidelines

Developed new Freshwater Sediment Quality Values

Apparent Effects Threshold (AET) "optimal" values

Current Implementation Plan –

Dave Bradley is Lead (360) 407-6907

(Subliminal suggestion: I'd call him if I were you...)

3.5

Wood Waste Guidance

Ecology IS CURRENTLY drafting guidance for the identification and assessment of marine wood waste cleanup sites

Please fold, spindle, mutilate and set fire to clandestine copy

Guidance will identify:

- Environmental impacts of wood waste
- Use of "best available science" assessment tools
- Recommended methods for site assessment and cleanup boundary identification

3.6

Risk Range for Sediment Cleanups Under Washington Law

Attorney General Memorandum set forth Washington State's interpretation of Ecology regulations – May 7, 2004

Clarifies:

- Relationship between MTCA and SMS rules
- SMS function as an extension of MTCA for sediment cleanups
- Human Health Risk Levels established in MTCA Cleanup Regulation apply to sediment sites

3.7

SEDQUAL Information System: R5.1

ArcGIS integration module (Arc View 9.x support)

Support for users to create custom **derived variable** definitions (summed compounds)

Station identifier increased from 12 to 25characters

Sample identifier increased from 8 to 25 characters

Many new data sets (surveys)

NOTE: QA2 data on CD ROM preferred

3.8

Contaminated Site Information … or mud matters, too

"Sediment-only" sites being added to Facility Site list for entry into TCP's Integrated Site Information System (ISIS)

Automating information for reporting purposes

3.9

Sediment Source Control

303d@ecy.wa.gov

- 2002/2004 WQ & Sediment 303(d) Lists
  - Spring 2005 to EPA
- NPDES Permit Technical Support
  - DNR Coordination

3.10

some... Sediment Site Status

- Jackson Park Housing Complex (Ostrich Bay)
- Bellingham Bay Demonstration Pilot Project
- Gas Works Park, Lake Union
- Skykomish River
- Spokane River

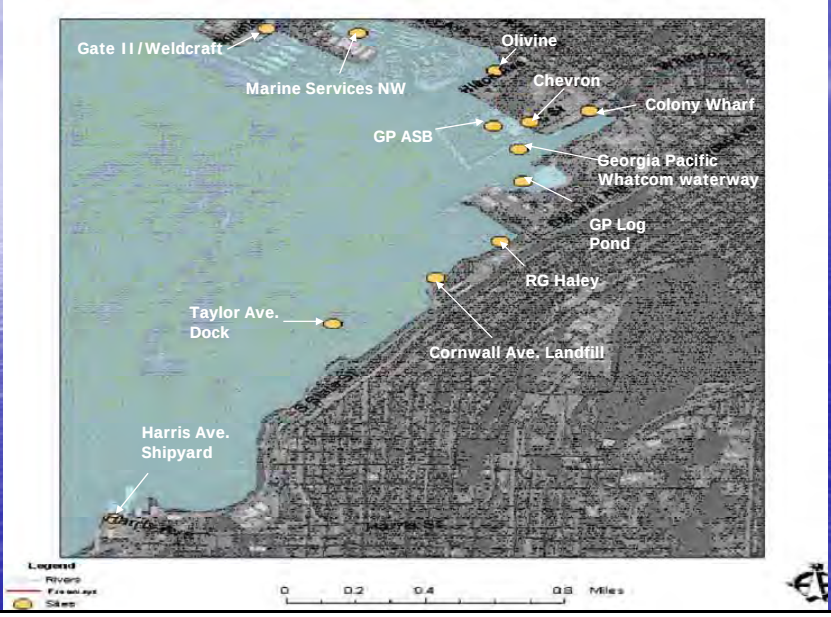
NOTE: Sediment Cleanups under VCP

3.11

JACKSON PARK HOUSING COMPLEX
NAVAL HOSPITAL BREMERTON

3.12

Bellingham Bay Demonstration Pilot



3.13

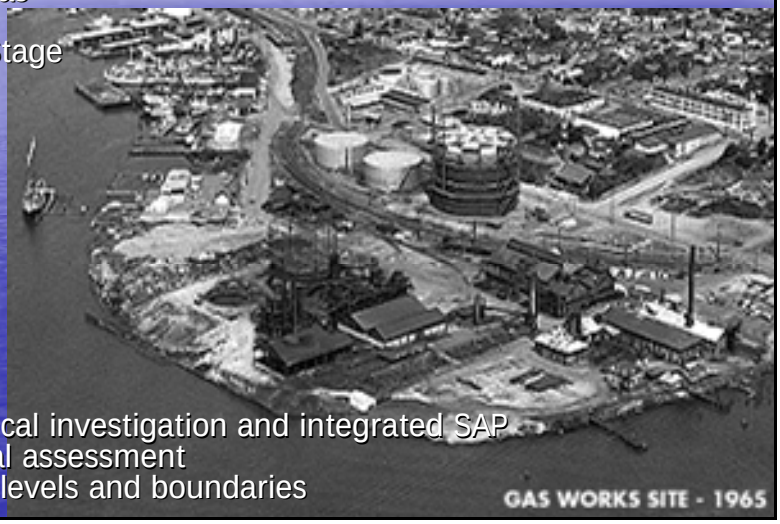
Whatcom Waterway - Bellingham

- Contaminants: Mercury, Phenol, 4-methyl phenol
- Georgia Pacific Properties Sold to Port of Bellingham with cleanup liability agreement
- Revised Cleanup Action Plan (CAP) under review
- Property sale and better clarity of future use by Port is partial driver for new CAP alternatives

3.14

Gas Works Park

- Contaminants: Metals, PAHs, DNAPL (surface and subsurface)
- Eastern (Puget Sound Energy) and Western (City of Seattle) Study Areas
- Cleanup Stage
  - RI/FS



- Geotechnical investigation and integrated SAP
  - biological assessment
  - cleanup levels and boundaries

3.15

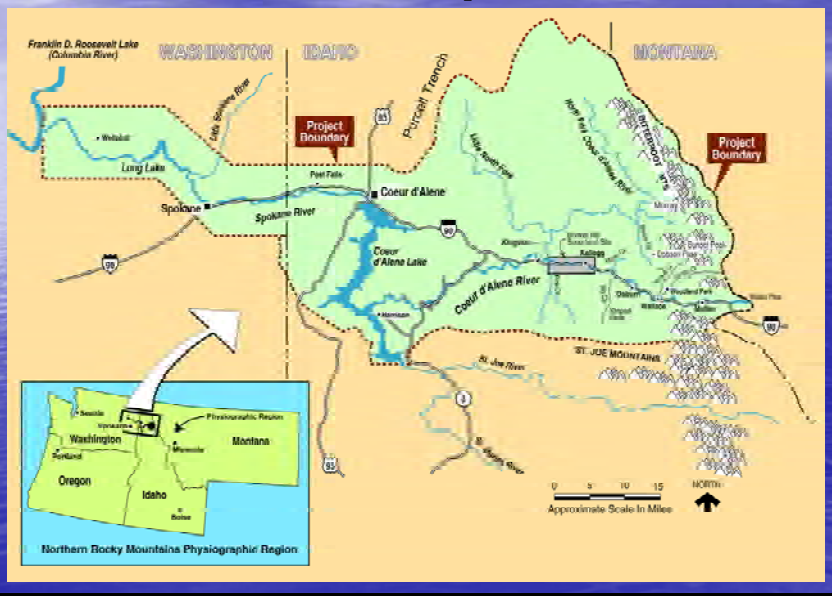
Skykomish River

- Burlington Northern/Santa Fe Railroad
- Contaminants: PAHs, TPH (Diesel/Oil) LNAPL - 15 feet below ground surface
- Groundwater to sediment pathway - Site specific TPH groundwater cleanup level for protection of sediments - 208 micrograms per liter

- Levee reconstruction/sediment removal Fall 2006

3.16

Spokane River Basin
(Coeur d'Alene Basin Superfund Cleanup)



3.17

Upriver Dam Site

3.18

Web Sites. . .

- Toxic Cleanup Program, Sediment Management homepage: http://www.ecy.wa.gov/programs/tcp/smu/sediment.html
- SEDQUAL data entry templates: http://www.ecy.wa.gov/programs/tcp/smu/sedqual/sedqual_templates.htm
- 2003 SAPA: http://www.ecy.wa.gov/programs/tcp/smu/sapa/sapa.htm
- Cleanup Site Information: http://www.ecy.wa.gov/programs/tcp/sites/sites.html
- Water Quality Program 303(d) homepage: http://www.ecy.wa.gov/programs/wq/303d/index.html

3.19

THAT'S ALL FOLKS...

3.20

EPA Region 10 Superfund
Puget Sound Sediment Cleanup

Sediment Management Annual Review Meeting

May 2005

Sheila Eckman, EPA

4.1

2004-2005 Puget Sound Cleanup Update

- Commencement Bay - Hylebos, Thea Foss, Middle Waterways
- Harbor Island - East Waterway, Todd Shipyard, Lockheed Shipyard
- PSR
- Lower Duwamish Waterway - RI/FS and Early Actions

4.2

Hylebos Waterway

- 80+ acres
- Being completed in segments
- 2004-05: 140,00 cy dredged
- Precision dredging in Head of Hylebos
- Will be complete in 2005-06 season.

4.3

Occidental

- Hylebos waterway
- RCRA Corrective Action facility
- Highly contaminated source material beneath sediments
- Comprehensive uplands/sediment investigation in 2005
- Joint EPA/Ecology CERCLA/RCRA oversight of Occidental

4.4

Thea Foss Waterway

- 2004-05 highlights: Most clamshell dredging completed, 2-3' cover, marinas reconfigured after remediation, CDF berm construction.
- 2005-06 plans: Remaining dredging (clamshell and hydraulic), mitigation area construction, CDF filled & closed.
- Completion in 2006

4.5

Middle Waterway - Complete!

- 2004-05: Subsurface Cleanup by DNR completed.
- Waterway cleanup complete: 112,625 cy material removed, 2.2 acres capped, 3.1 acres natural recovery. $17,165,000.

4.6

East Waterway - Harbor Island

- 2004-05: Removal action by Port of Seattle on 20 acres complete.
- Removed 260,000 cy. Sand layer placed on 14 acres.
- Will be moving into focused RI/FS in 2005.

4.7

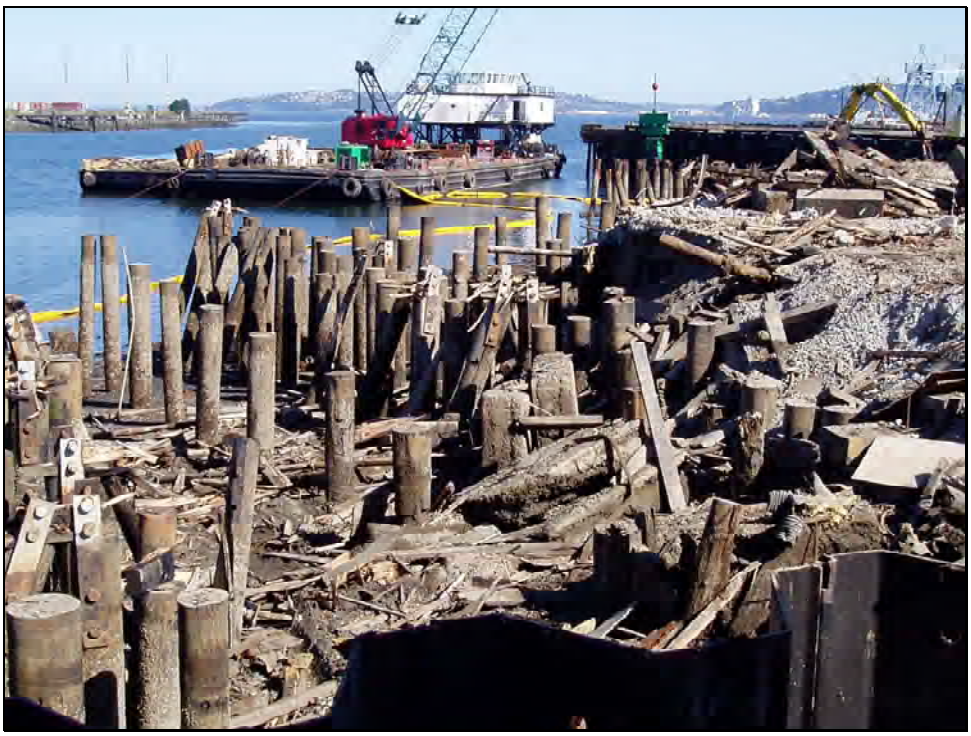
Lockheed Shipyard - Complete!

- 70,000 cy dredged
- 5 acres capped w/habitat mix
- Increased intertidal zone to about 3 acres.
- Total cost: $20m +

4.8

4.9

4.10



4.11

4.12

Todd Shipyard

- 2004-05 highlights: 130,000 cy dredged, intertidal habitat bench built, area under piers capped w/habitat mix, one pier demolished.
- 2005-2006: Complete project - complete underpier capping, demolish 2nd pier, build 2nd habitat bench, dredge remaining 70,000 cy.

4.13

4.14

4.15

PSR - Complete!

- 58 acre sediment cap (+14 to -240 feet)
- Subsurface slopes up to 50%
- 750 piles removed
- 10,000 cy sediment dredged for upland disposal
- 300,000+ cy for cap from upland borrow areas and clean sediment dredged from Snohomish River.
- Marine Sediment Unit - $18 million

4.16

Lower Duwamish Waterway

- RI/FS Phase 2 data collection.
- Source control continues.
- Final RI/FS expected early 2008.
- Terminal 117 Early Action proposed.
- Slip 4 - finalizing EE/CA.

4.17

T-117 Early Action

- Proposed Removal Action of contaminated sediments - public comment period closed April 7
- Proposed removing 13,000 cy (upland and inwater), backfilling, capping
- Approx. 1.88 acres
- 2005: final decision, design
- 2006: cleanup complete

4.18

Other Sediment Projects

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

4.19

4.20

4.21

EPA Contacts

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

4.22

Future of the SMARM Process

- **Introduction**
  - **Commitments and current status**
- **The problem**
  - **Resources versus responsibilities**
- **Some options**
- **Recommendations?**
- **Alternative acronyms/titles**

5.1

Future of the SMARM Process

Introduction

- **PSDDA EIS, MPR and MPTA commitment to implement meaningful annual reviews**
- **PSDDA "ARM" → regional, multi-agency/ program "SMARM" (1st Wed. in May)**
- **Planning, coordination and development of papers (December - April)**
- **Decisions and documentation (Summer/Fall)**

5.2

Future of the SMARM Process

Introduction

- Planning within and outside monthly meetings
- No contract support except for Minutes
- Staff-days to develop papers (*estimated*)
  - Program updates: 1-3
  - Issue papers (major changes): 10-20
  - Clarification papers (minor changes): 2-10
  - Status reports (policy/technical updates): 4-10
  - "Typical SMARM": 80 staff-days

5.3

Future of the SMARM Process

The Problem

- Resources outpaced by responsibilities
- Adjustments
  - Streamlined processes
  - Improved efficiency
- Limits to these means negative impacts

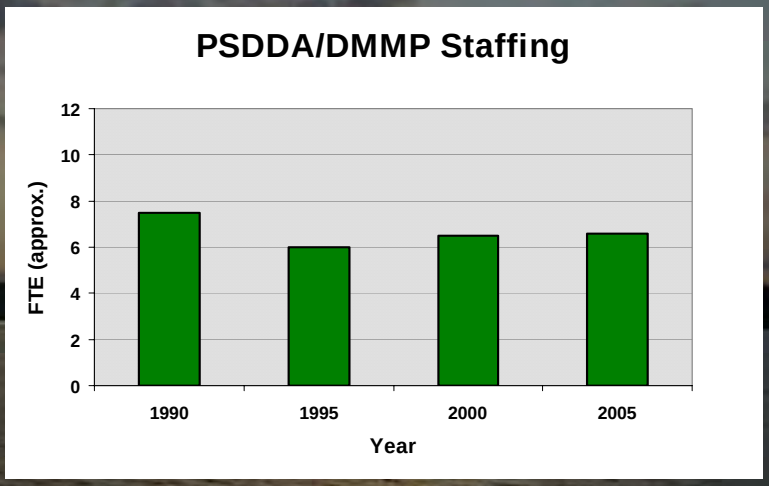
5.4

Future of the SMARM Process

- **PSDDA/DMMP resources**
  - **≅ $3-4M program startup**
  - **≅ 7.5 FTE (1990) → ≅ 6.5 FTE (2005)**
- **DMMP responsibilities**
  - **Navigation projects/year have doubled**
  - **DM volume evaluated more than doubled**
  - **Increased project complexity, policy issues competing priorities, long-term planning**

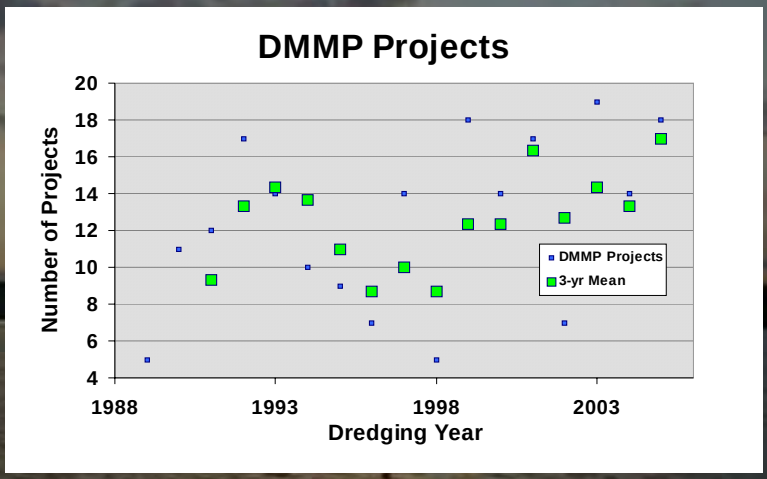
5.5

Future of the SMARM Process



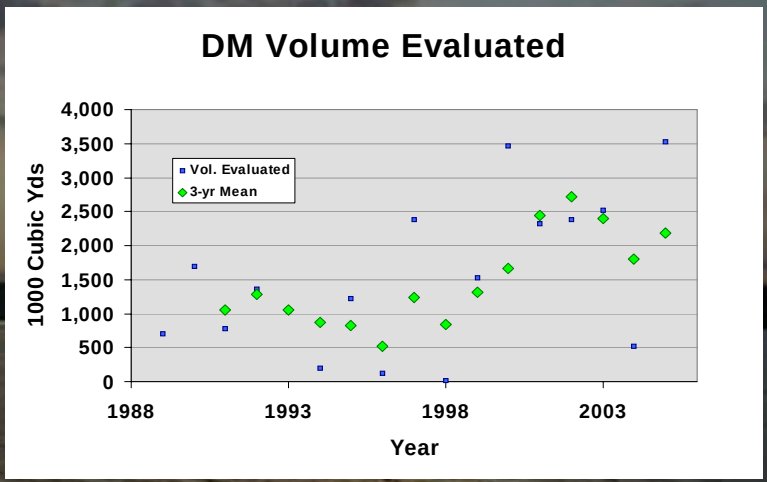
5.6

Future of the SMARM Process



5.7

Future of the SMARM Process



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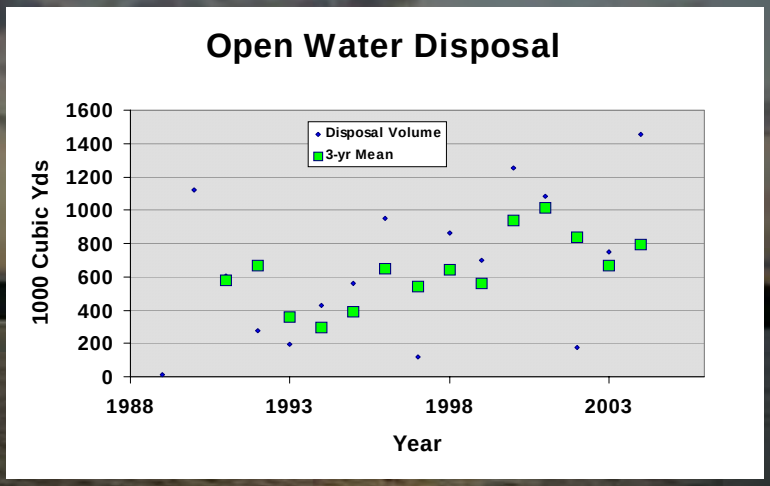
Future of the SMARM Process



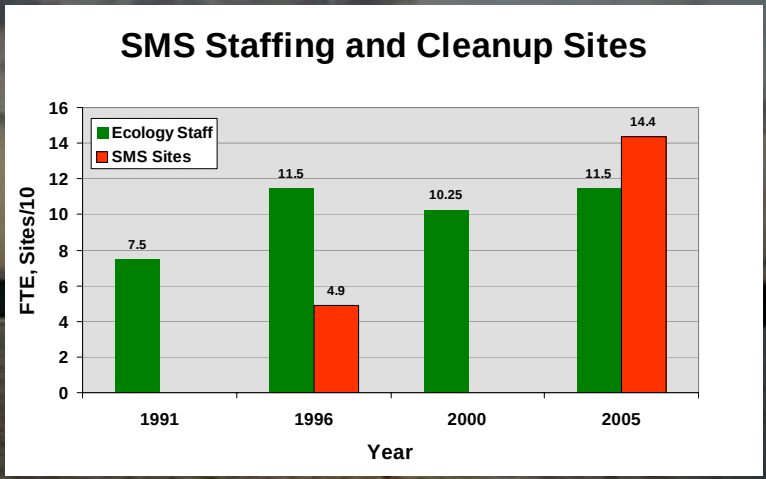
5.9

Future of the SMARM Process

- **SMS program resources**
  - **≅ 7.5 FTEs (1989) → ≅ 11.5 (2005)**
- **SMS responsibilities**
  - **Sediment cleanup sites have tripled**
  - **Sources control program more active**
  - **Increased project complexity, new policy issues and competing priorities**

5.10

Future of the SMARM Process



5.11

Future of the SMARM Process

Options

- **No change**
- **Scale back**
  - **Agencies abbreviate SMARM every other year**
  - **Every other SMARM planned externally**
- **100% web-based process, no meeting**
- **Maintain/enhance SMARM**

5.12

Future of the SMARM Process

Recommendations?

- **No preferred option at this time**
- **Agencies are seeking feedback - which option is preferred, are there other alternatives?**
- **Decision this summer**
- **Details will be posted to Corps/DMMO web site**
  http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=dmmo&pagename=home

5.13

Future of the SMARM Process

Alternative acronyms/titles

- **No change:** SMARM
- **Scaled back option: SMRM? SMOG?**
- **Biennial affair: EYES? OYSTER?**
- **Externally planned: BOAST? OTHER?**
- **Web-based option: 'SMARM-less in Seattle'?**
- **More resources: 'Mother-of-all-SMARMs'?**

5.14

Evaluating Sediment for Cleanup and/or Navigation Dredging

- Introduction
- Projects
- Distinctions
  - Purpose, authorities, process
  - Sampling and Analysis Plans
- Common ground

6.1

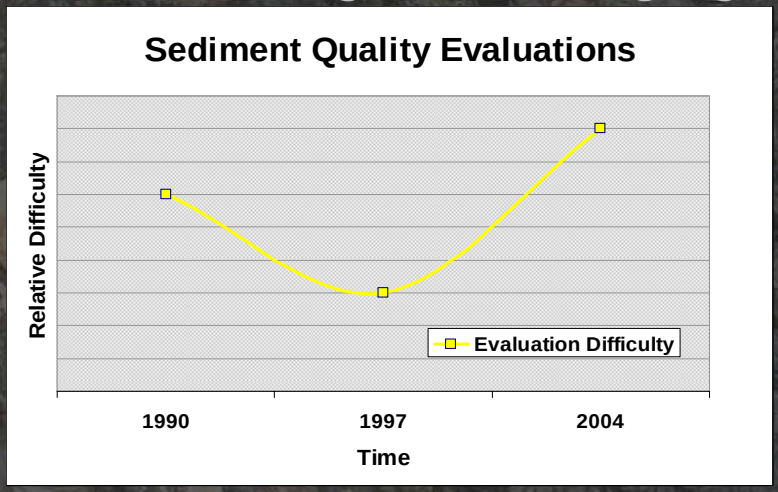
Evaluating Sediment for Cleanup and/or Navigation Dredging

Introduction

- Early sediment evaluations often “tricky”
- Regional experience → evaluations more routine
- Increased complexity
  - Projects located in more contaminated areas
  - Sediment quality more heterogeneous
  - Multiple purpose projects
  - Multiple regulatory authorities

6.2

Evaluating Sediment for Cleanup and/or Navigation Dredging



6.3

Evaluating Sediment for Cleanup and/or Navigation Dredging

Projects

- Dakota Creek Industries, Anacortes
  - Navigation dredging needs near ongoing upland cleanup
  - Evaluated under DMMP with MTCA assistance
- East Waterway, Seattle
  - Substantial navigation need in highly contaminated cleanup area
  - Began as navigation project, removal action conducted under CERCLA

6.4

Evaluating Sediment for Cleanup and/or Navigation Dredging

Projects

- Fisherman's Terminal, Seattle
  - Navigation dredging need in a cleanup area
  - Evaluated under DMMP
- Glacier NW and South Park Marina, Lower Duwamish River
  - Navigation dredging in sediment cleanup site
  - Evaluated under DMMP, CERCLA and MTCA/SMS authorities

6.5

Evaluating Sediment for Cleanup and/or Navigation Dredging

Projects

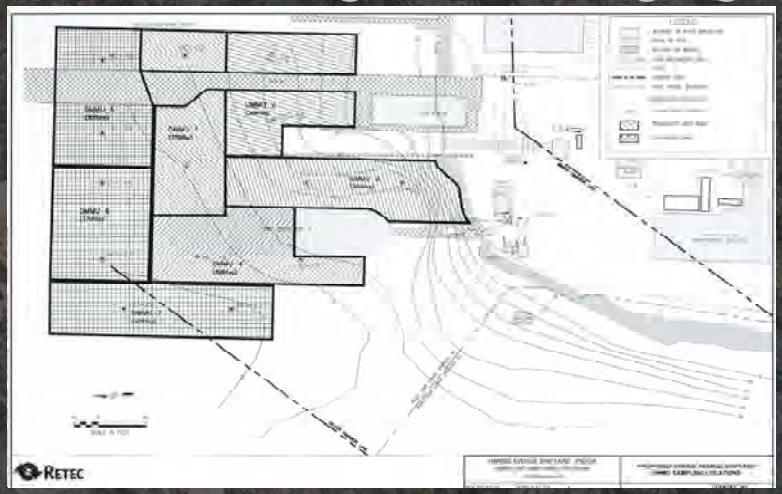
- *Harris Avenue Shipyard, Bellingham*
  - Navigation needs in cleanup investigation area
  - Evaluated under both DMMP and MTCA/SMS
- Manke Lumber, Tacoma
  - Wood debris cleanup site with navigation needs
  - Evaluated under both DMMP and MTCA/SMS
- US Navy, PS Naval Shipyard, Sinclair Inlet
  - Maintenance dredging coupled with cleanup

6.6

Evaluating Sediment for Cleanup and/or Navigation Dredging

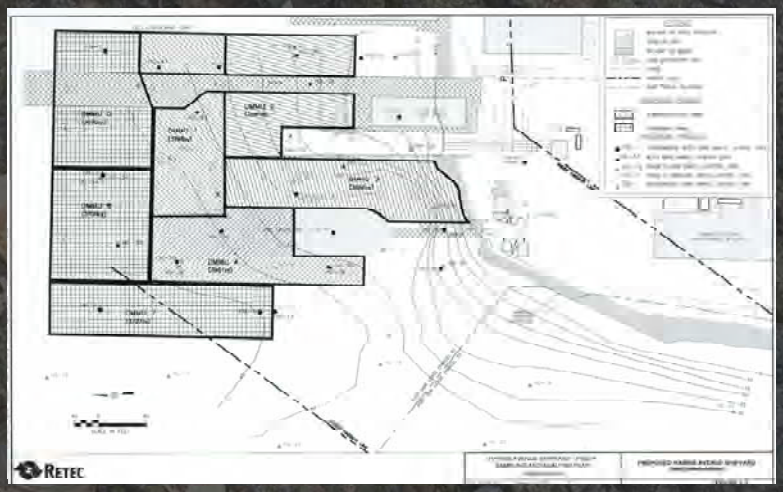
6.7

Evaluating Sediment for Cleanup and/or Navigation Dredging



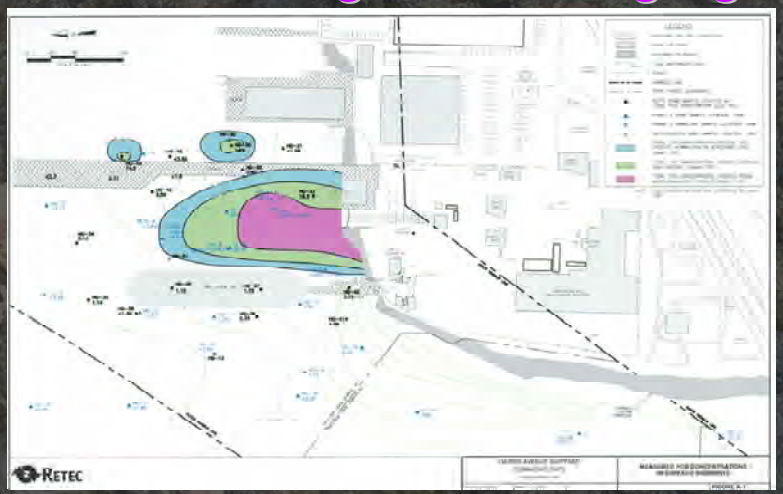
6.8

Evaluating Sediment for Cleanup and/or Navigation Dredging



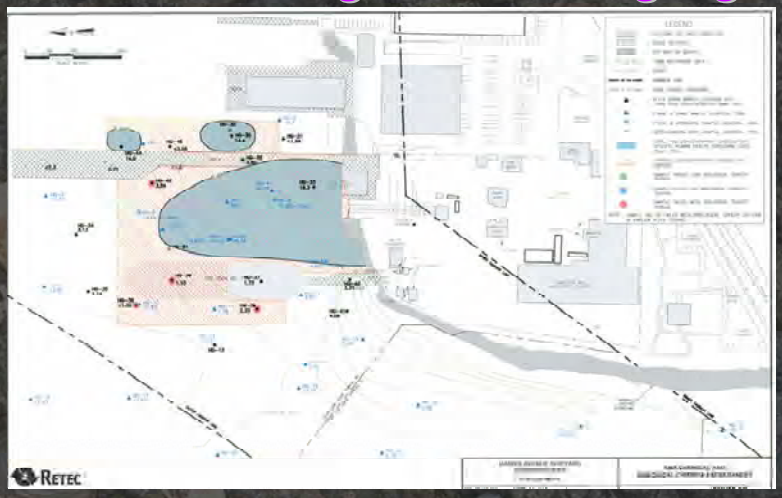
6.9

Evaluating Sediment for Cleanup and/or Navigation Dredging



6.10

Evaluating Sediment for Cleanup and/or Navigation Dredging



6.11

Evaluating Sediment for Cleanup and/or Navigation Dredging

Distinctions

- Purpose, authority, process
  - Why is sediment being evaluated?
    - "Risk" to open-water disposal site?
    - Risk from exposure to *In situ* sediment?
  - What is appropriate authority (ies)?
  - How does regulatory process work?
  - What is the need for coordinating the evaluation process?

6.12

Evaluating Sediment for Cleanup and/or Navigation Dredging

Distinctions

- Sampling Analysis Plans
  - DMMP SAP where navigation need and
    - No imminent cleanup action or investigation and
    - No known or suspected reason for cleanup

6.13

Evaluating Sediment for Cleanup and/or Navigation Dredging

Distinctions

- Sampling Analysis Plans
  - Cleanup (CERCLA and/or MTCA/SMS)
    - Ongoing remedial actions/investigations
    - Known or suspected contamination, planned investigations
    - No imminent navigation need

6.14

Evaluating Sediment for Cleanup and/or Navigation Dredging

Distinctions

- Sampling Analysis Plans
  - "Hybrid" SAP
    - Ongoing cleanup actions or investigations
    - Known or suspected contamination, near-term investigations planned
    - Demonstrated navigation need in near term
    - Recommend combining into single SAP

6.15

Evaluating Sediment for Cleanup and/or Navigation Dredging

Common ground

- Both can assess risk from exposure to contaminants in "surface" sediment
- Evaluating "nature and extent" of contaminants for a cleanup site, e.g., RI/FS process, requires sediment core analysis
- Core samples can be useful for suitability determinations
- Sampling and testing can be similar

6.16

Evaluating Sediment for Cleanup and/or Navigation Dredging

Common ground

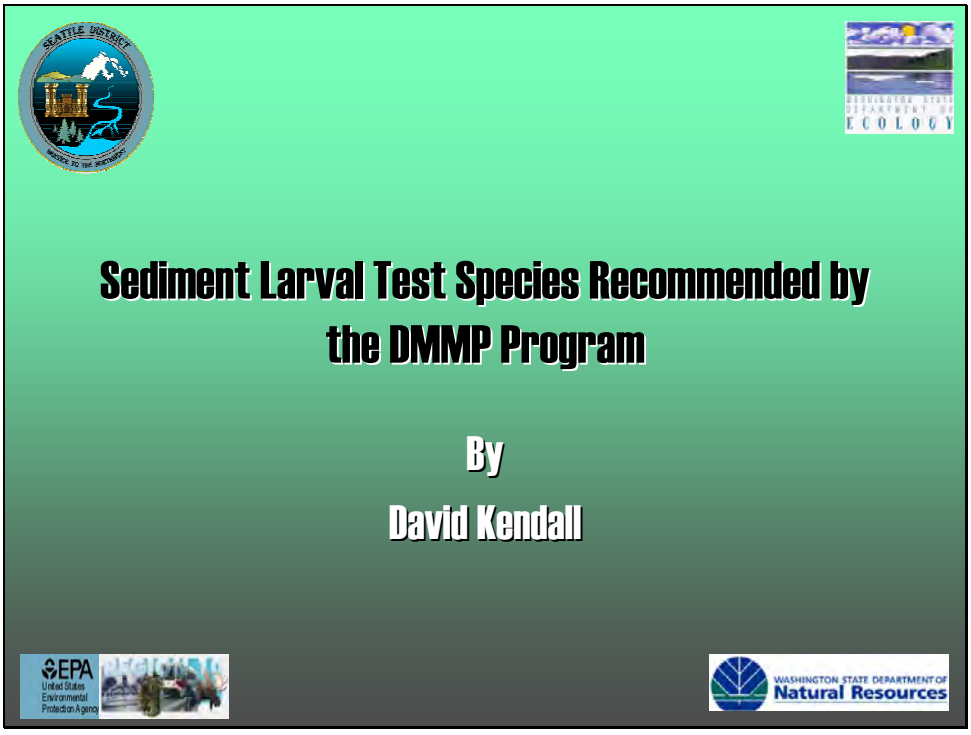
- *In situ* sediments at cleanup site may be suitable for open-water disposal

But

- Sampling frequency often differs
- Composited core samples usually not for assessing *in situ* surface sediment risks
- Surface grabs (only) usually not very useful for DMMP suitability determinations


SEDIMENT MANAGEMENT
ANNUAL REVIEW MEETING
May 4, 2005
Summary of Proposed DMMP Changes not being presented at SMARM
EPA
United States Environmental Protection Agency
WASHINGTON STATE DEPARTMENT OF
Natural Resources

7.1


Sediment Larval Test Species Recommended by the DMMP Program
By
David Kendall
EPA
United States Environmental Protection Agency
WASHINGTON STATE DEPARTMENT OF
Natural Resources

7.2

Proposed Clarification

- The DMMP clarify that species recommended for routine use for the Sediment Larval Bioassay are:
  Mytilus galloprovincialis (bivalve)
  Dendraster excentricus (echinoderm)
- Other species may be used on a case-by-case basis with approval of DMMP agencies

7.3

Clarification of the Role of Detection Limits and Reporting Limits in the DMMP

By

Gwyn Puckett and John Wakeman

7.4

Proposed Clarification:

- Labs must report estimated concentrations that fall between **Method Detection Limits** (**MDLs**) and **Reporting Limits** (**RLs**)
- Labs must report **RLs** and the **MDLs** for any COC accompanied by "**U**" qualifier code
- Ensure Labs are provided with information required to meet project data requirements

7.5

Proposed Clarification

- Reaffirm that **Biological Testing required** when one or more COC have **detection limits > SLs**
- **Total Aroclor PCB reporting**: **DLs** serve as basis for summing non-detected Aroclor mixtures. Reported values of detected mixtures will be used, including "**J**" values falling between **DL** and **RL**

7.6

Dredging Quality control Plans and Pre-Dredge Meetings

By

Stephanie Stirling and Peter Leon

7.7

Proposed Clarification

- QC dredging plan must be reviewed and approved prior to pre-dredge meeting
- QC plan must be submitted to DMMP/DMMO for review 7 days prior to pre-dredge meeting
- Corps regulatory branch will schedule the pre-dredge meeting after insuring QC plan submitted and approved
- All four DMMP agencies are requested to attend pre-dredge meeting

7.8

Summary of Site Use Authorization Requirements of Washington Department of Natural Resources' Dredged Material Management Program Office

By

Peter Leon, Robert Brenner, Ted Benson

7.9

Proposed Clarification

- **SUA Application Process** – complete application required before processing SUA (USCOE Permit, 401 WQC, HPA, ESA, Shoreline Substantial Development Process or exemption)
- **Reporting requirements** – disposal site use reports due weekly, monthly disposal summary statements
- **Dredged Material Disposal Fees** - Puget Sound/ Strait of Juan De Fuca = $0.45/cy ($2,000 minimum); Grays Harbor/Willapa Bay = $0.10/cy ($300 minimum)

7.10

Proposed Clarification

- **Dredging Project Status** – Grantee responsible for keeping DNR informed about project status (MODS to plan of operation = 24 hour notice; Notification of dredging initiation, delays, and completion = 24 hour notice; Disposal Volumes (pre and post dredging site measurements)
- **Other Concerns** – confusion regarding who is responsible for meeting SUA requirements, when the Grantee hires a subcontractor (Grantee is responsible for meeting all SUA requirements); DNR will not authorize any activity in conflict with other laws, regulations, permits affecting the disposal site premises and the use thereof.

7.11

Go to DMMP/DMMO Public Website for full documentation on proposed changes:

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

Click on: Civil Works from main menu (left side),

Click on: "Civil Works/"Dredged Material Management"

Click on: "Annual Review Meeting"

7.12

REPORTING OF SEDIMENT-BOUND CONTAMINANTS:

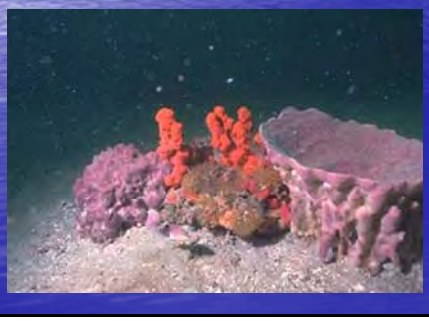
STANDARDIZATION OF SIEVING AND ANALYTICAL PROCEDURES

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Prepared by David Sternberg

8.1

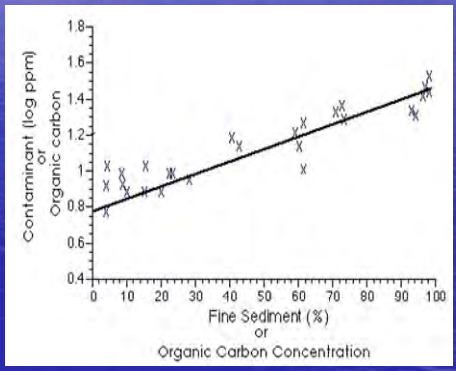
Applicability



8.2

Introduction

- Contaminants increase as grain size decreases
- Contaminants increase as organic carbon (OC) content increases
- OC increases as particle size decreases



8.3

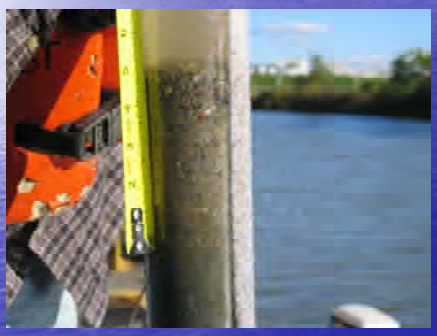
Problem Identification

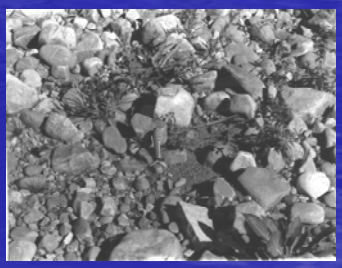
- Clarification of existing guidance for the proper handling & analysis of sediment samples
- Which sediment fraction should be analyzed for chemical contaminants?
  - Silt (4 µm – 63 µm)
  - Sand (63 µm – 2mm)
  - Gravel/cobble (> 2 mm)

  *Chemistry data reported on dry-weight or organic carbon normalized basis
- *Inclusion of larger/more inert clasts in chemical analysis may lead to biased results.*

8.4

Which fraction is analyzed for COPCs?





8.5

Grain-size exclusion: Common sense & literature-based conclusion

- Contaminants associated with clay/silt fraction of sediment (63 µm).
- Contaminants generally absent from higher-density sand fractions (63 µm - 2 mm)
- High contaminant levels may be found in lower density sand-size fractions (63 µm - 2 mm).
- Contaminants not associated with cobble/gravel (>2 mm)!!!

8.6

Proposed Action / Modification

- Clarify sampling and data reporting guidelines in order to better standardize sediment chemistry results.
- Ensure adherence to a common framework/guideline which will enable Ecology and concerned agencies to compare data between sites.
- Coordinate with the Regional Sediment Evaluation Team (RSET) to advance this initiative on a regional basis.

8.7

Specific recommendations include:

- Continue supporting the removal of large debris from sediment samples, provided that actions are documented.
- Require final sieving of samples be performed under laboratory conditions in order to ensure that lighter density organic debris is included in subsequent chemical analyses.
- Continue requiring that sediment grain size be routinely reported for at least four size classes or fractions: gravel/cobble (> 2 mm), sand (0.63 µm - 2 mm), silt (4 µm - 63 µm) and clay (< 4 µm).
- Standardize protocols for sieving and removal gravel and debris larger then 2 mm prior to chemical analyses.
- Measure and report, at a minimum, sediment chemical concentrations for the all sand and smaller size fractions of the bulk sample (i.e., < 2 mm).
- Continue requiring sediment chemistry data to be reported on a dry-weight basis, with data for non-polar organic compounds also organic carbon-normalized to facilitate comparison to SMS criteria.

8.8

Woodwaste Site Assessment and Cleanup Guidelines

Brett Betts
Sediment Management Unit, TCP-HQ

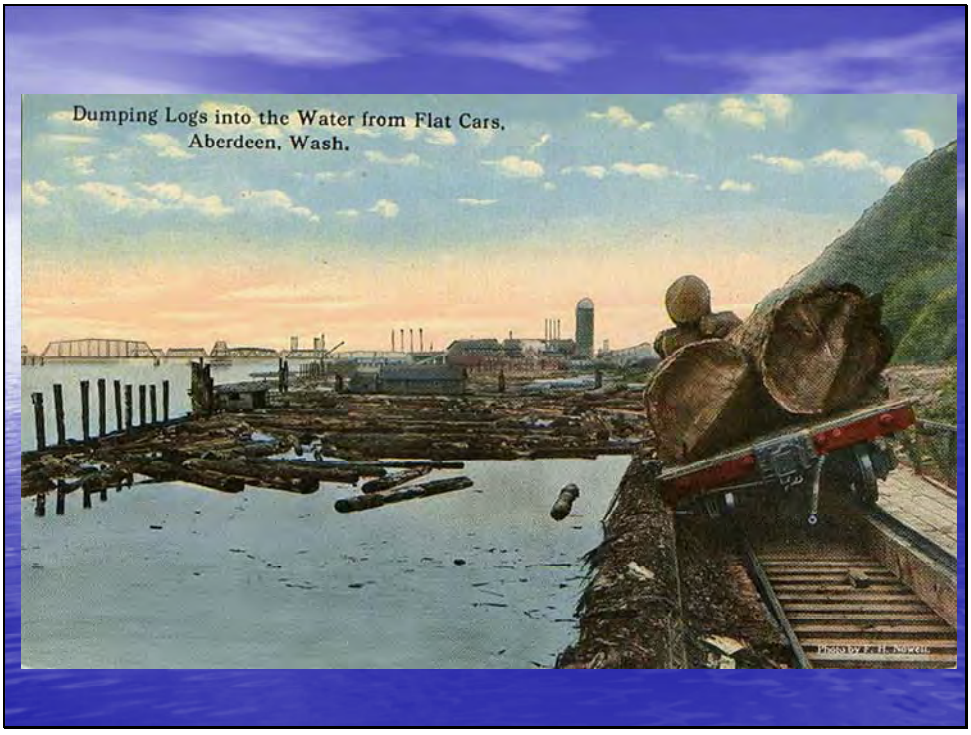
9.1

Port Gamble 1899

9.2


Large drive of shingle bolts on Stillaguamish River, Arlington, Wash.

9.3


Dumping Logs into the Water from Flat Cars,
Aberdeen, Wash.

9.4

Woodwaste Site Assessment and Cleanup Guidelines

Ecology is developing SMS rule guidance to address:

- Identification and assessment of woodwaste cleanup sites
- Woodwaste creates impacts to benthos via smothering, direct toxicity, and secondary toxicity e.g., DO sag
- Puget Sound region has many potential woodwaste cleanup sites in freshwater and marine areas

9.5

Woodwaste Site Assessment and Cleanup Guidelines

Guidance will:

- Implement SMS section 310(3) Identification and confirmatory designation of sediments which contain other toxics...
- Identify environmental impacts of woodwaste
- Review selected case-studies
- Recommend “best available science” assessment tools
- Recommend methods for site and cleanup boundary identification

9.6

Woodwaste Site Assessment and Cleanup Guidelines

Status of Guidelines

- Currently in-house review draft
- Case-studies and site identification recommendations remain to be written
- Anticipate recommendations to include independent use of benthic endpoints
- Anticipate field validation of benthos with SVPS tools

Toxicity Interpretation Consistency

Introduction

Problem statement

DMMP and SMS interpretations

Recommendations

10.1

Toxicity Interpretation Consistency

Introduction

PSDDA toxicity test interpretations (1988)

SMS test interpretations (1991)

Differences potentially important

SMARM 2004 status report on assessing benthic risk

10.2

EVALUATING BENTHIC RISK: FUTURE CLARIFICATIONS?

Problem statements

- **Interpretive endpoints - Shouldn't these be updated and consistent among/between regulatory programs?**
- Benthic community evaluations - How valid are criticisms of the early benthic effects data and interpretive endpoints? Update both?
- *In situ* tests and models - Should these be used more frequently to evaluate benthic risk? If so, then when and how?

10.3

Toxicity Interpretation Consistency

Problem Statement

More strict PSDDA/DMMP interpretation:

protective of disposal site, but

might limit viable cleanup alternatives

More strict MTCA/SMS interpretation:

protective of *in situ* benthic community, but

might lead to authorization of disposal sites as Sediment Impact Zones under SMS

10.4

Toxicity Interpretation Consistency

DMMP and SMS interpretations

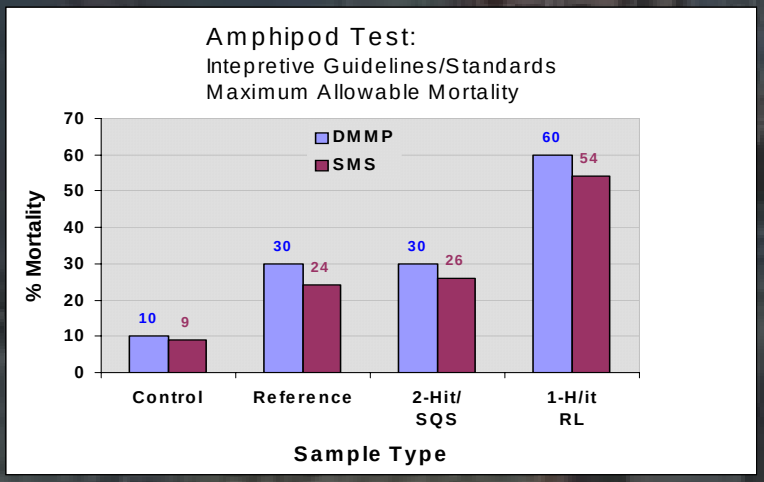
Some programmatic differences inter-preting 10-day amphipod survival test

Greater difference in larval development test interpretation

Juvenile polychaete growth test interpreted same by both programs

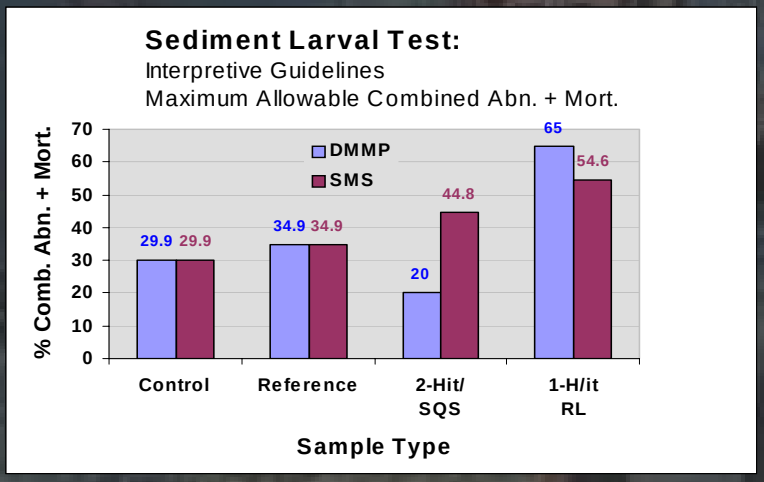
10.5

Toxicity Interpretation Consistency



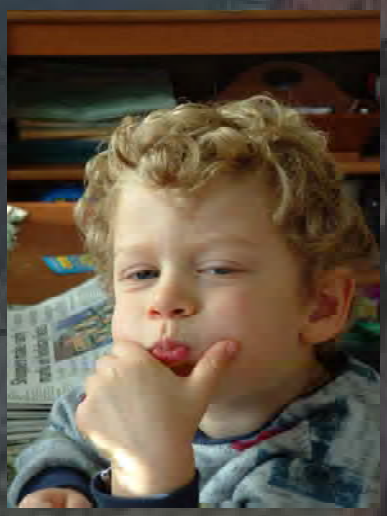
10.6

Toxicity Interpretation Consistency



10.7

Toxicity Interpretation Consistency



10.8

Toxicity Interpretation Consistency

Recommendations

How important are differences?

Which of these changes are easiest to make?

Which changes are defensible?

What are regulatory implications of proposed changes?

10.9

Toxicity Interpretation Consistency

Recommendations

10-day amphipod survival test: change certain interpretations (next slide)

96-hour sediment larval development test: no changes to interpretations now, evaluate potential changes for SMARM 2006

20-day juvenile polychaete growth test: no changes to interpretation needed

10.10

Toxicity Interpretation Consistency

Recommendations

Toxicity Test	DMMP Interpretive Guideline	Maximum effect allowed now	Proposed maximum effect	Proposed SMS changes
10-day amphipod (Mortality)	Negative control	10%	10%	-
	Reference	30%	**20%**	**R = 20%**
	Test, 2-hit nondispersive	30%	**25%**	-
	Test, 1-hit nondispersive	60%	**50%**	**RL = 50%**
	Test, 2-hit dispersive	30%	**25%**	
	Test, 1-hit dispersive	40%	**30%**	

Table 2. Summary of proposed changes to DMMP toxicity test interpretive guidelines. Changes are presented in bold-faced type. Legend: C = mean response in the negative control sample; I = mean initial stocking density; R = mean response in the references sample; RL = the regulatory level in the SMS rule, e.g., cleanup screening level, minimum cleanup level or maximum sediment impact zone; SQS = Sediment Quality Standards; T = mean response the test sample.

10.11

Toxicity Interpretation Consistency

Recommendations for DMMP

- **Reference samples:**
  - **reduce maximum allowable mortality from 30% to 20% (90th percentile of PS reference samples)**
- **Non-dispersive site guidelines:**
  - **Max "2-hit" guideline 30% → 20% mortality**
  - **Max "1-hit" guideline 60% → 50% mortality**
- **Dispersive site guidelines:**
  - **Max "2-hit" 30% → 25%**
  - **Max "1-hit" 40% → 30%**

10.12

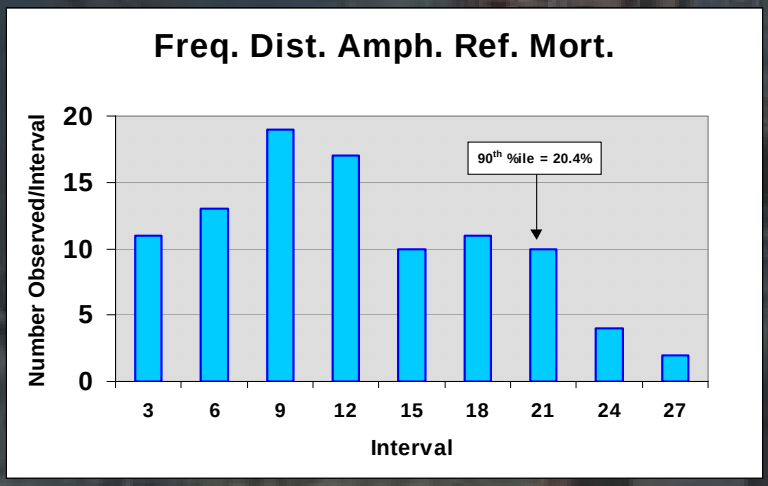
Toxicity Interpretation Consistency

Recommendations for SMS

- **Reference sample mortality:**
  - **Adopt same interpretation/performance standard (no more than 20%)**
- **CSL/MCUL interpretation:**
  - **Max allowable mortality 54% → 50%**

10.13

Toxicity Interpretation Consistency



10.14

REGIONAL UPDATE
JIM REESE
4 MAY 2005

US Army Corps of Engineers

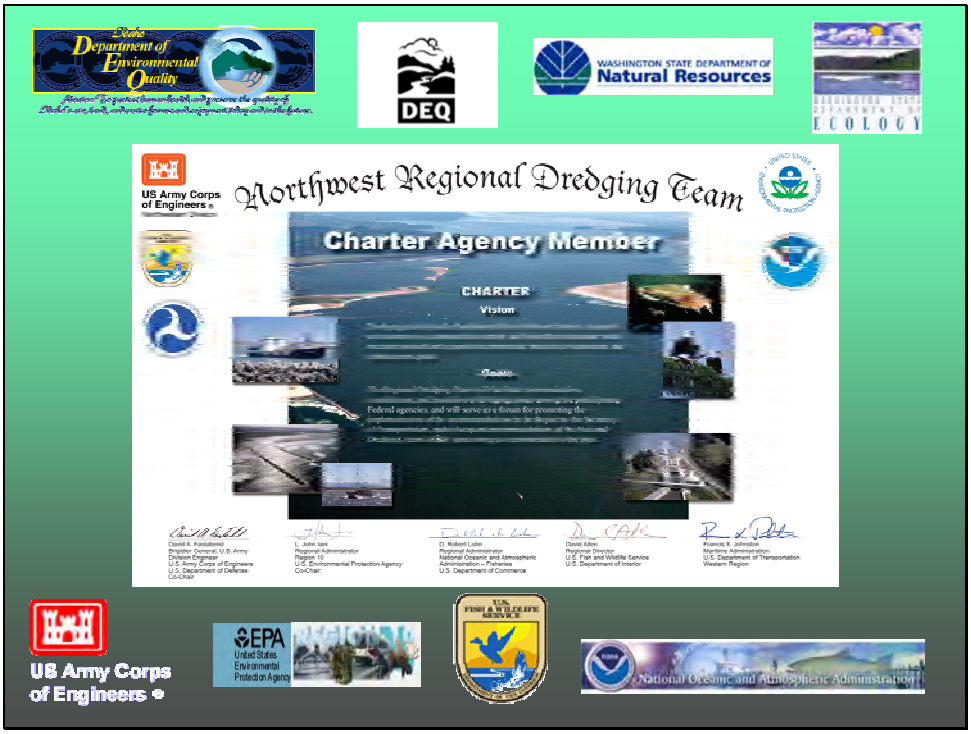
11.1

REGIONAL INITIATIVES

- REGIONAL DREDGING TEAM (RDT)
- REGULATORY REVIEW GROUP
- REGIONAL SEDIMENT EVALUATION TEAM (RSET)
- REGIONAL SEDIMENT MANAGEMENT (RSM)
- DREDGED MATERIAL MANAGEMENT PLANS (DMMP)
- REGIONAL DREDGING CONTRACT

US Army Corps of Engineers

11.2

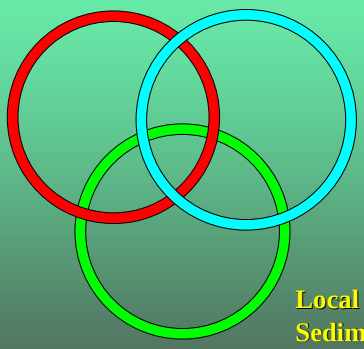

Northwest Regional Dredging Team
Charter Agency Member
CHARTER
Vision
US Army Corps of Engineers
EPA
National Oceanic and Atmospheric Administration

11.3


Introduction
Northwest Regional Dredging Team (RDT) Formed – April 2002 by EPA Region 10 and Northwestern Division Corps
Northwest for purposes of this charter is defined as inclusive of the States of Washington, Oregon, and Idaho
Purpose of RDT is to facilitate resolution of local and regional dredging/sediment issues as the regional extension of the national interagency dredging issues team (NDT)
US Army Corps of Engineers
EPA
National Oceanic and Atmospheric Administration

11.4

REGIONAL RELATIONSHIPS



Regional Sediment Evaluation Team RSET

Regional Sediment Management RSM

Local (Corps District) Sediment Management Group (LSMG)

US Army Corps of Engineers

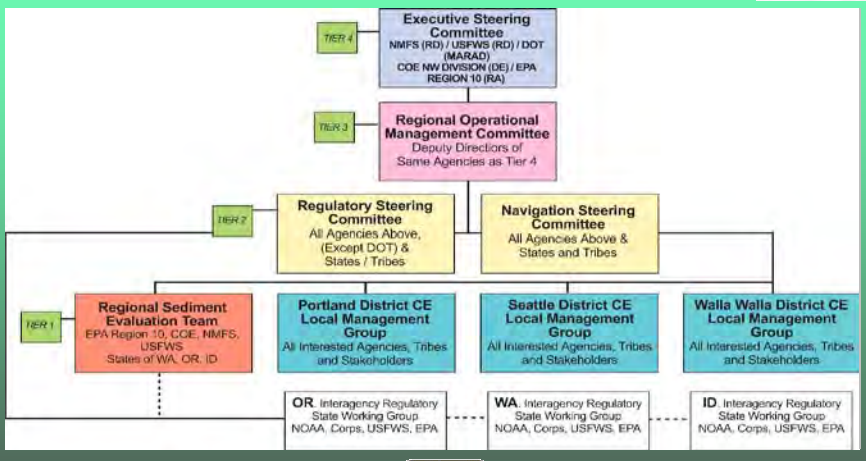
11.5

Beneficial Use of Dredged Materia

RDT

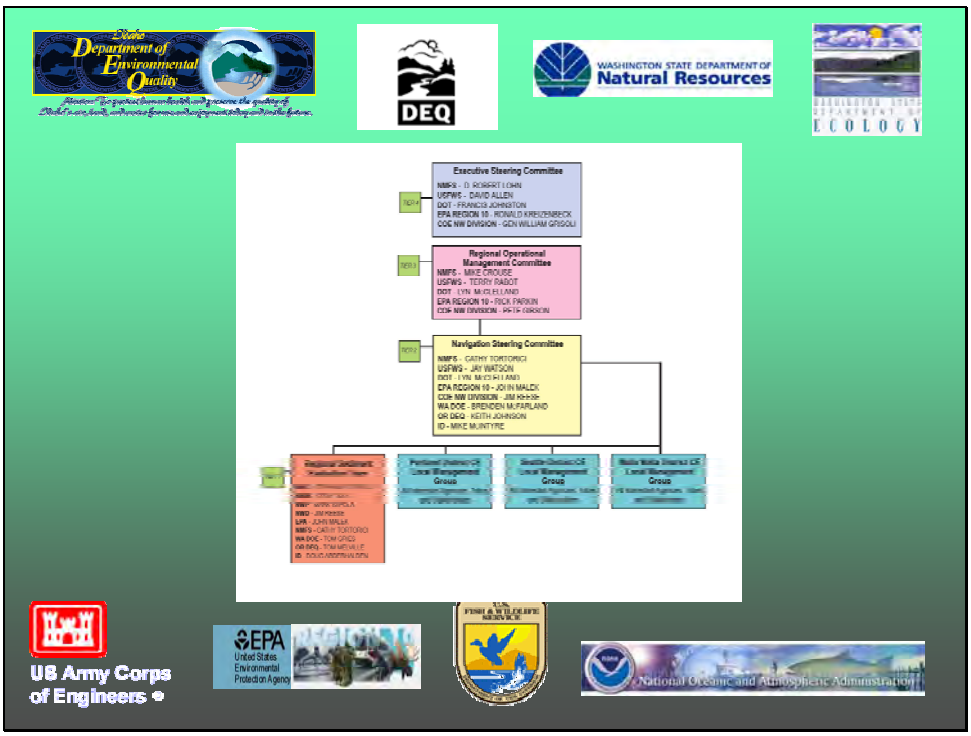
Environmenta Compliance

REGIONAL RELATIONSHIPS

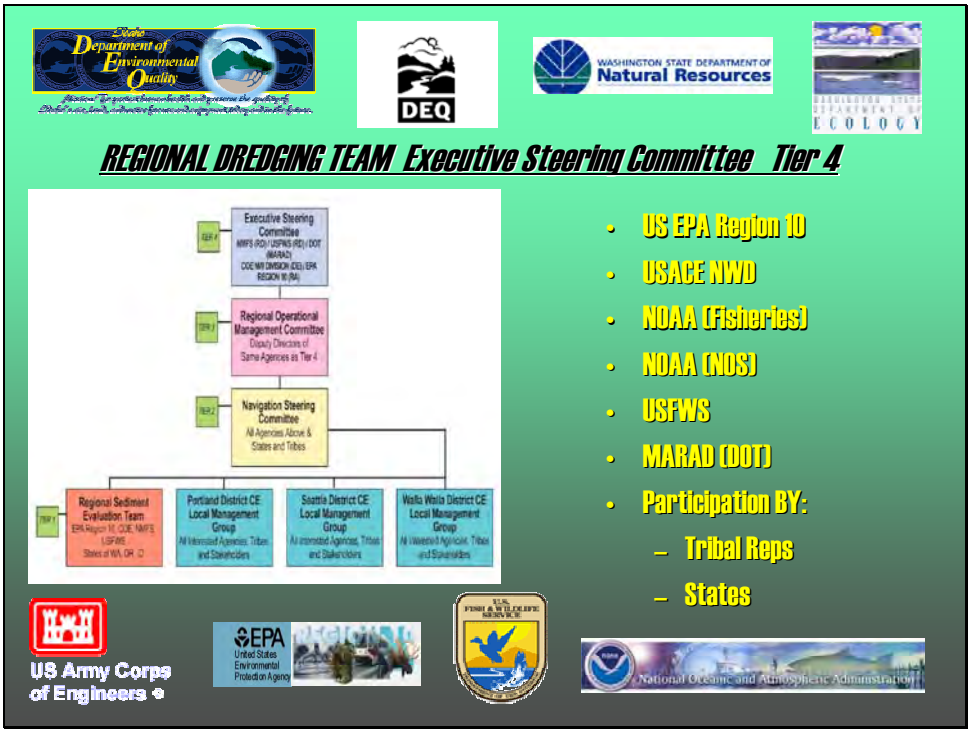


US Army Corps of Engineers

11.6

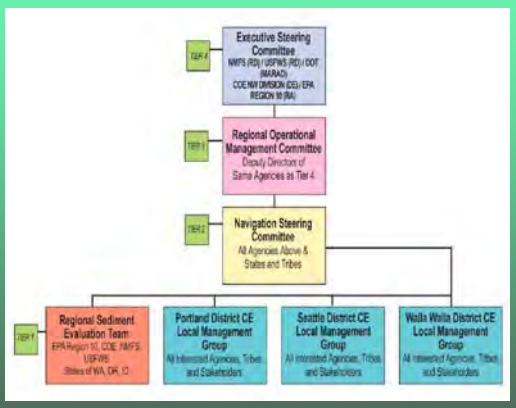

Executive Steering Committee
Regional Operational Management Committee
Navigation Steering Committee
US Army Corps of Engineers
EPA
National Oceanic and Atmospheric Administration

11.7


REGIONAL DREDGING TEAM Executive Steering Committee Tier 4
Executive Steering Committee
Regional Operational Management Committee
Navigation Steering Committee
Regional Sediment Evaluation Team
Portland District CE Local Management Group
Seattle District CE Local Management Group
Walla Walla District CE Local Management Group
US EPA Region 10
USACE NWD
NOAA (Fisheries)
NOAA (NOS)
USFWS
MARAD (DOT)
Participation BY:
Tribal Reps
States
US Army Corps of Engineers
EPA
National Oceanic and Atmospheric Administration

11.8

REGIONAL DREDGING TEAM Operational Management Committee Tier 3

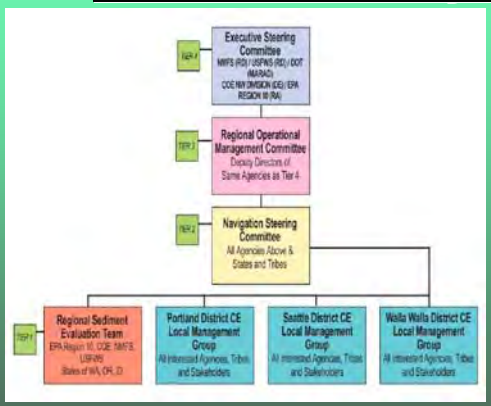


- This is the operations and management committee made up of:
- Regional Federal Deputy Directors
- Participation by:
  - Tribal Reps
  - States

US Army Corps of Engineers

11.9

REGIONAL DREDGING TEAM Navigation Steering Committee Tier 2

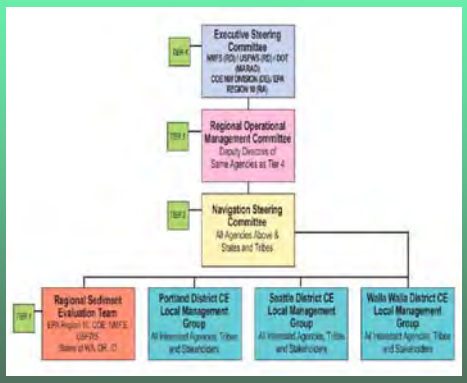


- Participate with all tiers
- Facilitate between tiers and elevate as requested
- Works with executive steering committee
- Attends all national level functions
- Presents cases to national team

US Army Corps of Engineers

11.10

REGIONAL DREDGING TEAM Local Management Groups Tier 1



- Conducts day to day
- Resolves all issues possible decides when to elevate
- Develops dredged material management plans (DMMP).
- Made up of:
  - Federal agencies
  - Tribes
  - State agencies
  - Ports
  - NGOs
- Chaired by CE District (teams can be sub-divided by watersheds if needed)

US Army Corps of Engineers

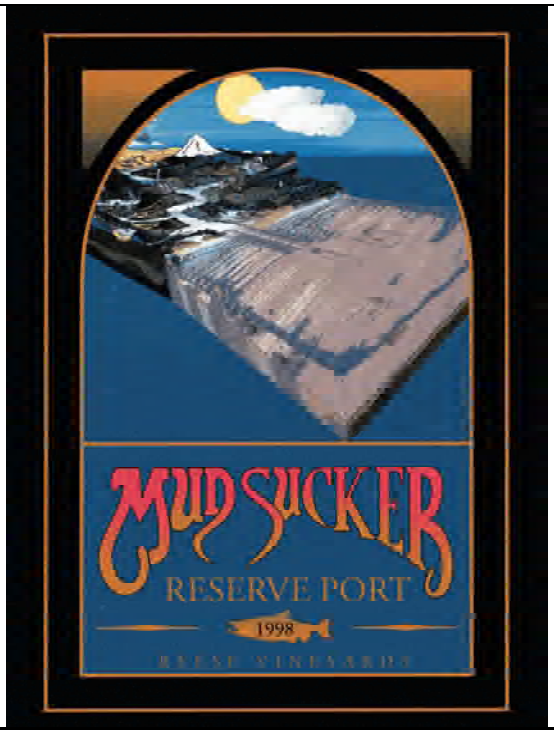
11.11

NEXT STEPS for RDT

- Organize Tier One Local Management Teams
- Develop LMG Charters and Sign
- Develop Meeting Schedules for all Tiers
- Get Region to use the Structure (Road Map)
- Use RSET/DMMPs as Pilot Cases

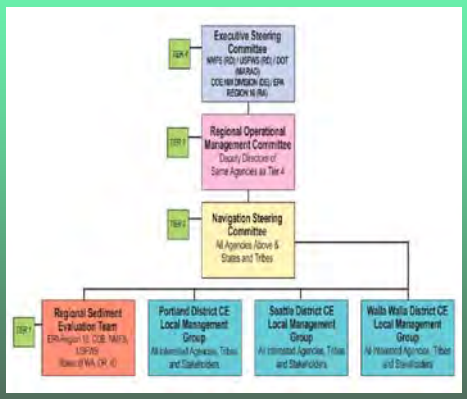
US Army Corps of Engineers

11.12



11.13

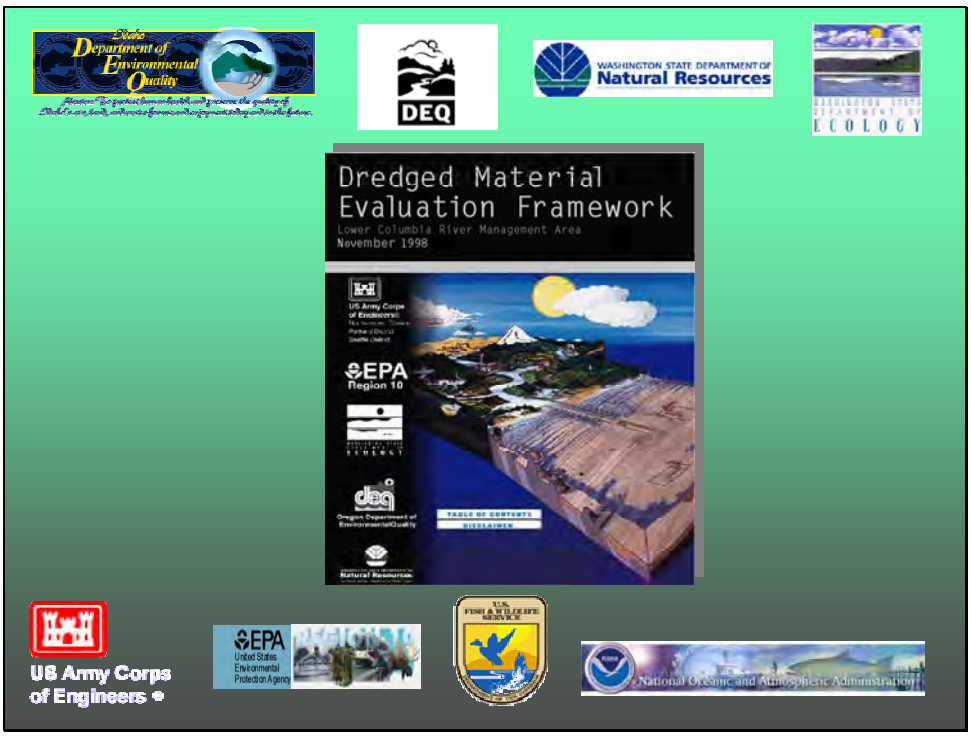
REGIONAL DREDGING TEAM REGIONAL SEDIMENT EVALUATION TEAM (RSET)



- Permanent Sediment experts Group representing:
  - Federal & State sediment quality/regulatory experts.
- Assist in preparation of DMEF, & revisions for the Local Teams
- Reviews sampling and analysis plans and data
- Recommends new tests
- First Task develop true regional manual from DMEF

US Army Corps of Engineers

11.14



11.15

Regional Sediment Evaluation Team (RSET)

- The RSET, a multi-agency group, has been formed under the auspices of the RDT to revise the existing regional DMEF for use by all NW Corps Districts, EPA Region 10, NMFS, USFWS, and other federal and state agencies that require sediment quality evaluation procedures. The RSET will expand and replace the Regional Management Team (RMT) defined in the existing DMEF.

US Army Corps of Engineers

11.16

Regional Sediment Evaluation Team Responsibilities

- Revise and Develop Sediment Evaluation Procedures for the Region
- Issue as NW Regional Sediment Evaluation Framework (SEF)
- Describe Process and Policy for Regulatory issues and How Sediment Evaluation are incorporated
- Keeper and Revisers of Sediment Evaluation Framework.
- Provide Panel for Review and Interpretation of Test Results
- Develop and Support Regional Sediment Data Base.
- Coordinate with RDT if issues with any of the above.

Revised and Developed

US Army Corps of Engineers

EPA United States Environmental Protection Agency

and

National Oceanic and Atmospheric Administration

11.17

Regional Sediment Evaluation Team (RSET)

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

US Army Corps of Engineers

EPA United States Environmental Protection Agency

National Oceanic and Atmospheric Administration

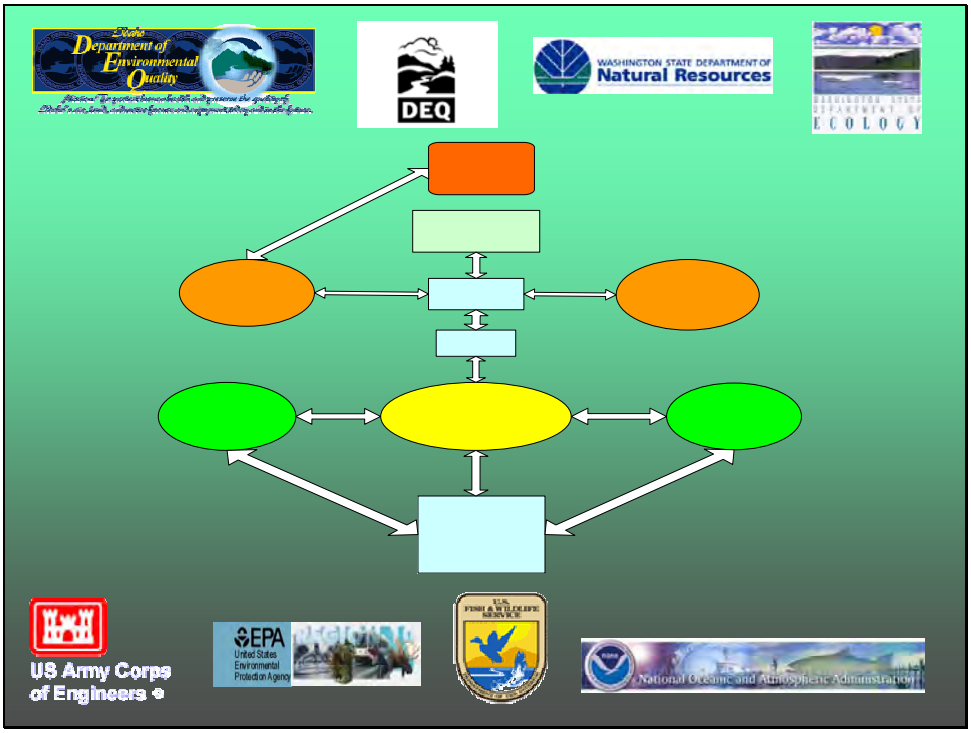
11.18

Regional Sediment Evaluation Team (RSET)

- Revision of DMEF
- Technical/Scientific issues
- Policy issues
- Long-term role

US Army Corps of Engineers

11.19



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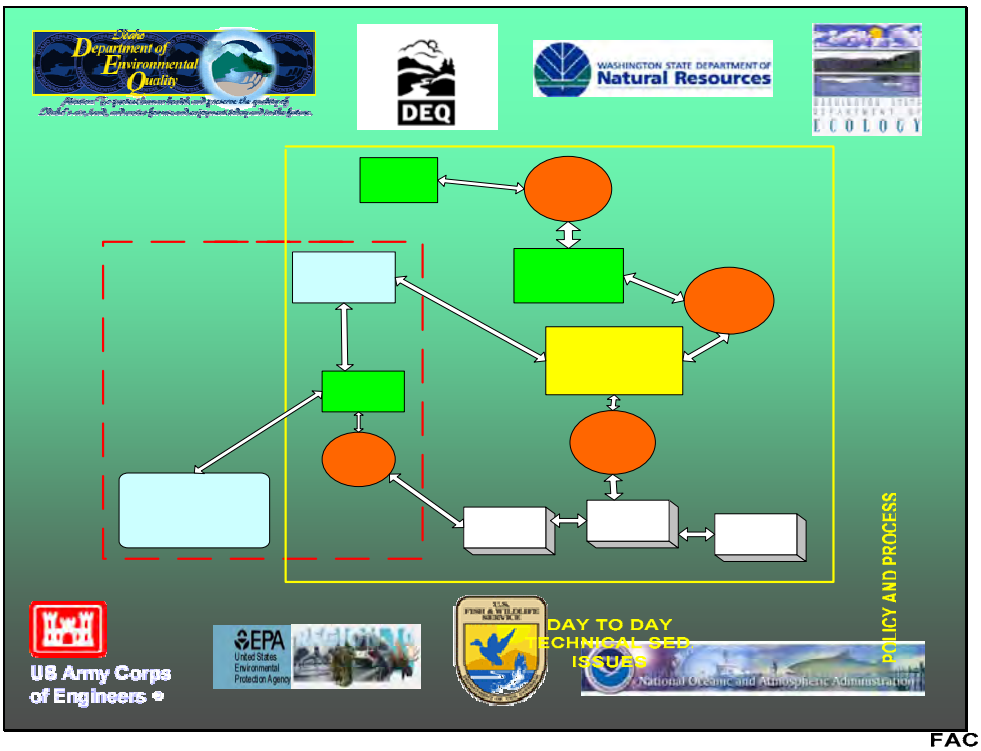
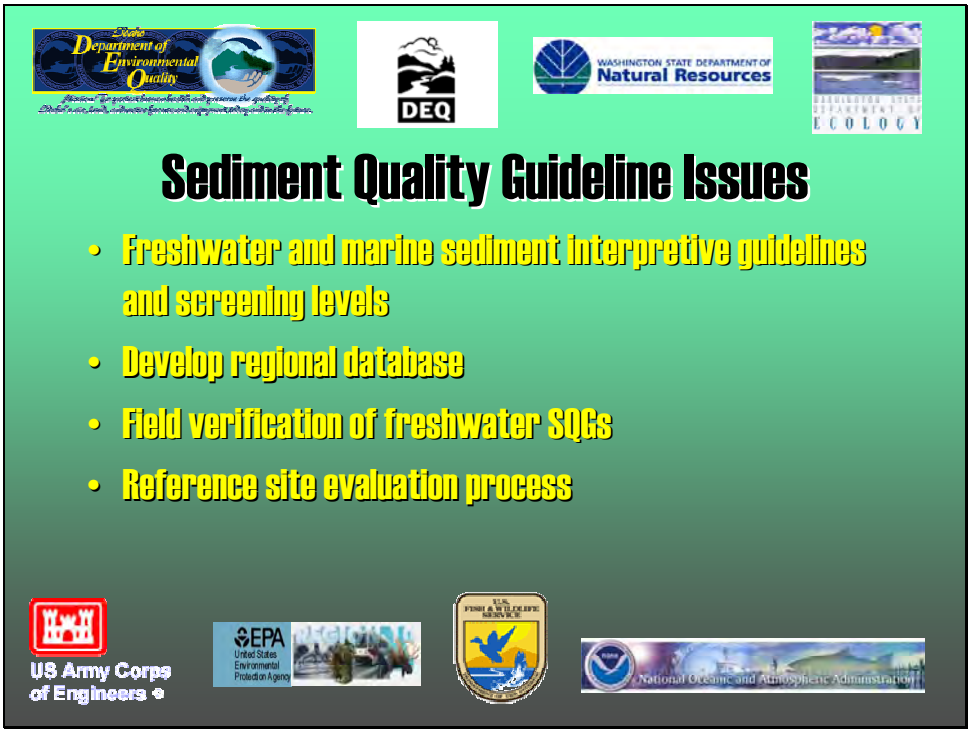
11.20



National Dredging Team (NDT)

FACILITATORS

11.21



RSET

SED ISSUES

S

11.22

Bioaccumulation Evaluation Issues

- Framework for addressing bioaccumulation under RSET
- Target tissue levels vs. sediment bioaccumulation triggers
- TTLs wildlife
- TTLs humans
- Freshwater bioaccumulation test species

US Army Corps of Engineers

11.23

Biological Testing Issues

- Evaluate use of 10-day versus longer term freshwater bioassays
- Are current suite of bioassays protective of ESA species?
- Review and refine (if necessary) biological interpretative criteria

US Army Corps of Engineers

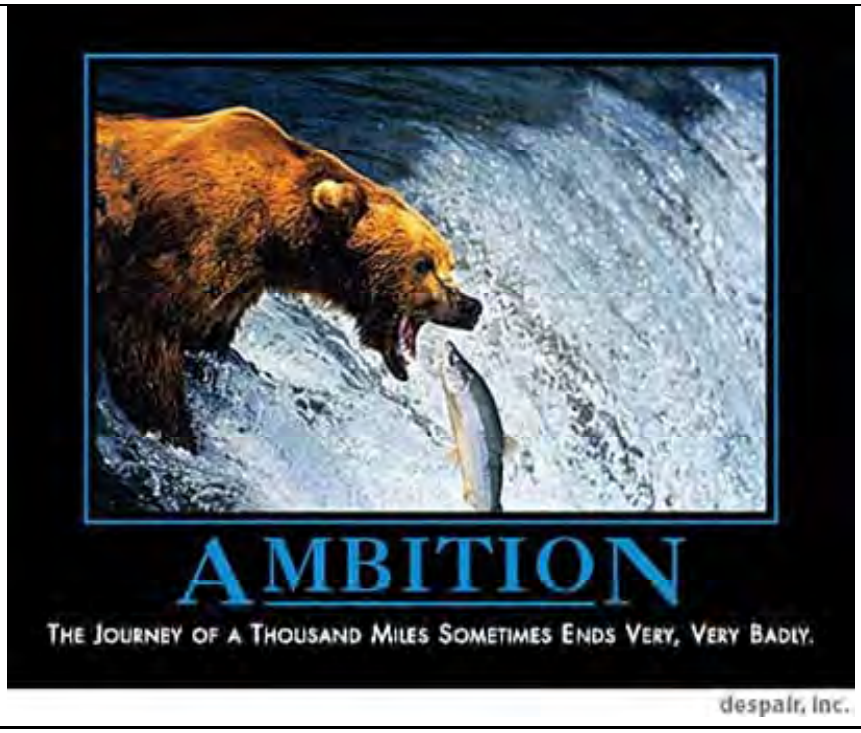
11.24

Where Do We Go From Here?

- Strong desire to keep process moving
- Technical sub-committees will continue work
- Monitor regional and national sediment quality efforts
- Outreach to public, Representatives of Oregon DSL, Idaho resource agencies, Tribes, and Washington Ports
- Technical Plenary; April 2005
- Public meeting with Draft Sediment Evaluation Framework; September 2005

US Army Corps of Engineers

11.25



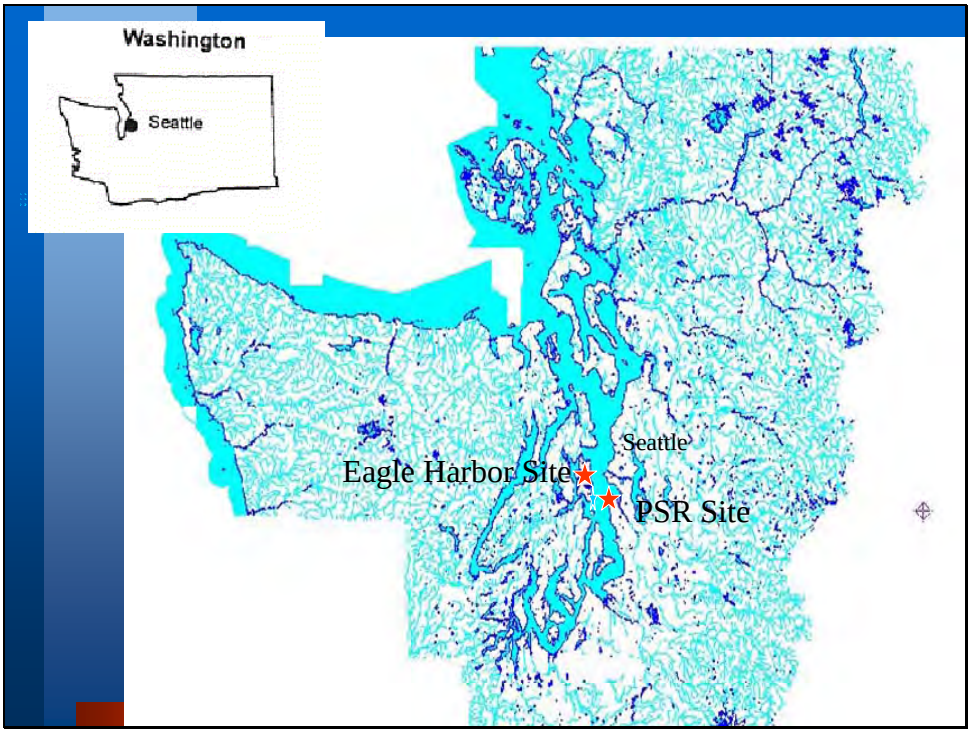
11.26


Department of Environmental Quality
DEQ
WASHINGTON STATE DEPARTMENT OF
Natural Resources
ECOLOGY
Questions?
US Army Corps of Engineers
EPA
United States Environmental Protection Agency
National Oceanic and Atmospheric Administration

Pacific Sound Resources: Capping Project

Sally Thomas, Project Manager, USEPA
Miriam Gilmer, Project Manager, USACE

12.1



12.2

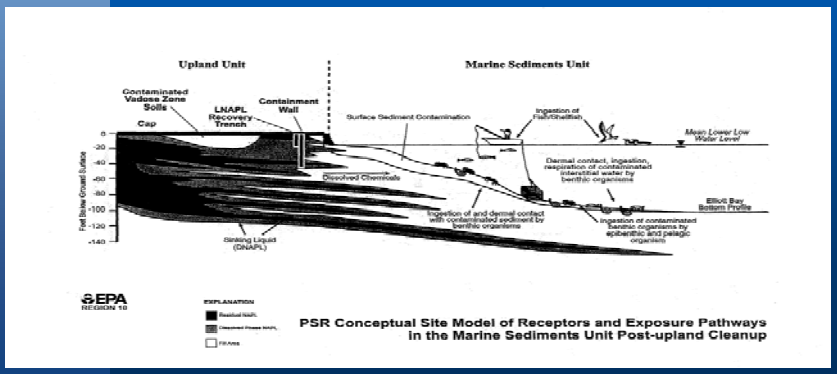
Background Information

- 100 year wood-treater operation
- 25 acre upland area
- 58 acres of contaminated sediment

12.3

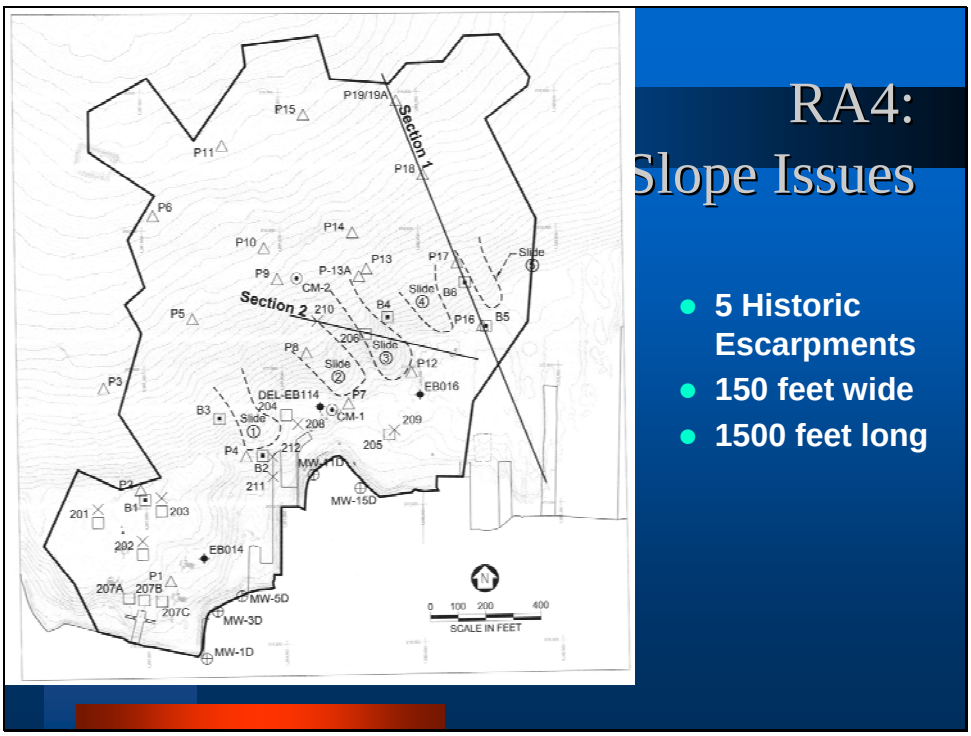
Site Characterization

- **Nature and extent of contaminants**
- **Physical characteristics of the site**



PSR Conceptual Site Model of Receptors and Exposure Pathways in the Marine Sediments Unit Post-upland Cleanup

12.4


RA4:
Slope Issues
5 Historic Escarpments
150 feet wide
1500 feet long
P19/19A
P15
P11
P18
Section 1
P6
P14
P10
P13
P17
Slide ⑤
P9
P-13A
CM-2
Slide ④
B6
Section 2
210
B4
P16
B5
P5
206
Slide ③
P8
Slide ②
P12
P3
DEL-EB114
P7
EB016
B3
204
Slide ①
CM-1
208
209
212
205
P4
B2
MW-11D
211
MW-15D
P2
B1
201
203
202
EB014
P1
207A
207B
MW-5D
207C
MW-3D
MW-1D
N
0 100 200 400
SCALE IN FEET

12.5

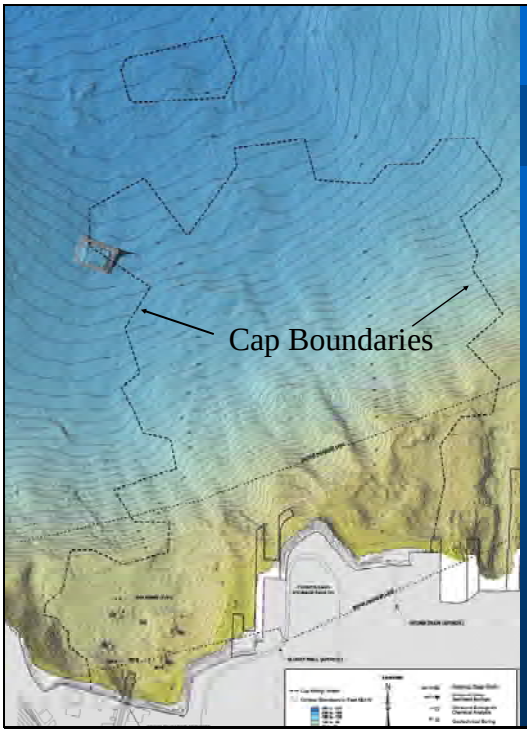

Record of Decision - 1999

12.6

Sediments Unit Project Overview

- 58 Acre Cap
- +14 to -240 feet
- Slopes to 20%
- 2,000 ft shoreline

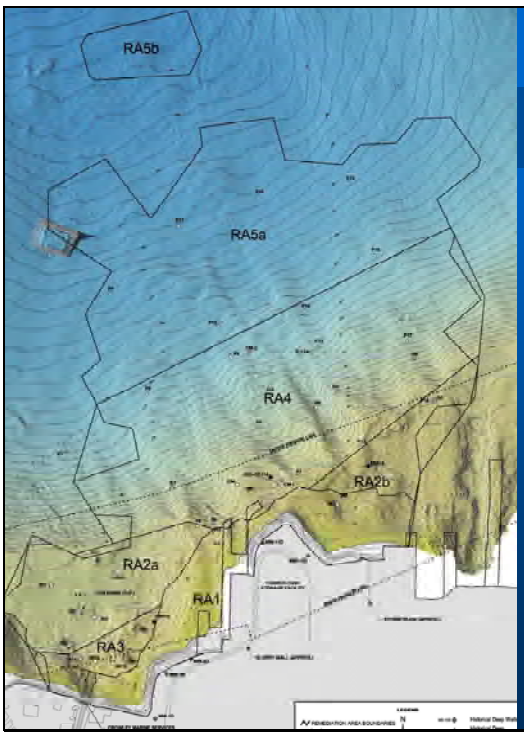
12.7



Design Issues

- **Chemical Isolation**
- **Intertidal Design**
- **Slope Stability**
- **Deepwater capping**

12.8



Remedy Implementation

- Piling and Superstructure Removal
- RA1 - Intertidal
- RA2 - Shallow nearshore
- RA3 - Operating area
- RA4 - Sloping offshore
- RA5 - Deep offshore

- Construction Monitoring

12.9

Cost Control

- RD/RA team Continuity
- Right people for the job
- Opportunities to reduce costs

12.10

RD/RA Team Continuity

- USEPA (ECL, ARU)
  - URS
- USACE (Cleanup, Navigation)
  - American Civil Constructors

CLEAR OBJECTIVES

12.11

Right People for the Job

- Technical expertise
- Construction oversight
- Contract administration

12.12

Opportunities to Reduce Costs

- Agile team that was ready to take advantage of opportunities as they arose.
- Dedicated team members willing to persevere to see a good idea implemented.

12.13

Cost Saving Opportunities

- Capping material
- Beneficial use
- Careful construction monitoring
- Dynamic management

12.14

Material cost greater than expected

- TOC amendment double the estimated cost
- **Savings of $2,250,000**

12.15

Beneficial Use – Federal Navigation

- **Duwamish River (VECP)**
  76,000 cubic yards
  Savings of $467,000

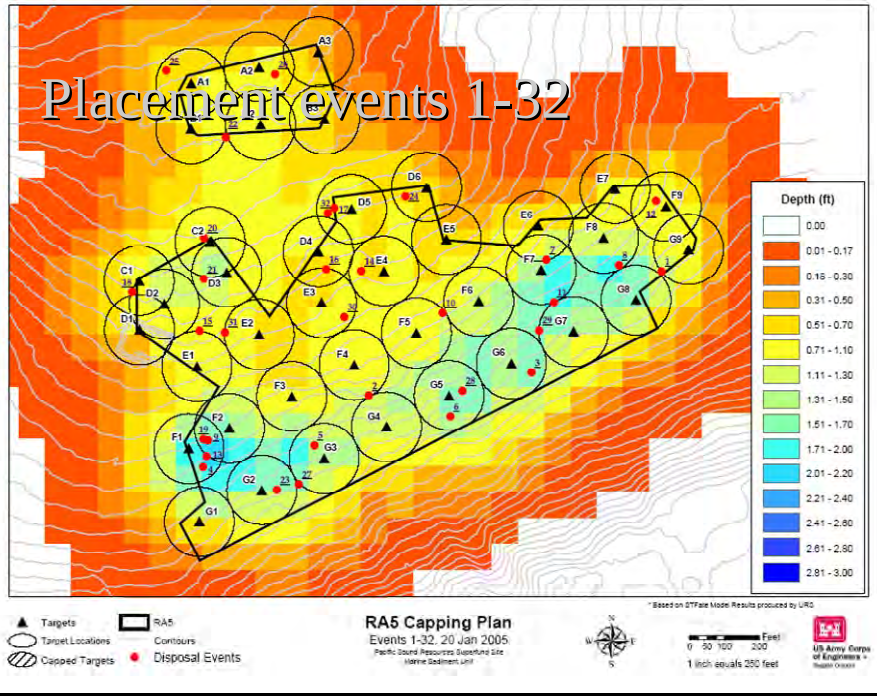
12.16

Beneficial Use – Federal Navigation

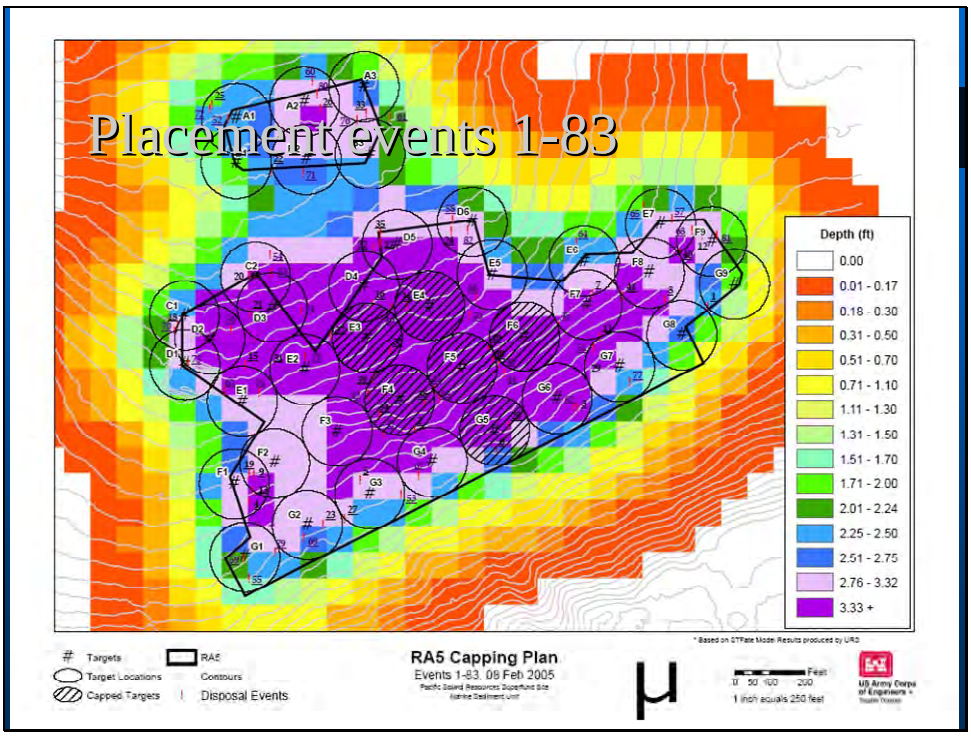
- Snohomish River
  315,000 cubic yards
- Typically sent for Open-Water Disposal

12.17

Placement events 1-32



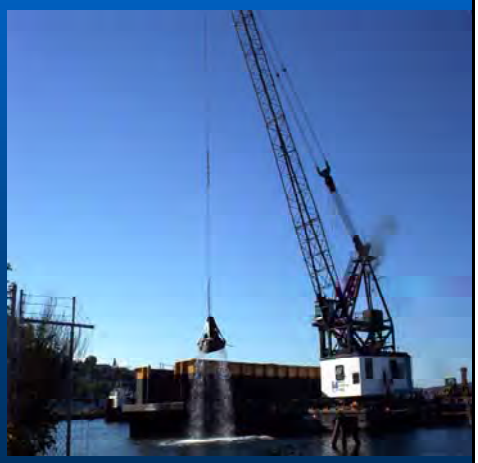
12.18



12.19

Beneficial Use – Non-Federal Projects

- Tyee Yacht Club, 2004
  2300 cy
- Lehigh, 2005
  3900 cy



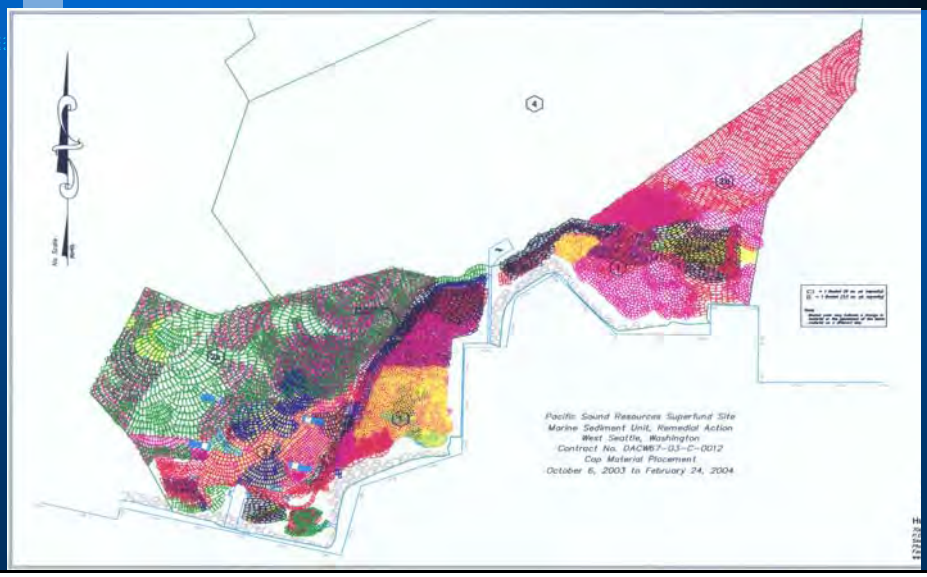
12.20

Construction Monitoring

- Bucket placement
- Bottom dump placement

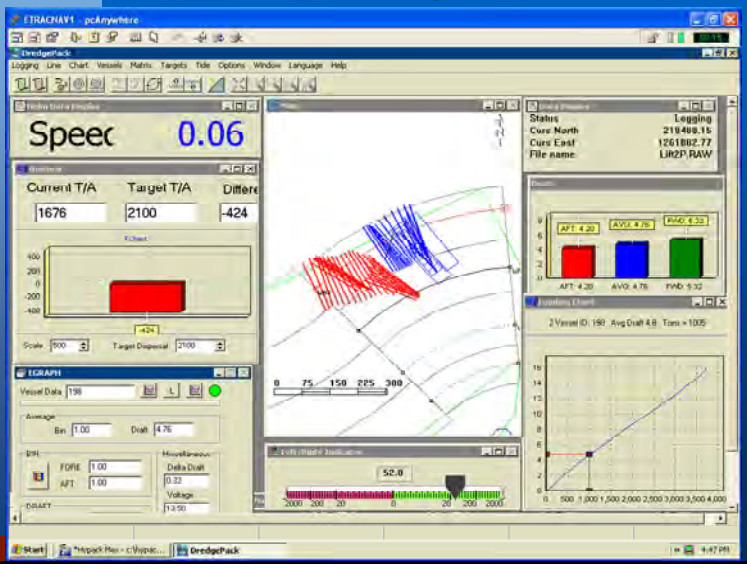
12.21

Bucket Placement



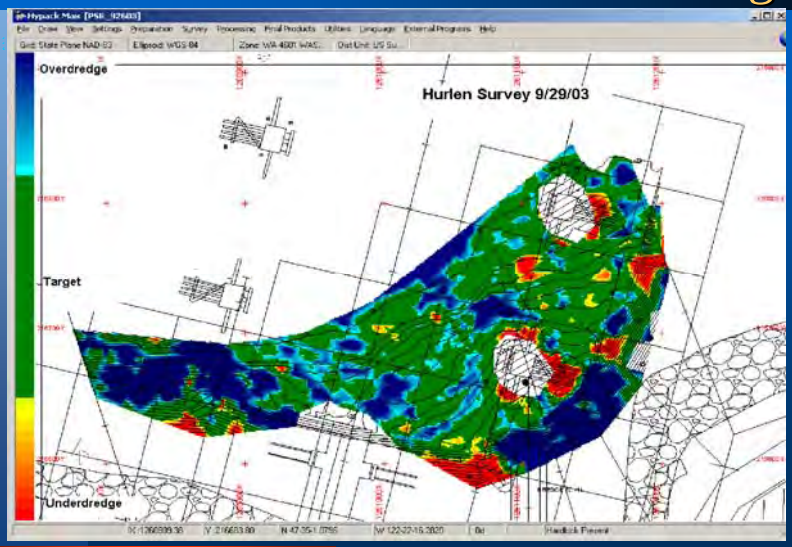
12.22

Bottom-dump Barge RA4



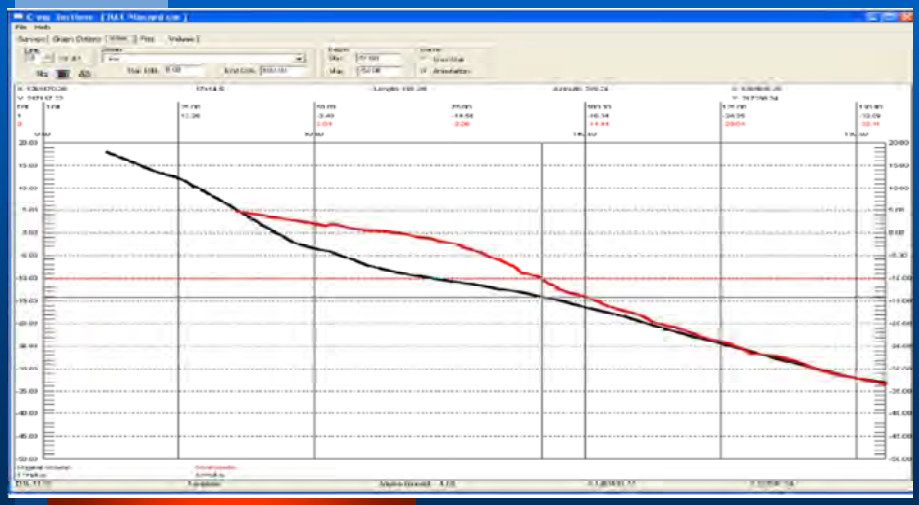
12.23

Placement Monitoring



12.24

Placement Monitoring



12.25

Total (MSU) Project Cost

- Total RD/RA Cost: $18 million
  - Design: $2 million
  - Construction: $16 million

12.26

Incremental Costs

Dredging:	$74/yd^3
Beneficial Use:	$5/yd^3
Upland Material:	$26/yd^3

Lessons Learned

- **Prepare Communication Mechanisms Early**
- **Contractor Selection**
- **Maintain RD/RA Team Continuity**

Bellingham Bay Demonstration Pilot Project

"A cooperative approach to expedite source control, sediment cleanup, and associated habitat restoration in Bellingham Bay"

Presented to
Sediment Management Program Annual Review Meeting

Presented by

Lucille T. McInerney, P.E.
Washington State Department of Ecology

May 4, 2005

Bellingham Bay Pilot Project

13.1

Bellingham Bay Demonstration Pilot

Presentation Outline

- Background
- Status
- Future

Bellingham Bay Pilot Project

13.2

Bellingham Bay Demonstration Pilot

Background

- Origination
  - Initiative of the CSMP, a state/federal program to eliminate conflicting sediment management policies
  - Concept - state/federal agencies partner with local entities to cooperatively address contaminated sediment management challenges
  - Bellingham Bay selected by CSMP in 1996 due to strong local interest
- Management and Funding
  - Co-managed by the Department of Ecology and the Port of Bellingham
  - Funded by the Department of Ecology through the Port Of Bellingham

Bellingham Bay Pilot Project

13.3

Bellingham Bay Demonstration Pilot

Background

- Process
  - Multi-organizational team of stakeholders

Bellingham Bay Pilot Project

13.4

Team Members

- Port of Bellingham
- City of Bellingham
- Whatcom County
- Lummi Nation
- Nooksack Tribe
- WA Dept. of Ecology
- WA Dept. of Fish and Wildlife
- WA Dept. of Natural Resources
- WA Dept. of Transportation
- Puget Sound Water Quality Action Team
- Georgia - Pacific West
- U.S. Army Corps of Engineers
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service

Bellingham Bay Pilot Project

13.5

Bellingham Bay Demonstration Pilot

Background

- Process - *continued*
  - MOA
  - Mission statement, goals and objectives
  - Identified the need for a landscape plan
  - Compiled existing environmental and land use information

Bellingham Bay Pilot Project

13.6

Bellingham Bay - Environmental Summary

- Water Quality:
  - Coliform and nutrient concerns
  - No hazardous substance exceedances in water column
- Sediment Quality:
  - Identified hazardous substance concerns
  - Localized sources of recontamination
- Habitat Quality:
  - Significant historical alterations

Bellingham Bay Pilot Project

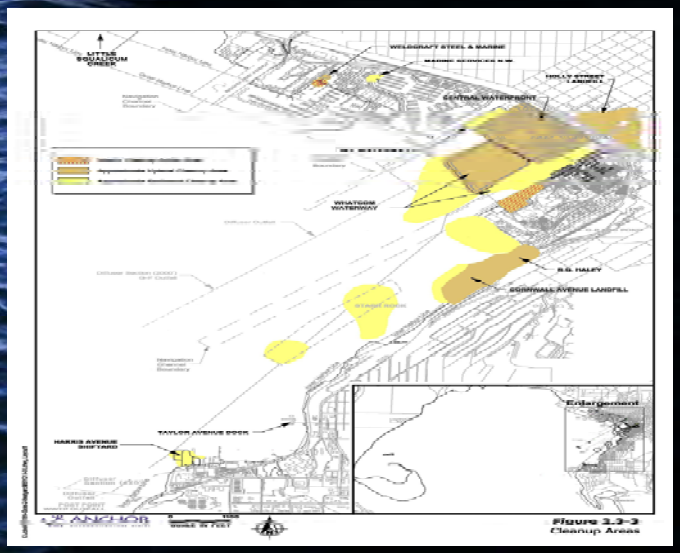
13.7

Bellingham Bay

Bellingham Bay Pilot Project

13.8

Bellingham Bay Cleanup Sites



Bellingham Bay Pilot Project

13.9

Habitat Restoration

- Maximize aquatic resource productivity through restoration and enhancement projects
- 19 project opportunities identified

Bellingham Bay Pilot Project

13.10

Land Use

- State, local and private property ownerships
- Broad range of existing land uses
- Existing regulatory programs govern land use

Bellingham Bay Pilot Project

13.11

Bellingham Bay Comprehensive Strategy

- Integrates sediment cleanup, control of pollution sources, habitat restoration and land use on a bay-wide scale
- Identifies priorities
- Creates a clear context for decisions
- Completed in October 2000 via Bellingham Bay Comprehensive Strategy Final EIS

Bellingham Bay Pilot Project

13.12

Bellingham Bay Demonstration Pilot

Status

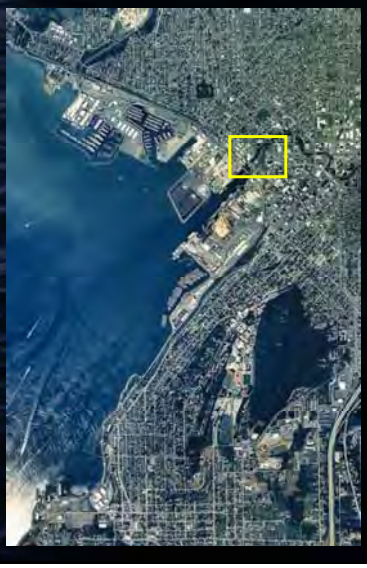
- Many projects completed since 1996 under Comprehensive Strategy
- Completed MTCA Cleanups
  - Holly Street Landfill
  - Weldcraft Steel & Marine Interim Action
  - G-P Log Pond Interim Action
- Habitat Restoration Project
  - Marine Park

Bellingham Bay Pilot Project

13.13

Holly Street Landfill

Site Location



Bellingham Bay Pilot Project

13.14

Holly Street Landfill

Bellingham Bay Pilot Project

13.15

Holly Street Landfill

Managers – Lucy McInerney (Ecology)/Sheila Hardy (City)

- Consistent with Comprehensive Strategy
- Completed in March 2005
- MTCA Cleanup:
  - Removal of contaminated soils and solid waste
  - Placement of an engineered cap
  - Use restrictions

Bellingham Bay Pilot Project

13.16

Holly Street Landfill

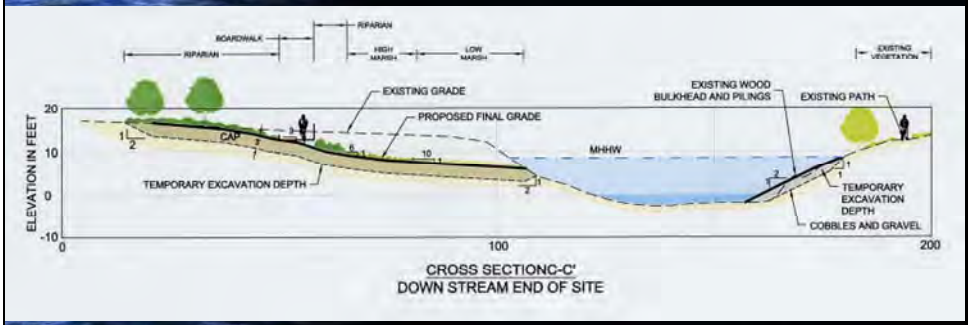
Managers – Lucy McInerney (Ecology)/Sheila Hardy (City)

- Habitat Restoration:
  - City voluntarily excavated additional material to convert 1/3 acre of uplands to aquatic habitat
  - Placement of appropriate substrates
  - Native vegetation and woody debris
  - Stabilize south bank
- Public Access:
  - Extension of Whatcom Creek trail system
  - Elevated boardwalk with viewpoints
  - Gravel surface on stabilized South Bank

Bellingham Bay Pilot Project

13.17

Integrated Cleanup/Restoration Plan



Bellingham Bay Pilot Project

13.18

North Bank - before

Bellingham Bay
Pilot Project

13.19

North Bank – after

Bellingham Bay
Pilot Project

13.20

South Bank bulkhead - before

Bellingham Bay
Pilot Project

13.21

South Bank bulkhead - after

Bellingham Bay
Pilot Project

13.22

South Bank refuse - before

Bellingham Bay Pilot Project

13.23

South Bank refuse - after

Bellingham Bay Pilot Project

13.24

Boardwalk and viewpoint

Bellingham Bay
Pilot Project

13.25

The newly completed project

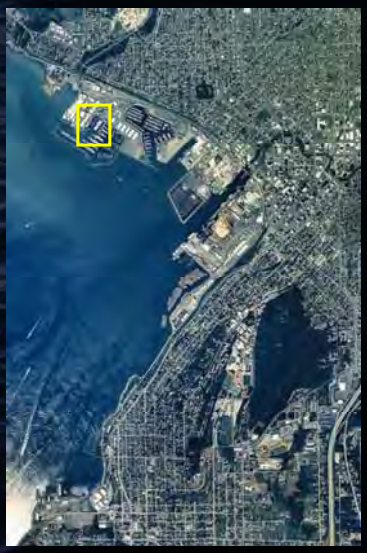
Viewed at low tide – March 2005

Bellingham Bay
Pilot Project

13.26

Weldcraft Steel and Marine

Site Location



Bellingham Bay Pilot Project

13.27

PORT OF BELLINGHAM

Bellingham Bay Pilot Project

13.28

Weldcraft Steel and Marine

Managers – Mary O'Herron (Ecology)/Mike Stoner (Port)

- Consistent with Comprehensive Strategy
- Completed in February 2004
- Interim MTCA Cleanup:
  - Removal of contaminated marine sediment
  - Removal of creosote pilings
  - Removal of inactive marine railway

Bellingham Bay Pilot Project

13.29

Weldcraft Steel and Marine

Managers – Mary O'Herron (Ecology)/Mike Stoner (Port)

- Habitat Restoration:
  - Port voluntarily constructed habitat bench on the outside face of breakwater for Squalicum Harbor
- Site Redevelopment:
  - Construction of 150-ton travel lift pier to replace marine railway
  - Installation and repair of bulkheads

Bellingham Bay Pilot Project

13.30

Weldcraft - Before

PORT OF BELLINGHAM

Bellingham Bay
Pilot Project

13.31

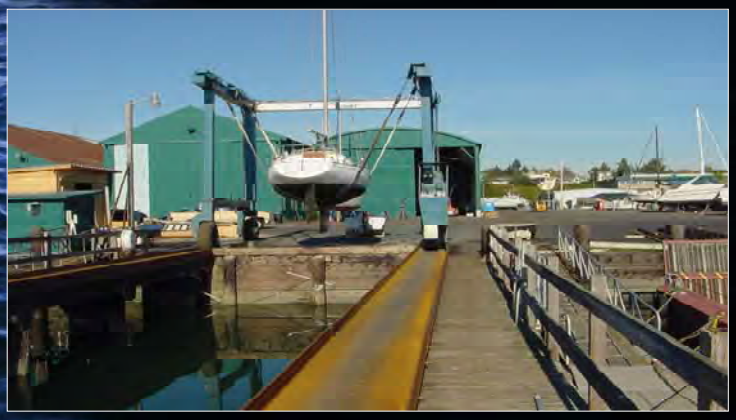
Weldcraft - Before

PORT OF BELLINGHAM

Bellingham Bay
Pilot Project

13.32

Weldcraft - Before



PORT OF BELLINGHAM

Bellingham Bay
Pilot Project

13.33

Weldcraft - Before

PORT OF BELLINGHAM

Bellingham Bay
Pilot Project

13.34

Weldcraft - After

Bellingham Bay
Pilot Project

13.35

Weldcraft - After

Bellingham Bay
Pilot Project

13.36

Weldcraft - After

Bellingham Bay
Pilot Project

13.37

Weldcraft - After

Bellingham Bay
Pilot Project

13.38

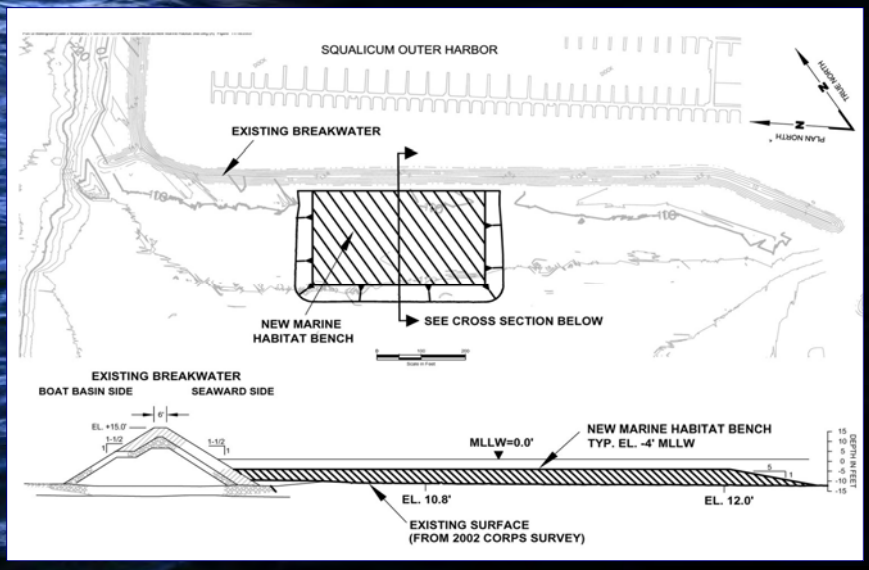
Weldcraft Steel and Marine

Habitat Bench

Bellingham Bay Pilot Project

13.39

Habitat Bench

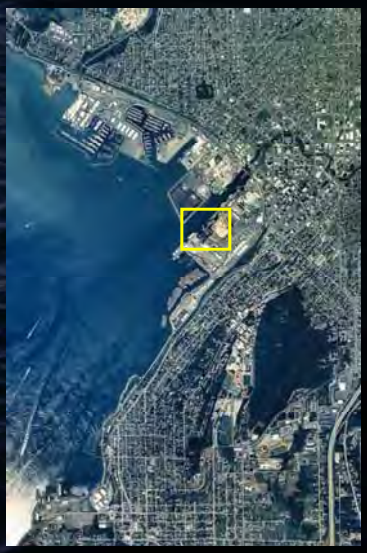


Bellingham Bay Pilot Project

13.40

G-P Log Pond

Site Location



Bellingham Bay Pilot Project

13.41

G-P Log Pond

Managers – Lucy McInerney (Ecology)/Chip Hilarides (G-P)

- Consistent with Comprehensive Strategy
- Completed in 2001
- Part of the Whatcom Waterway Site

Bellingham Bay Pilot Project

13.42

G-P Log Pond

Managers – Lucy McInerney (Ecology)/Chip Hilarides (G-P)

- Interim MTCA Cleanup:
  - Capping of contaminated marine sediment with materials from other Corps dredging projects
  - Removal of creosote pilings, riprap, and debris
  - Use restrictions
- Habitat Restoration:
  - G-P voluntarily placed excess material to restore 5.6 acres of historically lost habitat

Bellingham Bay Pilot Project

13.43

G-P Log Pond - Before

Bellingham Bay Pilot Project

13.44

G-P Log Pond - After

Bellingham Bay Pilot Project

13.45

Marine Park

Site Location

Bellingham Bay Pilot Project

13.46

Marine Park Shoreline Restoration

Manager – Adam Fulton (Port)

- Port initiative consistent with Comprehensive Strategy
- Completed in April 2005
- Habitat Restoration:
  - Removal of concrete rubble
  - Gently sloping cobble/sand beach
  - Rock drift sills
- Public Use:
  - Improved access and amenities

Bellingham Bay Pilot Project

13.47

Marine Park - Before

Bellingham Bay Pilot Project

13.48

Marine Park - After

Bellingham Bay Pilot Project

13.49

Bellingham Bay Demonstration Pilot

Future

- Administration
  - Continue Ecology funding and co-manage with Port
  - Continue Team activities to coordinate and pursue actions consistent with the Comprehensive Strategy
- Cleanup
  - Address ten contaminated sites over the next seven years using the guidance of the Comprehensive Strategy

Bellingham Bay Pilot Project

13.50

Bellingham Bay Demonstration Pilot

Future - continued

- Habitat Restoration
  - Restoration in conjunction with cleanups
  - Continue to pursue opportunities to restore habitat in accordance with the Comprehensive Strategy
  - Eel grass seeding at the G-P Log Pond
  - Modeling of currents and salinity in Bellingham Bay

Bellingham Bay Pilot Project

13.51

Bellingham Bay Demonstration Pilot

Future - continued

- Land Use
  - January 20, 2005 the Port acquired 137 acres of waterfront property from G-P, including contaminated properties
  - Land use change from heavy industrial to mixed use
  - Changes will be integrated with cleanup and habitat restoration

Bellingham Bay Pilot Project

13.52

Bellingham Bay Demonstration Pilot

Further Information and Contacts

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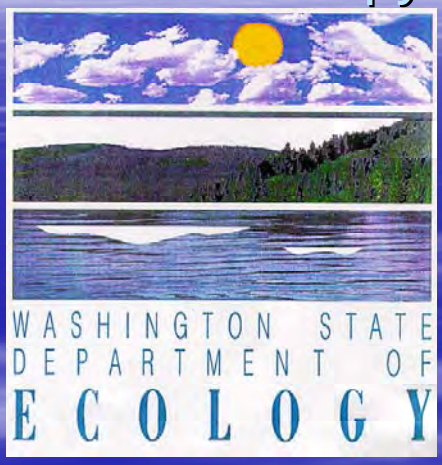
mikes@portofbellingham.com

Bellingham Bay Web Site:
www.ecy.wa.gov/programs/tcp/sites/blhm_bay/sites/bel_bay_sites.html

Bellingham Bay Pilot Project

Sediment Cleanup at the Puget Sound Naval Shipyard



An Update by
Ted Benson, TCP/SMU

14.1

Remedial Actions And Lessons Learned

(with Comments as Appended by the Navy included parenthetically)

14.2

DISCLAIMER

- The opinions expressed here are not those of my employer, my wife, or probably even myself.
- After 20 years of marriage, 12 years of military service, and 10 years of state employment, I am well aware that I have no right to an opinion.

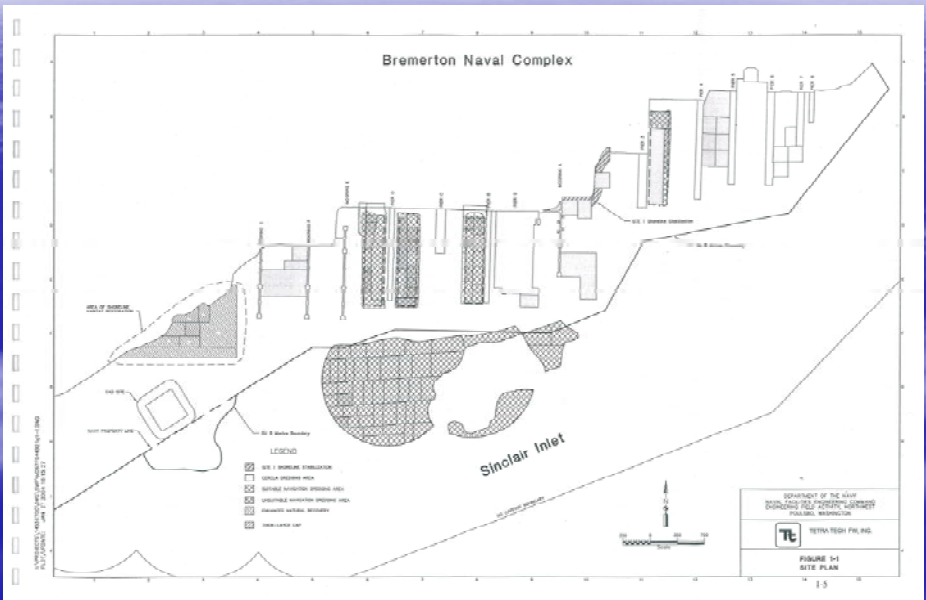
14.3

PETA Statement

- No animals were harmed in the preparation of these remarks, although the mutt next door that barks all night is living on borrowed time, let me tell you.

14.4

PSNS and Sinclair Inlet



14.5

Last Year

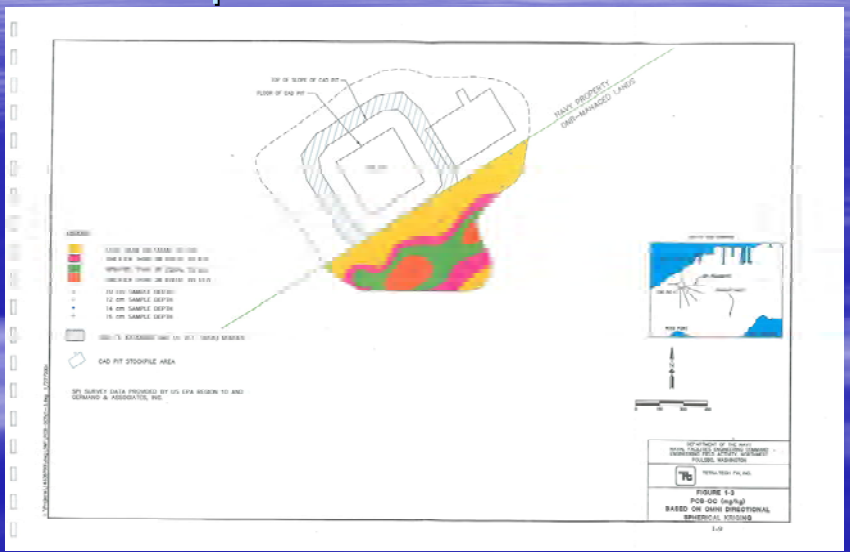
- Presentation was on the pit-CAD apron area, and the loss of disposed dredged material to the area around the CAD.
- The material on State-owned Aquatic Lands was addressed through Enhanced Natural Recovery.

14.6

Discovery of the “Mud Wave” Deposition
Sediment Profile Imagery

14.7

Characterization of State-owned Aquatic Lands for ENR



14.8

That was last year…

So, what has transpired over the intervening months?

14.9

But first,

A short digression.

14.10

When I was younger, I said:

"When I grow up I'm going to be somebody."

and

"I want to live in a house full of women."

14.11

I should have been more explicit!

14.12

How Is That Relevant to PSNS?

- An explicit description of pollutants and their distribution is invaluable for cleanup.
  - The “Exclusion Zone” near the shipyard, and Sinclair Inlet have both had their sediment characterized more than once.
  - The information resulting from these efforts was used to craft the Remedial Actions undertaken by the U.S. Navy.
  - But cleanup results are not as anticipated!

14.13

Monitoring Events

- CAD area sampled in August 2001
  - 1st round in August of ’01
  - 95’ offset sampled 28SEP01
  - 125’ offset sampled 08OCT01
  - 155’ offset sampled 09OCT01
- Dredged area sampled Summer of 2003
  - Monitoring events scheduled for 2003, ’05, ’07, ’12, and 2017

14.14

Results of Monitoring

- CAD area results presented last year
- Operable Unit B results:
  - 500' cells
    - Aroclors detected in all cells
    - Total Aroclors ranged from 1.39 to 99 mg/kg, OC

    (The 99 mg/kg is considered to be an outlier. The area from which it was sampled is more characteristic of an uplands source, and will not be re-sampled in the 2005 or subsequent sampling events.)

14.15

OPERABLE UNIT B

- Area Weighted Average (AWA) PCB concentrations at PSNS OU-B:
  - Pre-RA - 7.8 mg/kg, OC PCB.
  - RA goal - 4.0 mg/kg, OC PCB.
  - Post-RA - 11.4 mg/kg, OC PCB.

    (The Post-RA sampling includes areas not characterized in Pre-RA sampling that were assumed to have lower PCB concentrations than later observed. The Navy considers the contribution from these areas to add approximately 4 mg/kg to the overall AWA. If this consideration is included, the true AWA post-RA is on the order of 7.4 mg/kg.)
  - Final goal – 3 mg/kg, OC PCB by 2014. This goal will probably not be reached. This goal was to be reached thru natural attenuation.

14.16

WHY?

Why weren't cleanup goals met?

14.17

Influences from Characterization

- Was the dredged area sampled immediately after dredging?
  - No (It was decided that sampling would be per a monitoring plan not developed until after dredging, and would be consistent with the pre-remedial plan.)
- Were there methodological differences between sampling iterations?
  - Yes (Differences were in areal extent, intensity, and detection/reporting limits. The post-RA sampling is better.)
- Was the sampling intensity sufficient to adequately describe the sediments?
  - Probably not
- Were stations reoccupied after dredging?
  - No

14.18

More Issues

- Is a composited sampling approach best?
  - Perhaps not in this case (The composited approach was dependent on the remedial strategy selected: AWA vs. "hot spot removal." AWA was the selected approach.)
- Were scenarios constructed to look at possible short-comings?
  - No, and doing this may have helped anticipating eventual problems
- What else could have been done?
  - Greater anticipation of "weak links" (The Navy feels that they did their best with available tools and models.)

14.19

Other Potential Problems

- "Racing the clock." Dredging was done until fish window closure. There was very limited time to do cleanup passes.
  - Cut cycle time in half, and bucket losses may go up by a factor of 16
- Combination of cleanup and navigational dredging can be difficult.
  - Some cleanup material went to Elliott Bay PSDDA site

(Note: Environmental dredging was held to tighter controls than navigation dredging.)

14.20

An Inherent Conflict

- Contracting cleanup based solely on volume encourages “production,” which can lead to greater residuals.
- Contracts must include sampling and analysis of the dredged area and sufficient time for additional cleanup passes.

(Note: Concentrations in dredged areas have not been collected. Sample grids overlap dredge and non-dredge areas. Therefore, the conclusion that dredge residuals casued this condition is not substantiated. However, it is a possible explanation, as is localized sediment transport. Sampling will be conducted in dredge areas and localized sediment transport studies will be conducted on 2005 to evaluate these impacts.)

14.21

A Business Opportunity?

- I believe what was experienced at PSNS shows that there are opportunities for closer coordination between dredging firms and environmental firms, resulting in better coordination of dredging and post-dredging monitoring.
- I will, in the future, recommend a “wedding” of the monitoring and dredging in the dredging contract.

14.22

Speaking of weddings …

14.23

ARARs

- Appropriate, Relevant, and Reliable Sayings:
  - *"If you don't know where you're going, how are you going to know when you get there?"*
    --Satchel Paige
  - *"A foolish consistency is the hobgoblin of small minds."*
    --Ralph Waldo Emerson
  - *"There's a fine line between genius and insanity. I have erased this line."*
    --Oscar Levant (mistakenly attributed to me)

14.24

"If you don't know where you're going…"

- You also have to know where you're starting from.
  - Sampling location and intensity must be sufficient to fully describe the site.
  - More is better. Don't stop at the break point on the cost/benefit curve. Look on site characterization as an investment in knowledge.
  - Remember that cost savings, when it comes to site characterization, are often false savings.

    (More data is always better, however, a decision must be made on what data is necessary to make decisions on the site, level of intensity and quality. The DQO process was followed and agency agreement reached on pre-remedial data and remedy.)

14.25

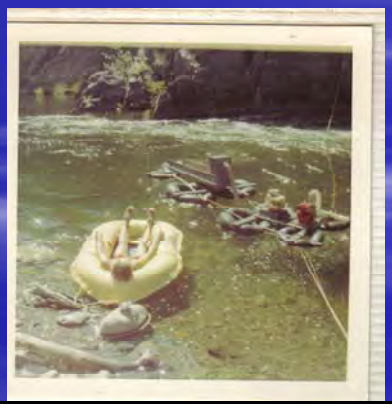
"A foolish consistency…"

- Keep to the same plan for all analyses, unless changes are absolutely required.
- Document this plan for the probable event of personnel changes. Document where the changes are stored.
- If protocols are changed, present data in both formats for a complete comparison.
- Remember the full quote, and that you may have to work with me.

14.26

Another Small Digression

- I have a long history with dredging and site management, starting in 1966.
  - Here's me as a dredger. And our dredging rig.



14.27

Military Experience

- Navigator and Diving Officer on icebreaker "*POLAR STAR*"
- Supervisor of the Seward, Alaska, Incident Command Post during the "*EXXON VALDEZ*" oil spill response.
- Here I am as "America's last line of defense."

14.28

Military Diving Experience

14.29

State Employment

- I started work with the state in 1995, representing DNR for the PSDDA multi-agency team.
- I helped draft the evaluation framework for dredging on the Columbia River
  - I suggested “Columbia River Analysis Protocol”
  - It was said my work already went under that acronym, so they chose “Dredged Material Evaluation Framework”

14.30

State Diver

14.31

Involvement with PSNS

- Worked with consulting firm who did bioassays for Pier D.
- Worked as DNR's PSDDA representative for Pier D dredging.
- Worked with DMMP for navigational portion of PSNS MCON P-338 (this project).
  - Reviewed the "Kitsap pit-SAP"
- Now assigned to Federal Facilities at Ecology.

14.32

This Presentation Is Not Intended To Assign Blame

- Without going into great statistical detail, for which my reputation precedes me, it's easy to say who's to blame.
- I have used a least-squares analysis curve-fitting of a fifth-order polynomial expression to characterize my participation, and have found my participation to be highly correlated with any and all problems at this site.
- So, if blame must be assigned, blame me.

14.33

Does Correlation Imply Causality?

- Often, no.
- In this case, probably.
- And it's probably genetic:
  - Father involved in WW2.
  - Grandfather involved in WW1.
  - See the pattern?

14.34

I have some small degree of comfort:

14.35

The Use of Screen Tube Larval Tests to Evaluate Woody Debris in Sediment (Low Density Sediment)

William Gardiner
MEC/Weston Solutions
Port Gamble, Washington

15.1

Acknowledgements

- Manke Lumber Company
- Clay Patmont, Kim Magruder, Dan Hennessy (Anchor Environmental)
- Jack Word and Matt Zinkl (MEC/Weston)
- Tom Gries, Russ McMillan (DOE)
- David Kendall (USACE)

15.2

Problem Identification

- Sediment that is low density or containing highly flocculent materials (such as woody debris) may cause physical effects in bioassays
- The PSEP larval test is particularly susceptible (larvae can become trapped in light surface layer)
- Difficult to find reference site
- Physical separation has been suggested in past for larval test (ie. Larval Workshop)

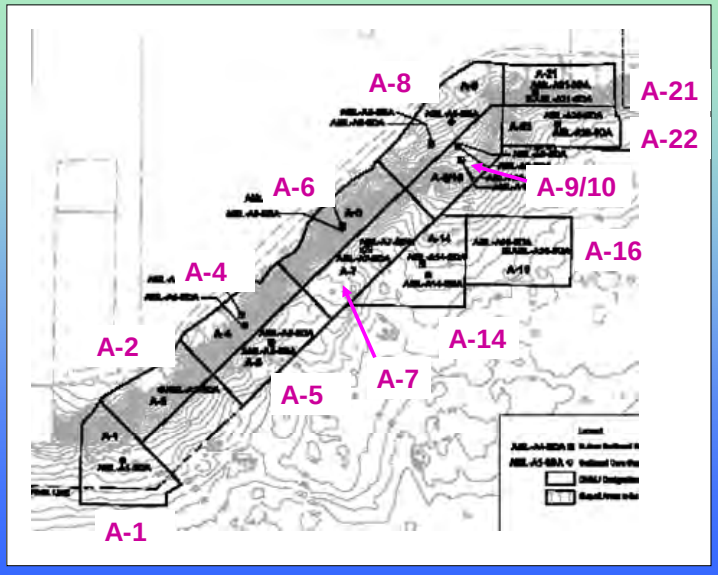
15.3

Manke Lumber Site

- Located at the head of the Hylebos Waterway, Tacoma
- Part of a MTCA action for the Hylebos Upper Turning Basin
- MTCA goal: reduce the TVS in surface sediment to <15%

15.4

10 DMMU Locations



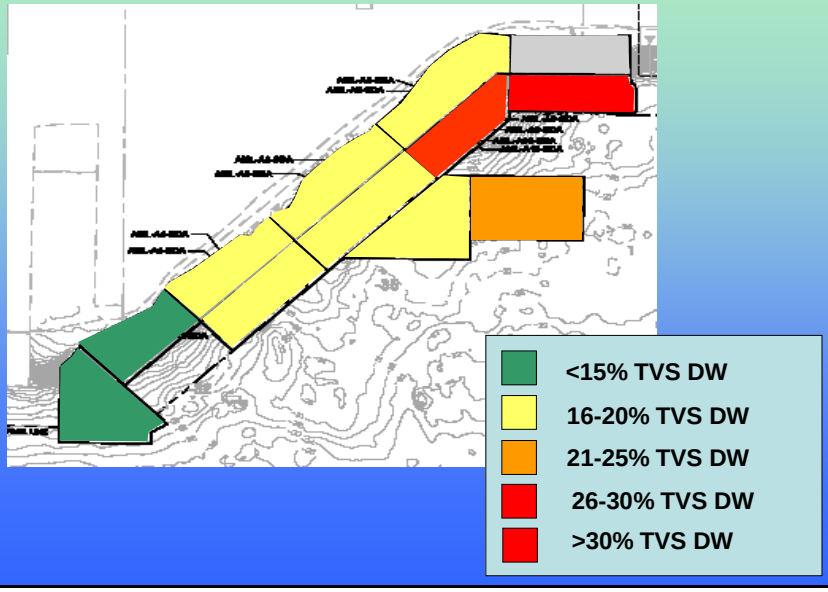
15.5

Sediment Chemistry

- Little or No Contaminants of Concern
- Visual observations indicate woody debris present
- TVS values exceed 15% dry weight goal for Upper Turning Basin in 10 DMMUs

15.6

TVS Distribution



15.7

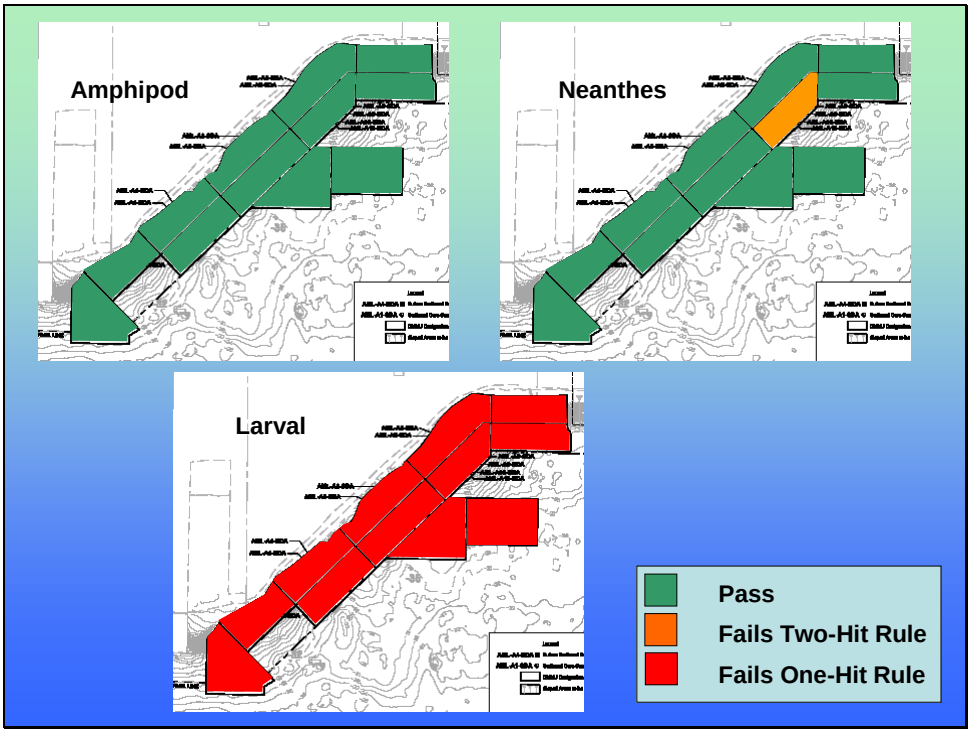
Bioassays

- Standard suite of PSDDA/PSEP tests
  - 10-day Amphipod with *Eohaustorius estuarius*
  - 20-day Polychaete with *Neanthes arenaceodentata*
  - 48-hour larval test with *Mytilus galloprovincialis*

15.8

Sample	Amphipod (% Survival)	Neanthes Growth (mg/ind./day)	Larval (% C-Normal)
Control	100%	0.81	77%
Reference	94-97%	0.61-0.83	64-69%
A-4	95% (6)	0.76 (0.3) (S=56%)	22 % (8)
A-5	83% (6)	0.72 (0.3)	32% (10)
A-6	90% (8)	0.78 (0.1)	38% (9)
A-8	94% (6)	0.81 (0.2)	34% (12)
A-9	85% (10)	0.53 (0.2)	32% (10)
A-10	90% (4)	0.83 (0.3)	22% (5)
A-14	91% (4)	0.73 (0.2)	38% (35)
A-16	89% (4)	0.81 (0.1)	15% (5)
A-21	87% (6)	0.81 (0.1)	23% (16)
A-22	90% (6)	0.81 (0.1)	32% (15)

15.9



15.10

What's going on in Larval Test

- Lack of discrimination between samples
- Poor larval recovery (normal development, but not many recovered)
- Presence of light flocculent layer throughout test
- Very long settling time in larval test
- Presence of fine woody debris
- No ammonia/sulfide issues
- Appear to be physical interactions

Screen Tube Tests - Methods

- Consultation with DOE/USACE-Seattle
- Use modified screen tube test to separate larvae from floc-layer
- Method based on sediment-water interface tests developed by Anderson et al. 2000.
  - Screen (37 um Nitex) on Lexan core tube approximately 1 cm from sediment surface
  - Screen Tubes placed in an intact sediment core
  - Embryos stocked directly in tubes

Screen Tube Tests

Modifications:

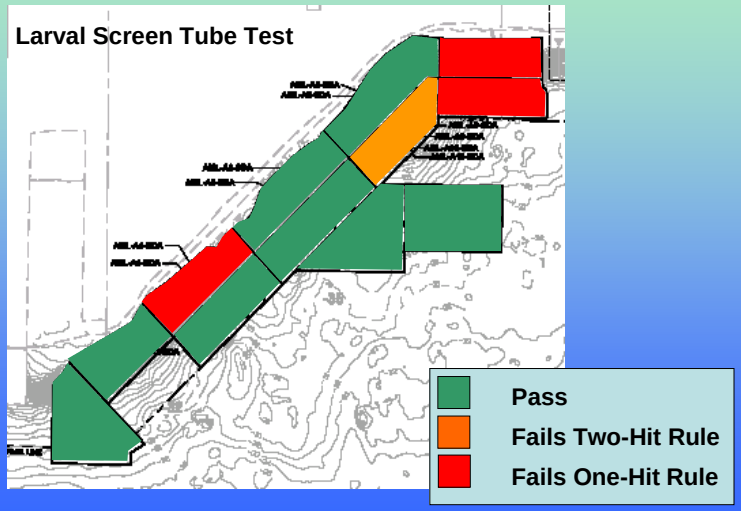
- 25 µm screen placed at end of 4-cm dia. Lexan tube
- Test containers layered similar to amphipod test
- Place screen tubes in test chamber 4-h after water addition
- Screen in direct contact with sediment
- Embryos spiked into screen tubes 20-40 E/mL
- Test terminated by homogenizing tube contents and subsampling tube

15.13

Sample	Larval (% C-Normal)	Larval (% C-Normal)
Control	95%	77%
Reference	83-89%	64-69%
A-4	16% (12)	22 % (8)
A-5	86% (15)	32% (10)
A-6	88% (16)	38% (9)
A-8	77% (25)	34% (12)
A-9	70% (21)	32% (10)
A-10	88% (15)	22% (5)
A-14	89% (11)	38% (35)
A-16	98% (3)	15% (5)
A-21	2% (3)	23% (16)
A-22	3% (4)	32% (15)

15.14

Results of Screen Tube Test



15.15

Conclusions

- **Screen Tube Tests appeared to be sensitive to treatment effects, while reducing the physical effects of woody debris and floc**
- **Screen Tube Tests offer an alternative for evaluating sediment with very fine wood debris and other light, flocculent material**
- **Appears to be able to distinguish between hit and non-hot stations**
- **Need to understand nature of exposure better**
- **Project was a good example of interactive process with DMMO**

15.16

Sulfide as a Marine Sediment Toxicant

Prepared for SMARM 2005

Richard S. Caldwell
Northwestern Aquatic Sciences
Newport, OR

Introduction

- In recent years ammonia has been identified as a potential confounding factor in marine sediment bioassays
- Yet ammonia concentrations in pore water rarely exceed toxic levels
- Conversely pore water sulfide concentrations sometimes exceed toxic levels by one to two orders of magnitude
- This presentation will explore the potential of sulfide to be a significant confounding factor or primary toxicant in marine bioassays

Production of Sulfide

- Anaerobic organic decomposition in marine environments uses sulfate rather than oxygen as the dominant electron acceptor producing sulfide.
- Estimated that 30 tons of sulfide are produced annually worldwide from marine sediments. Three tons are from pollutant sources such as sewage outfalls, paper mills, aquaculture, etc.

16.3

Fates of Sediment Sulfides

- Volatilization
  - Occurs mostly at night in absence of photosynthetic sulfide oxidation
- Chemical oxidation
  - Half-times reported from 0.4-65 hr are mostly insignificant compared to biological oxidation
- Metal Sulfide Precipitation
  - 5-94% of sulfide is precipitated as pyrite. Other metals are insignificant. Pyrite is in a dynamic state mediated by function of seasonal factors
- Biological oxidation
  - Most important oxidative process. Mostly microbial. Micro-, and macro-invertebrates, and fish also capable of oxidation

16.4

Sulfide in Marine Sediment Porewater (Bagarinao, 1992)-1

Location	Sulfide, mg/L	Reference
Mission Bay tidal marsh, top 10 cm,	19-112	Vetter et al. 1989
San Francisco Bay , tidal marsh	29-80	Klug et al. 1985
Santa Barbara basin sediment	to 0.8	Cary et al. 1989
Dana Point	0.6	Thompson et al. 1989
LA Harbor, East basin	0.3	Thompson et al. 1989
Palos Verdes, sewage outfall	24	Thompson et al. 1989
Santa Monica Bay, 7-mi outfall	230	Thompson et al. 1989
New Hampshire salt marsh	29-112	Hines et al. 1989

16.5

Sulfide in Marine Sediment Porewater (Bagarinao, 1992)-2

Location	Sulfide, mg/L	Reference
Delaware Massachusetts. salt marsh	3.2-109	Luther et al. 1986
Gulf of California	to 480	Goldhaber & Kaplan 1974
North Sea soft bottom	6.1	Theede et al. 1969
Medway, Kent Estuary	1-96	Wharfe 1977
Thames Estuary	2.6-13	Ingold & Havill 1984
Exuma, Bahamas, mangrove roots	16-48	Nickerson & Thibodeau 1985
swamp, unvegetated area	35-132	Nickerson & Thibodeau 1985

16.6

Sulfide Tolerance of Adult or Juvenile Marine Organisms

Species	Total S, mg/L	pH	Endpoint	Reference
Rhepoxynius, amphipod	1.6	8.0	48-hr LC50	Knezovich et al. 1996
Eohaustorius, amphipod	3.3	8.0	48-hr LC50	Knezovich et al. 1996
Anisogammarus, amphipod	0.8	8.2	48-hr LC50	Caldwell 1975
Corophium,amphipod	<1	8.3	48-hr LC50	Caldwell 1975
Gnorimoshaeroma, isopod	6.0	8.0	48-hr LC50	Caldwell 1975
Cancer, 1st instar crab	1.0	8.0	48-hr LC50	Caldwell 1975
Macoma, clam juv.	8.0	8.2	48-hr LC50	Caldwell 1975
Crassostrea, oyster juv.	2.6	8.2	48-hr LC50	Caldwell 1975
Arctica, clam	6.4	7.5	10-d LOEC	Oeschger, Storey 1993
Neanthes, polychaete	4.8	8.0	96-hr NOEC	Dillon et al. 1993

16.7

Sulfide Tolerance of Larval Marine Organisms

Species	Total S, mg/L	pH	Endpoint	Reference
Strongylocentrotus, urchin	0.19	8.0	48-hr EC50	Knezovich et al. 1996
Mytilus, mussel embryo	0.1	8.0	48-hr EC50	Knezovich et al. 1996
Crassostrea, oyster embryo	0.30	7.9	2-hr EC50	Caldwell 1975
Cancer, crab zoeae	0.6	8.1	48-hr EC50	Caldwell 1975

16.8

Recent NAS Project Site Pore Water Sulfides

Site	Type	# of samples	Sulfide (mg/L)	NH3-N (mg/L)	Mortality (%)
569	Wood products	35 (day 10)	0-28	0-14	0-100
717	Transportation	4	0-55	0-34	0-24
718	petroleum	11	0-67	1-112	0-53
719	Wood products	47	0-72	0-27	0-95

16.9

What Conditions are Required for Sulfide Toxicity in Bioassays?

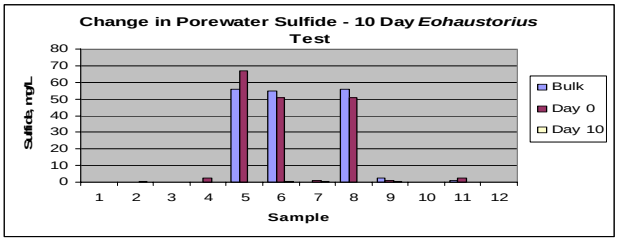
- Sediment sulfide toxicity is a function of:
  - Porewater soluble sulfide concentration
  - Organism's sulfide LC50
  - Rate of sulfide loss from sediment porewater
  - Rate of toxic action
  - Avoidance ability of organism

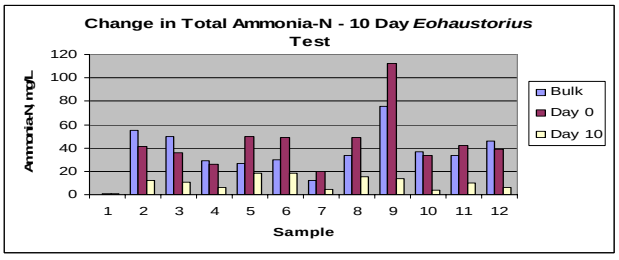
16.10

Summarizing

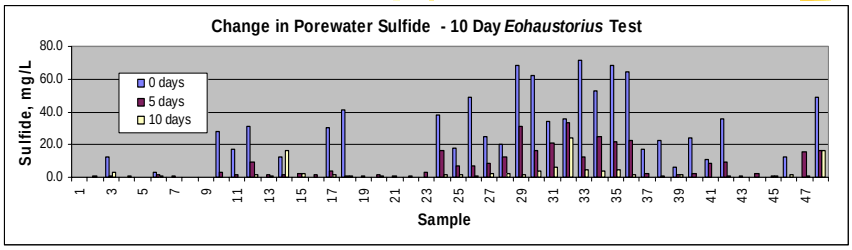
- Observations:
  - Toxic effects of sulfide to marine organisms in water occur between 0.1 – 10.0 mg/L sulfide
  - Natural marine sediment porewater sulfide concentrations frequently exceed 100 mg/L
  - Concentrations of 20 to 100 mg/L sulfide have been frequently observed in bioassay test sediments
- What about:
  - Rate of sulfide disappearance from bioassay systems?
  - Rate of sulfide toxicity in organisms?

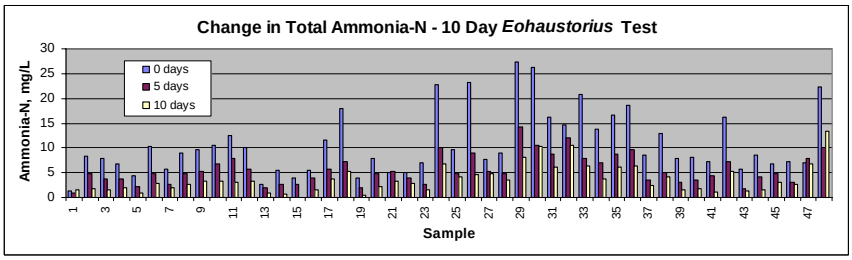
Eohaustorius and Petroleum Site 718





Eohaustorius and Wood Waste Site 719





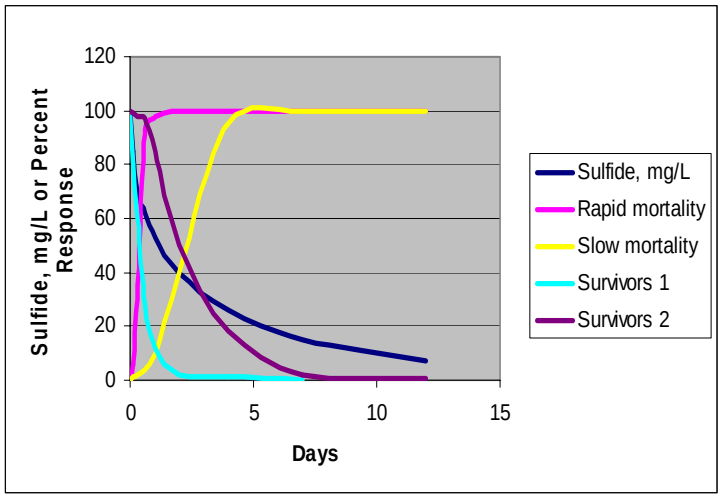
16.13

Rate of Sulfide Toxicity (Caldwell, 1975)

Organism	24-hr LC50	48-hr LC50	96-hr LC50
Cancer, zoeae	0.7	0.6	0.5
Cancer, 1st instar crab	1.0	1.0	1.0
Gnorimoshaeroma, isopod	6.8	6.0	5.2
Anisogammarus, amphipod	3.2	0.8	0.2
Corophium, amphipod	1.4	<1.0	<1.0
Macoma, clam	>10.0	8.0	6.0
Crassostrea, oyster	3.3	2.6	1.4

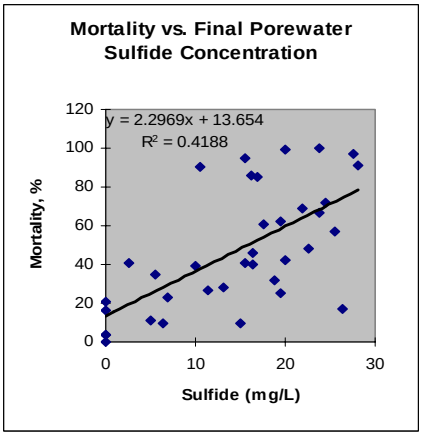
16.14

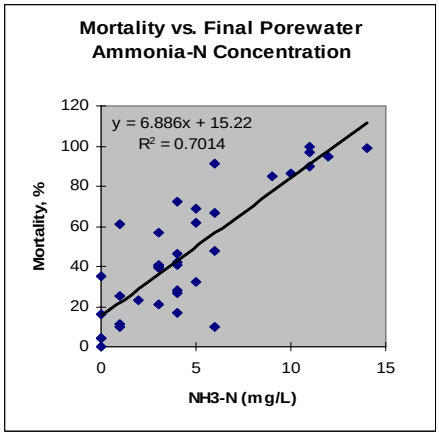
Survival Affected by Mortality & Sulfide Loss Rates



16.15

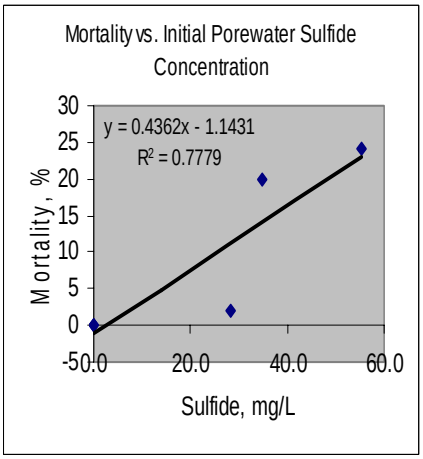
Rhepoxynius and Wood Waste Site 569

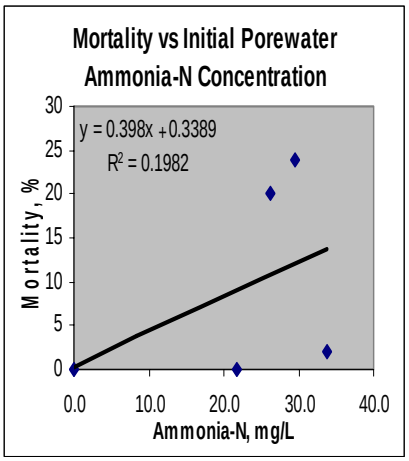




16.16

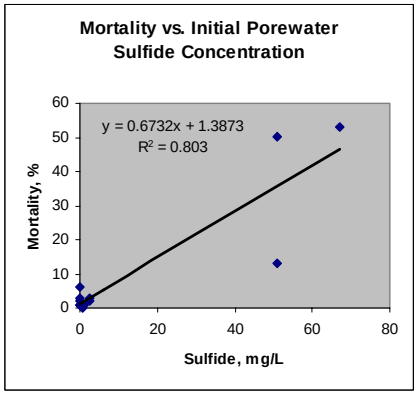
Eohaustorius and Transportation Site 717

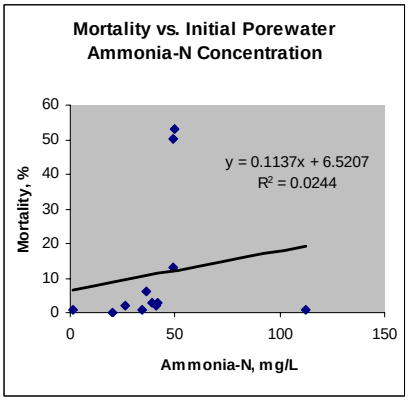




16.17

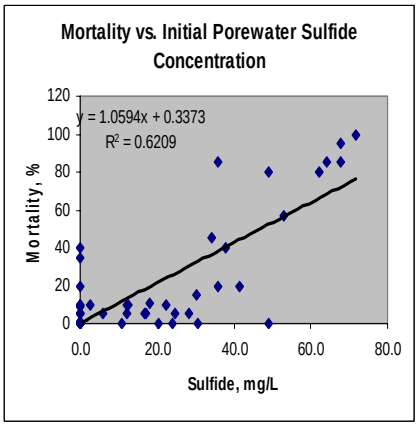
Eohaustorius and Petroleum Site 718

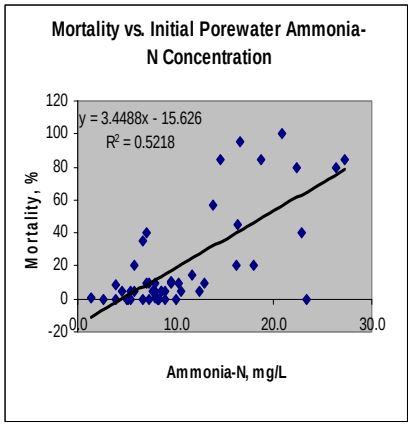




16.18

Eohaustorius and Wood Waste Site 719





16.19

Results of Sediment TIE

- In a study of eight sediments having various high sulfide and ammonia concentrations in the pore water, results support a conclusion that toxicity was predominantly due to sulfide, not ammonia.

16.20

Effect of Aeration on Sulfide, Ammonia & Toxicity

Sediment	Baseline			Aeration		
	Sulfide	Ammonia	LC50	Sulfide	Ammonia	LC50
1	<10	8	>100	<2	8	>100
2	65	18	34	5	18	>100
3	80	25	11	5	20	>100
4	115	20	12	6	22	>100
5	75	22	20	2	20	>100
6	130	62	17	11	60	40
7	125	48	11	8	42	>100
8	125	58	10	11	58	>100

Summary

- Toxic effects of sulfide to marine organisms in water occur between 0.1 – 10.0 mg/L sulfide
- Concentrations of 20 to 100 mg/L sulfide have been regularly observed in bioassay test sediments
- Half-time of sulfide disappearance in bioassay systems approximates two days
- LT50 for sulfide toxicity approximates one day
- Porewater sulfide concentrations >30 mg/L may result in significant amphipod mortality in standard marine sediment bioassays

Conclusion

- The evidence summarized in this report support a conclusion that sulfide may be as or more important than ammonia as a confounding factor or a primary toxicant in marine sediment bioassays

16.23

Recommendations

- Perform studies to further characterize sulfide disappearance rates in sediment bioassays
- Further characterize pore water toxicity rates for sulfide
- Perform laboratory studies with otherwise unpolluted sediments to further characterize pore water sulfide/amphipod mortality relationships. e.g. sediment dilution or spiking studies.
- Monitor regulatory bioassays more intensively where sulfide toxicity is indicated.

16.24

Sediment Management Annual Review Meeting
May 4, 2005

Contaminated Sediment Residuals: Recent Monitoring Data and Management Strategies

Clay Patmont
Anchor Environmental

Jeff Stern
King County Department of Natural Resources & Parks

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17.1

Sediment Residuals Defined

Contaminated sediments that either:

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

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17.2

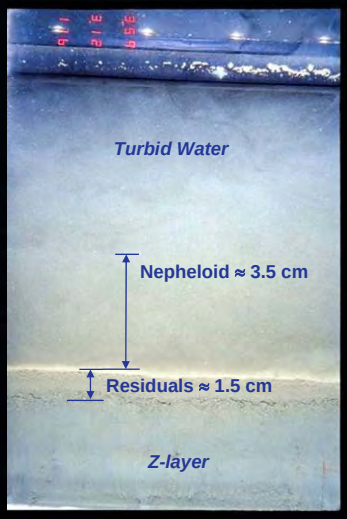
Residual Sediment Characteristics

Typical physical properties

- Fine-grained
- Unconsolidated
- High moisture content
- May exist as a "fluid mud" layer

Typical chemical properties

- Constituent concentrations typically equal the depth averaged dredge prism concentration



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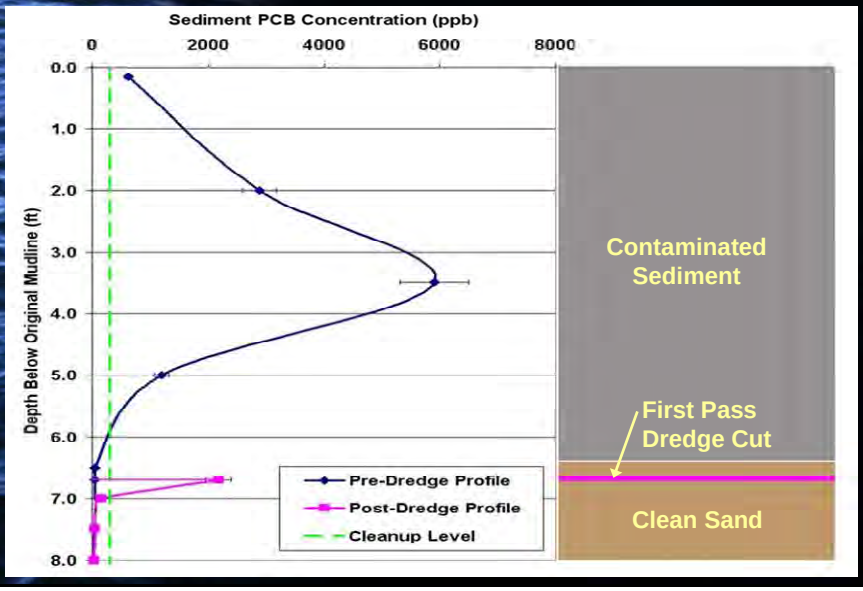
17.3

Pre- and Post-Dredge Sampling Data
Hylebos Waterway Middle – PCB Deposit



17.4

Primary Sources of Sediment Residuals

NEAR FIELD

- Disturbed sediments loosened by dredge head or bucket, but not effectively captured and removed
- Failure of cut slopes
- Resettling of resuspended sediment at point of dredging and from haul barges

INTERMEDIATE FIELD

- Localized scour of adjacent bed by prop wash
- Transport via mud wave & nepheloid layer

FAR FIELD

- Water column resuspension and settling

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17.5

Primary Sources of Sediment Residuals

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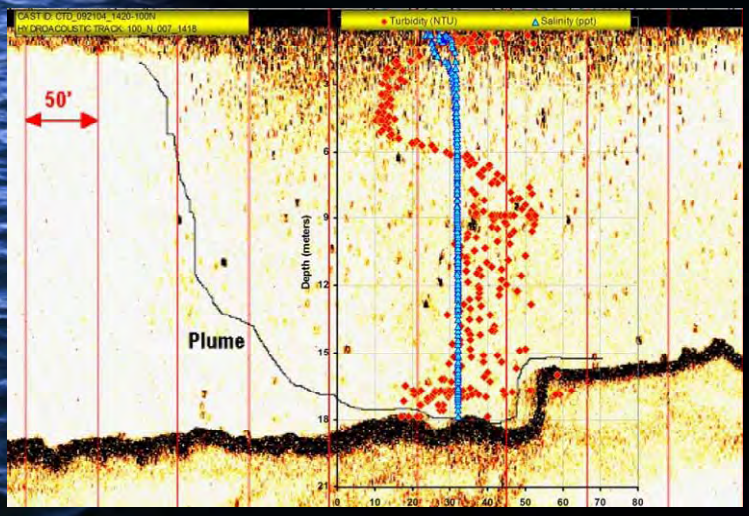
17.6

Other Residuals Sources

17.7

Hydroacoustic Signature of Far-Field Turbidity Plume During Dredging



17.8

Sediment Residuals: Probable Controlling Factors

- Dredge operator skill
- Sediment physical characteristics
  - ✓ Liquid limit of sediment
  - ✓ Fines content vs. sand content
- Site characteristics
  - ✓ Magnitude of chemical exceedance
  - ✓ Debris/underlying geology
  - ✓ Current or propeller wash velocities
  - ✓ Slopes
- Equipment selection and precision
- Use of BMPs (operational & specialized equipment)

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17.9

Suggested Approach to Characterize Contaminated Sediment Residuals

- Detailed pre- and post-dredge characterization data:
  - ✓ Dredge prism chemistry
  - ✓ Base ("z") layer chemistry
  - ✓ Surface chemistry (incl. adjacent areas)
  - ✓ Core profiling (visual)
- First-pass (post-dredge) data collection
- Statistical requirements – sample size
- Mass-balance calculations
- Potential transport modeling

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17.10

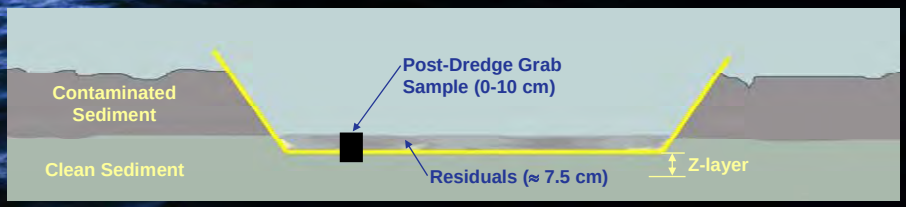
Suggested Approach to Characterize Residuals Thickness

Average PCB Concentrations (ppb)	
Dredge Prism	1,530
Z-layer	37
Post-Dredge Grab Sample	1,165

Mass-Balance Approach

10 cm (1,165 ppb) = t (37 ppb) + (10 – t)(1,530 ppb)

calculated residual thickness ≈ 7.5 cm



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17.11

Case Study Examples

Representative projects with available data for mass balance calculations:

- Fox River, WI (two pilot projects)
- Lavaca Bay, TX (pilot)
- New Bedford Harbor, MA (pilot)
- Reynolds Aluminum, NY
- Hylebos Waterway (mouth & middle), WA
- Middle Waterway, WA
- Duwamish/Diagonal, WA

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17.12

Residuals Case Study Examples

Site	First-Pass Dredge Volume (cy)	Date	Equipment Type	Avg. First-Pass Residuals Mass Release (%)[1]
Fox River SMU 56/57 Pilot	31,000	1999	10" Horizontal Auger	17
Fox River Deposit N Pilot	8,200	1998/ 99	8" Cutterhead	~8
New Bedford Harb. Pre-Design	2,300	2000	4.5 cy Horiz. Profile Bucket	6
Duwamish/ Diagonal	70,000	2003/ 04	12 cy Clamshell	~6 (2 to 12)
Hylebos Waterway Middle	200,000	2004	20 cy Clamshell	5
Lavaca Bay Pilot	10,000	1999	14" Cutterhead	4
Reynolds Aluminum	63,000	2001	5.5 cy Cable Arm™	4
Middle Waterway	90,000	2003/ 04	6-12-16 cy Clamshell	4
Hylebos Waterway Mouth	390,000	2003/ 04	20 cy Clamshell	2

[1] Calculated as the ratio of the residual mass to the dredge sediment mass based on first-pass data.

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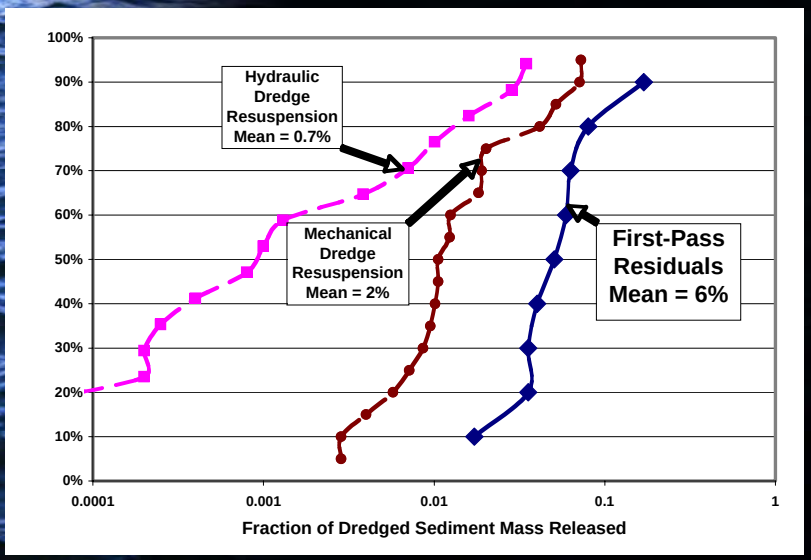
17.13

Residuals vs. Resuspension Measurements



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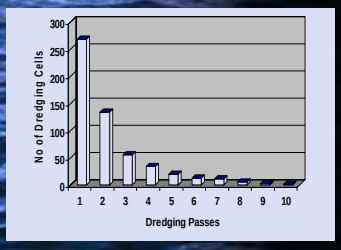
17.14

Typical Residuals Management Sequence and Contingency Dredging Actions



- Cleanup goals anticipated to be met after first pass
- First pass dredging
  - ✓ Digging to grade
  - ✓ High spot removal
- Confirmation sampling
- Additional dredging pass to address residuals
- Re-sample
- Re-dredge until clean

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17.15

Wide Range of Possible Contingency Actions

- Monitored Natural Recovery
  - ✓ Suitable in areas with adequate sedimentation rates or nepheloid layer transport
- Enhanced Natural Recovery
  - ✓ Useful in low sedimentation areas or when immediate risk reduction needed
- Cap Residual Sediment
  - ✓ More certain solution
  - ✓ Over-dredge where final depth is critical
- Re-Dredge
  - ✓ Limited effectiveness in many cases

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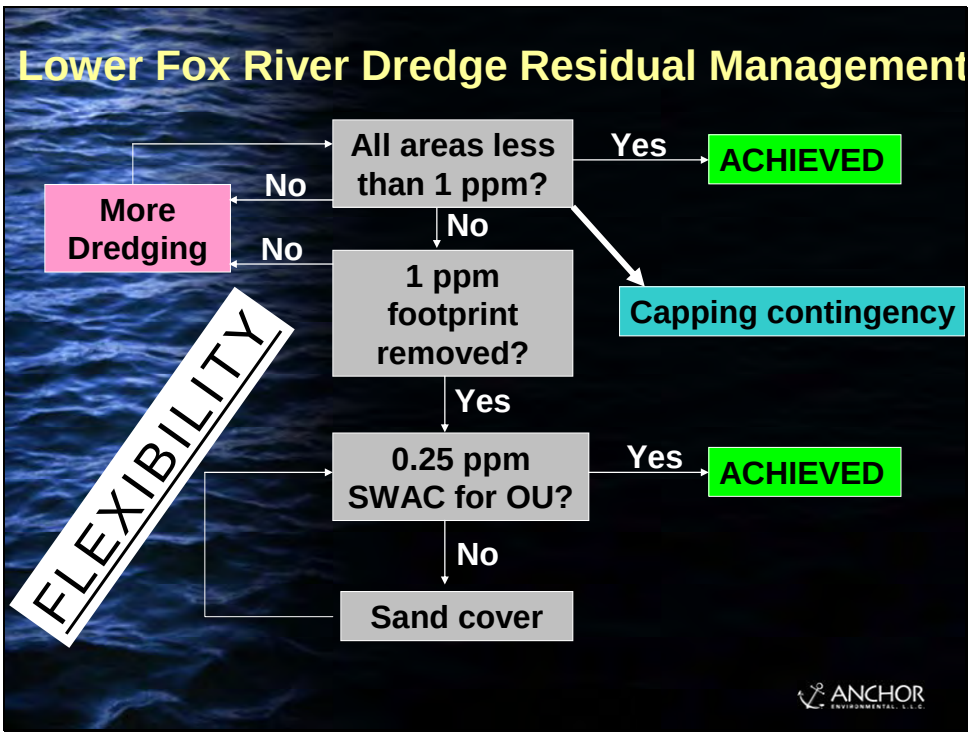
17.16

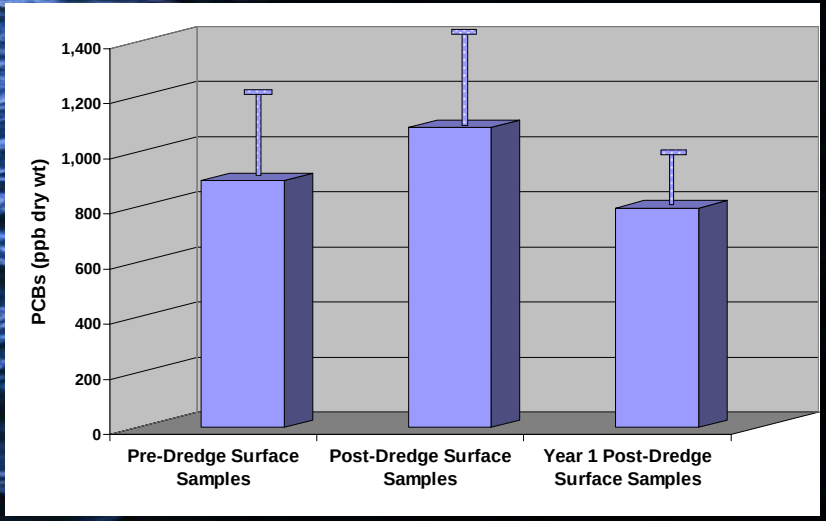

Lower Fox River Dredge Residual Management
All areas less than 1 ppm?
Yes
ACHIEVED
No
More Dredging
No
1 ppm footprint removed?
Capping contingency
Yes
FLEXIBILITY
0.25 ppm SWAC for OU?
Yes
ACHIEVED
No
Sand cover
ANCHOR

17.17


Duwamish/Diagonal Site
ANCHOR

17.18

Duwamish/Diagonal Natural Recovery of Off-Site Post-Dredge Residuals



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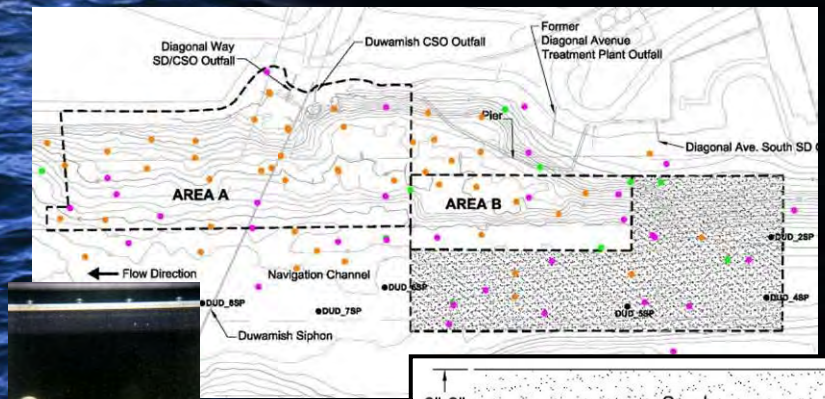
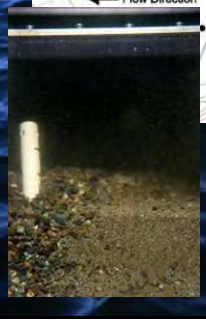
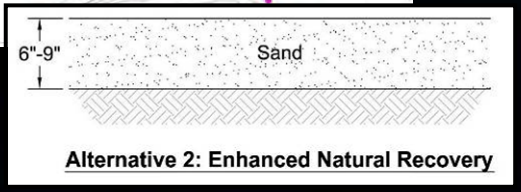
17.19

Duwamish/Diagonal Thin-Layer Cover of Off-Site Post-Dredge Residuals







Alternative 2: Enhanced Natural Recovery

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17.20

Management Recommendations

- Plan for residuals early in project planning
  - ✓ Residuals inform remedy and design
- Need for up-front contingency planning
  - ✓ Up-front agreement on post-dredge data interpretation
  - ✓ Facilitate rapid management decisions
- Monitor dredging operations
  - ✓ Water quality not a good indicator of residuals
- Consider range of contingency options
  - ✓ Re-dredging has limited effectiveness in many cases
  - ✓ Capping residual sediment is more certain
- Expand residuals case history database

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