U.S. Army Corps of Engineers
Seattle District

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING

MAY 5, 2004 MEETING MINUTES

Prepared for:

DMMP Agencies

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List of Acronyms and Abbreviations

AET	Apparent Effects Threshold
BCOC	Bioaccumulative chemicals of concern
BT	Bioaccumulation trigger
CAD	Confined Aquatic Disposal
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CSMP	Cooperative Sediment Management Program (Washington State)
cy	Cubic yard(s)
DDT	Dichloro-diphenyl-trichloroethane
DMEF	Dredged Material Evaluation Framework
DMMP	Dredged Material Management Program
Ecology	Washington State Department of Ecology
EDC	Endocrine disrupting chemicals
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
IM	Information management
ISIS	Integrated Site Information System
LAET	Lowest Apparent Effects Threshold
ML	Maximum level
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
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
RSET	Regional Sediment Evaluation Team
SAIC	Science Application International Corporation
SEDQUAL	Sediment Quality Information System
SL	Screening level
SMARM	Sediment Management Annual Review Meeting
SMS	Sediment Management Standards
SMU	Sediment Management Unit
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 5, 2004. This Sediment Management Annual Review Meeting (SMARM) was hosted by the Washington State Department of Ecology (Ecology) and was held at the Comfort Inn Conference Center located in Tumwater, Washington. The SMARM encompassed both the Dredged Material Management Program (DMMP) annual review meeting and Ecology's Sediment Management Standards (SMS) annual review process. The DMMP is an interagency cooperative program for dredged material management that began with the Puget Sound Dredged Disposal Analysis Program (PSDDA) and has expanded to other regions of Washington State. The DMMP agencies include the 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 Ecology. The meeting agenda is provided as Attachment 1, the list of attendees is provided as Attachment 2, and the presentation materials of the individual speakers are provided as Attachment 3.

Welcome and Opening Remarks

1. Wayne Wagner, USACE, Seattle District. Mr. Wagner started the meeting with talk of preliminaries, such as name tags, signing in, location of the bathrooms, and lunch locations. He finished with an introduction of Colonel Debra Lewis, Commander, USACE, Seattle District.

Colonel Lewis welcomed the meeting participants and spoke of her passion for sediment and light-weight aggregate. She reminded the audience of the dire circumstances that brought forward the need to have such a meeting, and how it makes what we are doing that much more important. While acknowledging the difficulties of today's economy and public environment, she stressed the importance of collaboration and teamwork to continue the effort of cleaning up the contaminated sediments.

Linda Hoffman, Director of Ecology, then gave a brief recap of sediment management in the state of Washington since the birth of SMS in 1991. The first list of contaminated sediment sites was published in 1996 and the most current version in 2003. Out of 133 sites on the 2003 list, 110 are marine sites, and 23 are freshwater sites; two-thirds of all sites are in the cleanup process. A third of the marine sites are not currently in the process of being cleaned up because they have either already undergone cleanup, or no action was necessary at those sites.

Ms. Hoffman emphasized that it is important for the state to continue with sediment cleanup because it is critical to the health of our water bodies, especially Puget Sound. Since last year's meeting, progress has been made on cleaning up the Puget Sound Naval Shipyard Superfund site. Work is ongoing in Bellingham Bay and has begun to focus on Whatcom Waterway.

Ecology is spearheading the effort to create a set of freshwater guidelines for use in Washington State. The Toxics Cleanup Program-Sediment Management Unit (SMU) at Ecology has been improving its information management systems and is working with the agency as a whole to improve intra- and inter-agency sharing of information. In addition to the freshwater guidance, Ecology is also working on guidance for dealing with wood waste issues.

Ms. Hoffman then summarized the purpose for the meeting.

1. Report the status of agencies
2. Update what is happening in science
3. Introduce proposals for changes
4. Provide a forum for those outside the realm of sediment management to bring forth issues for agency consideration

Mr. Wagner acknowledged the individual members of the Panel representing the DMMP agencies and the SMS program. Panel members included:

- Loren Stern – WDNR
- John Malek – EPA
- Kathryn DeJesus – Ecology
- David Kendall – USACE

Mr. Wagner stated that the meeting was being sponsored jointly by the DMMP agencies and the SMS program, with Ecology acting as host and the USACE acting as moderator. The objectives of the meeting were then reiterated by Mr. Wagner before turning the floor over for the agency reports.

Slides

PP 0.1	Sediment Management Annual Review Meeting
PP 0.2	2003 SMARM
PP 0.3-4	Meeting Objectives and Purpose
PP 0.5-6	Agency Summary Reports

PP 0.7-8	DMMP/SMS Presentations
PP 0.9	Regional Sediment Team Update
PP 0.10	Topical Presentations
PP 0.11	Public Issue Papers
PP 0.12	Summary and Closing

AGENCY SUMMARY REPORTS

1. Summary of DMMP Testing Activities (Lauran Warner, USACE). Ms. Warner provided a summary of DMMP testing activities on behalf of the USACE. She began with her own explanation of why the Sediment Management Annual Review Meeting (SMARM) occurs year after year, referring to the state of Elliott Bay approximately 100 years ago and referencing "The Imperiled Sound" article published 20 years ago in *The Seattle Times* on the declining health of Puget Sound. In response to the crisis, the PSDDA and the DMMP began. Twenty years after the *Seattle Times* report, Washington State and the Northwest currently lead the nation in interagency coordination; however, progress is ongoing and at times slow.

Ms. Warner provided an overview of modifications to the PSDDA guidelines that have occurred in the past year. The Bioaccumulative Chemicals of Concern (BCOC) list has been updated and new screening level (SL), bioaccumulation trigger (BT), and maximum level (ML) tables have been created; some contaminants were added, some removed, others had value adjustments. The definition of dredged material has been more clearly defined from the original regulations but still remains flexible. Pre-dredge conferences were held for Grays Harbor and Willapa Bay Projects to coordinate with contractors and applicants (Ms. Warner stated that this is more important than it looks). She also spoke about the importance of determining recency guideline exceedances and how to test when they occur.

Ms. Warner then summarized testing activities associated with the 2004 dredging year (June 16, 2003 to June 15, 2004). Over 1 million cubic yards (cy) were dredged; eight suitability determinations and five recency evaluations were performed. All projects passed except two, which equates to a little over 1 percent that were not suitable for open water disposal. No bioaccumulation testing was required for any of the projects.

The major projects of 2004 were the Upper and Lower Snohomish turning basins, the Blair Bridge Reach, and the Port of Peninsula in Willapa Bay. Recency extensions, which required no further testing, were given to Puget Sound Naval Shipyards, East Waterway-subsurface, Padden Creek, and Glacier NW-Lower Duwamish. The East Waterway had a few surface samples fail and therefore did not qualify for open water disposal. Other areas

that had changes included Blair Waterway, the Pacific Sound Resources (PSR) site in Elliott Bay, and Lower Duwamish Superfund site. Many projects are ongoing and upcoming, see slides for full list.

Ms. Warner then discussed potential issues to be dealt with in the near future. Invasive species are increasingly coming to the forefront and there is no guidance in how to deal with them. Freshwater guidelines are being developed by Ecology and the Oregon Department of Environmental Quality (ODEQ). The Regional Sediment Evaluation Team (RSET), the newest portion of the DMMP, has been founded and is beginning its development. Beneficial uses for clean dredged material are continuously being explored; these range from capping to beach nourishment, and building up deltas and nearshore areas. As beneficial uses increase and divert dredged material from DMMP sites, funding from fees decreases, and this could become a long-term issue.

For more information, Ms. Warner referred the audience to the USACE website (PP 1.21).

There were no questions.

Slides

PP 1.1	Dredging Year 2004 Testing Activities
PP 1.2	Historical Photograph of Seattle
PP 1.3	Photograph of Outfall
PP 1.4	Photograph of "The Imperiled Sound" article from *The Seattle Times*
PP 1.5	20 Years Later
PP 1.6-7	The Big Picture
PP 1.8	Modifications since the last SMARM
PP 1.9	2004 Testing and Evaluation
PP 1.10	Dredging Year 2004 Characterizations
PP 1.11	Dredging Year 2004 Findings
PP 1.12	2004 Big Ones
PP 1.13-14	2004 Recency Extensions
PP 1.15	Project Changes and Trends
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PP 1.18	Future Challenges
PP 1.19	Upcoming Issues
PP 1.20	Beneficial Uses
PP 1.21	For more DMMP information

2. Summary of DNR Disposal and Monitoring Activities (Peter Leon, DNR). Mr. Leon presented the results from the 2003 Tiered Full Monitoring at the Commencement Bay DMMP Disposal Site. He began the review by thanking John Nakayama of Science Applications International Corporation (SAIC) for support in the monitoring effort. The monitoring framework is based on three questions:

- Does dredge material remain on site?
- Has dredge material disposal caused biological effects conditions to be exceeded?
- Are unacceptable adverse effects occurring off site due to disposal?

Puget Sound has eight DMMP disposal sites, and the 2003 study focused solely on the Commencement Bay site located off Brown's Point in Tacoma. The site is in 550 feet of water, is oval in shape, and is approximately 4,600 by 3,800 feet with a circular waterline disposal target 1,200 feet in diameter. Tiered monitoring uses a variety of tools to assess the questions at hand: sediment vertical profile system (SVPS) imagery, sediment chemistry, benthic infauna, bioassays, and tissue chemistry.

Mr. Leon gave a brief overview of past monitoring activities at the Commencement Bay site, including the 1988 baseline study, 1996 summary, 1998 SVPS summary, and 2001 full monitoring event.

He discussed in detail the results of the 2003 monitoring. SVPS was used at 64 stations, and sediment, tissue, and benthic monitoring stations were spread amongst approximately a dozen stations. The DMMP agencies had established six hypotheses around the monitoring. Hypothesis #1, that dredge material remains on site was rejected through the use of SVPS imagery, though the footprint is smaller than in 2001. Sediment chemistry was also discussed. The conventional parameters were comparable to previous years. No metals exceeded guidelines and all organics were non-detects, except for hexachlorobenzene, dichloro-diphenyl-trichloroethane (DDT), and a few semi-volatile organic compounds (SVOCs). Benchmark analysis was triggered by the SVOC exceedances, but all stations passed bioassay testing. Field variance was acceptable for most chemicals. Some metals triggered benchmark analysis for tissue samples, but again all bioassays passed. The benthic community increased in both taxa and abundance from previous years.

The hypotheses:

- Hypothesis 1-rejected: dredged material does not remain on site
- Hypothesis 2-rejected: chemistry levels increased off site due to disposal
- Hypothesis 3-accepted: onsite chemical concentrations do not exceed guidelines
- Hypothesis 4-accepted: sediment toxicity does not exceed guidelines

- Hypothesis 5-accepted: no increase in chemical burden of benthic taxa
- Hypothesis 6-accepted: no decrease in abundance of benthic taxa

Mr. Leon concluded his talk by discussing future activities in Commencement Bay. With the current rate of disposal at the site, the limit will likely be reached by 2007. The site will be monitored again this summer.

There were no questions.

Slides

PP 2.1	2003 Tiered Partial Monitoring at the Elliott Bay Disposal Site
PP 2.2	Monitoring Framework
PP 2.3	Agenda
PP 2.4	DMMP Sites in Puget Sound
PP 2.5	Commencement Bay Disposal Site
PP 2.6	Tiered Full Monitoring Framework
PP 2.7	2003 Modifications
PP 2.8	Summary of 1988 Baseline Conditions
PP 2.9	Summary of 1995 “Full”
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PP 2.15	Sediment Vertical Profile System (SVPS)
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PP 2.17	Sediment Chemistry: Conventionals and Metals
PP 2.18-19	Sediment Chemistry: Organics
PP 2.20	Sediment Chemistry: BCOCs
PP 2.21	Sediment Chemistry: Field Variability
PP 2.22	Tissue Chemistry
PP 2.23	Bioassays
PP 2.24	Benthic Community Analysis
PP 2.25	Benchmark Station Analyses
PP 2.26	Evaluation of 2002 Data
PP 2.27	Question 2
PP 2.28	Question 3
PP 2.29	Future Activities at Commencement Bay
PP 2.30	DNR SUA Disposal Volumes DY 2004

3. Summary of SMS Cleanup/Source Control Activities (Kathryn DeJesus, Ecology). Ms. DeJesus of Ecology gave a summary of the SMS cleanup and source control activities, and the development of state freshwater sediment quality guidelines. Ms. DeJesus mentioned recent hiring activities in the SMU of the Toxics Cleanup Program (TCP) at Ecology, notable additions include Ted Benson, Gina Casteel, and David Sternberg. She also summarized the structure of the TCP, where the SMU is located, with a quick explanation and reminder of how there are four regional offices that manage sediments in addition to the headquarters office in Lacey, Washington.

The development status of Washington's freshwater sediment quality guidelines was summarized as currently being in phase 2. Phase 1 consisted of a review of existing North American guidelines. Ms. DeJesus stated that phase 2 resulted in the development and recommendation of revised Washington state freshwater sediment quality values based on AETs and a floating percentile method developed by Teresa Michelsen (Avocet Consulting) under contract to Ecology. An implementation plan to field test the new chemical values in freshwater environments is currently under development. Ms. DeJesus emphasized that no guidelines will be adopted without first being proven reliable in the field through extensive research.

Ms. DeJesus acknowledged that the SMU is also working on developing guidance on woodwaste, as more and more sites are undergoing woodwaste cleanups. They are working to understand the environmental impact and best tools available, including help with identification and assessment. She expects that Ecology will have guidance ready in the summer of 2005.

Ms. DeJesus briefly mentioned that Sediment Quality Information System (SEDQUAL) revision 5.0 will be available this summer and has many improvements over previous versions. The new version will allow for benthic triad analysis and contains mapping links.

Ecology's Integrated Site Information System (ISIS) list is being updated to include contaminated sediment-only sites and will contain a comprehensive list of all contaminated sites in the state.

Within Ecology, SMU is working with the Water Quality Program to update the 303(d) list on sediment impacted water bodies. There will be a 45-day public comment period in July for the 2004 list. The two programs are working together on source control to make sure National Pollutant Discharge Elimination System (NPDES) permits are not creating new sites through permitted discharges.

Ms. DeJesus went through a quick update of sites around the state that have undergone cleanups in the past year. Jackson Park-Ostrich Bay, a former Navy ammunition depot and the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) site, has undergone extensive upland remediation, and marine sediment clean up is in the developmental stages. Bellingham Bay Pilot Project is ongoing. Notable sites in cleanup stages within Bellingham Bay include Gate 2 Boatyard and Whatcom Waterway. The Georgia Pacific (GP) Log Pond capping was very successful and exceeded expectations. The Lower Duwamish Waterway has undergone source control; 489 businesses were interviewed and 64 percent of those have taken action. The Duwamish Diagonal Project was completed and Boeing is working to reduce polychlorinated biphenyl (PCB) contamination.

Ms. DeJesus discussed the freshwater sites the eastern region office has in progress, such as the Spokane River (which is part of the Coeur d'Alene Superfund site) and Lake Roosevelt. Ten beach or shoreline areas in the Spokane River are to undergo sediment management or cleanup, and a health advisory has been issued against consumption of fish from the river. On the west side of the state, the Skykomish River was polluted by 100 years of railroad operations and a formal dispute resolution is currently in progress.

Websites for the various programs within the Toxics Cleanup Program are listed on the last slide of the presentation.

There were no questions.

Slides

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PP 3.7	SEDQUAL Information System
PP 3.8	Contaminated Site Information…or mud matters, too
PP 3.9	Sediment Source Control
PP 3.10	Some Sediment Site Status
PP 3.11	Jackson Park Housing Complex
PP 3.12	Bellingham Bay Demonstration Pilot Remedial Activities
PP 3.13	Gate 2 Boatyard
PP 3.14	Whatcom Waterway – Bellingham

PP 3.15-16	Lower Duwamish Waterway
PP 3.17	Ecology Eastern Region Freshwater Sediment Projects
PP 3.18	Spokane River Basin
PP 3.19	Upriver Dam Site
PP 3.20	Spokane River Health Advisories
PP 3.21	Lake Roosevelt
PP 3.22	Skykomish River
PP 3.23	Web Sites

4. **Summary of Regional CERCLA Activities** (Lori Cohen, EPA Region 10). Ms. Cohen started her summary of CERCLA cleanup activities by thanking all those involved for their cooperation in the cleanup efforts. Over half a million cy (~166 acres) of contaminated sediments have been removed from Puget Sound under Superfund. The general approach of Superfund sediment work is to seek input from the community on cleanup plans, comply with the Clean Water Act, coordinate with natural resource agencies to create habitat, and fund projects by responsible parties.

Ms. Cohen then proceeded to recap the sediment cleanup work that Puget Sound underwent in 2003. Harbor Island Superfund site is an ongoing site; the West Waterway needs no further action after extensive studies by EPA, but Lockheed, Todd, PSR, and East Waterway all still require action. Approximately 250,000 cy of sediment, contaminated primarily by PCBs and metals, will be dredged from the East Waterway by the Port of Seattle. Former Lockheed Shipyard had 52,000 cy of dredged material, 7,000 piles, 10,000 tons of treated pilings, 13,000 tons of concrete, and 70 tons of scrap metal removed. Post cleanup monitoring data found that some contamination remained in place; therefore, work will continue into a second season. PSR, a 58-acre site with woodwaste-, PCB-, and metals contamination, had 800 piles removed, subtidal and intertidal areas dredged and/or capped, and intertidal habitat created.

Ms. Cohen went on to summarize cleanup activities for the Commencement Bay Superfund site. Thea Foss Waterway had 7,500 cy of dredged material removed, placement of a 3-foot cap, and a sheet pile wall installed. Ms. Cohen mentioned that the mouth of the Thea Foss Waterway will be cleaned up this year. Middle Waterway had 100,000 cy of material dredged and 4.5 acres capped. Ms. Cohen stated, after the cap was determined not to be effective, the mouth of the Hylebos Waterway and Blair Slip 1 are anticipated to be cleaned up next year and source control has continued. The head of the Hylebos Waterway had intertidal work completed last year.

Cleanup work planned for 2004 includes: Todd Shipyards, Thea Foss Waterway, the head of Hylebos Waterway, and the head of Middle Waterway. The Lower Duwamish Waterway and Portland Harbor are currently in the remedial investigation/feasibility study (RI/FS) process. Both are emphasizing source control before beginning remediation work.

There were no questions.

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PP 4.8	Before Aerial Photo of Lockheed Shipyard
PP 4.9	After Aerial Photo of Lockheed Shipyard
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PP 4.29	Head of Hylebos
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PP 4.31	Cleanup Work Planned for 2004
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PP 4.36	Status of Site in RI/FS
PP 4.37	Lower Duwamish Waterway Site
PP 4.38	Portland Harbor Site
PP 4.39	Lori Cohen, Office of Environmental Cleanup

DMMP/SMS PRESENTATIONS

5. **Summary/Overview of Clarification and Status Papers** (Stephanie Stirling, USACE) Ms. Stirling presented a summary of clarification papers and status reports that are not presented at the annual review meeting. Ms. Stirling noted that all papers are available on the dredged material website through the USACE. The finalized program changes are also found on the DMMO website under program modifications (topical and chronological).

She began her recap of the papers with the "*Neanthes* Ammonia and Sulfide" paper, which discusses the potential interference of ammonia and sulfides authored by David Kendall and Justine Barton. The threshold of concern for the 20-day test was tested, and ammonia purging is not recommended. Clarifications and guidelines for ammonia reporting include case by case thresholds and purging methods and tests. Ms. Stirling also mentioned that *Neanthes* has a no effect level of <115 mg/Kg bulk ammonia, 10 mg/L total Interstital ammonia, 0.46 mg/L Interstitial unionized ammonia, and 3.4 mg/L total sulfides.

Ms. Stirling mentioned that disposal site coordinates have been updated for the PSDDA sites and Grays Harbor and Willapa Bay sites, and copies are available from the DMMO website under program modifications.

Next, Ms. Stirling discussed Lauran Warner's Tier I Suitability Determinations: Exclusions from Testing. Exclusions will be assessed by the DMMP agencies; either the determinations will be suitable for Tier I, or they will not and Tier II will be necessary.

The DMMP agencies have come up with new guidelines for phthalates to conceptually match with SMS guidelines. Bioassay testing is currently not required for phthalate only exceedances, but this policy may be re-evaluated by DMMP after the SMARM.

Comment. "Dr. Teresa Michelsen of Avocet Consulting expressed her concern regarding guidelines for phthalates, in particular the decision that bioassay testing will not be required for phthalate-only exceedances. In conducting a recent reliability analysis for Ecology regarding the marine standards applied in the Columbia River, she found that the currently high values for phthalates (based on HAETs) resulted in missing some actual toxicity. She believes that phthalates should not be treated differently than other chemical exceedances for this reason, since laboratory contamination has largely been reduced and it is a contaminant in the environment that appears to be responsible, on its own, for toxicity."

Response: Dr. David Kendall of USACE responded that the DMMP agencies will deliberate on Dr. Michelson's concern. **Postcript**. The agencies have discussed Dr. Michelson's comments, revised the clarification paper, posted it on the DMMP website for additional public review and notified those who were invited to the 2004 SMARM. Comments on the revised clarification paper will be accepted through November 15, 2004. The agencies will finalize the clarification paper to address new comments, as deemed appropriate, and then notify the public of the new phthalate guidelines.

Slides

PP 5.1	Summary of Clarification Papers and Status Report
PP 5.3	Papers
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PP 5.6	Table 1. Thresholds of Concern for *Neanthes* 20-day Chronic Test
PP 5.7	Ammonia Purging
PP 5.8	Clarification: Guidelines for standard reporting of ammonia data
PP 5.9	Clarification: Threshold ammonia concentrations and guidelines for conducting ammonia reference toxicant (LC50) tests
PP 5.10	Clarification: Threshold concentrations for consideration of purging
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PP 5.12	*Neanthes* and Sulfides
PP 5.13	Disposal Site Coordinates
PP 5.14	Photo of STOP sign and "No Stopping Anytime Sign"
PP 5.15	Table of DMMP: Puget Sound Disposal Site Characteristics
PP 5.16	Table of Grays Harbor and Willapa Bay Disposal Site Characteristics

PP 5.17 Tier 1 Suitability Determinations: Exclusions from Testing

PP 5.18 Clarification: DMMP will assess some sediments for suitability at Tier I

PP 5.19 New DMMP Guidelines for Phthalates

PP 5.20 For More Information

6. ***Neanthes* 20-day Chronic Bioassay Protocol Issues** (David Kendall, USACE) Dr. Kendall highlighted *Neanthes* protocol issues that remain to be resolved between the DMMP/SMS 20-day protocol and the WES (now-ERDC) 28-day protocol. The DMMP/SMS protocol was implemented in 1992 and has generally performed well over the past twelve years. Prior to implementation, the protocol underwent an interlaboratory comparison study with six laboratories and a full peer technical review. In 1999, Ecology developed draft *Neanthes* apparent effects thresholds (AETs), which set nine lowest apparent effects thresholds (LAET) for cadmium, chromium, lead, anthracene, dibenz(a,h)anthracene, 1,2-dichlorobenzene, dimethylphthalate, 2,4-dimethylphenol, and benzoic acid. The WES *Neanthes* protocol is currently being evaluated for potential implementation on the East Coast by New York District/Region 2 EPA. As part of that effort, the *Neanthes* protocol differences have been highlighted as needing a more vigorous comparative study to discern how the two protocols compare when evaluating contaminated sediments and dredged material. In 1997, the DMMP participated in a WES directed effort, which was a limited but insufficiently robust comparison of the two *Neanthes* protocols (20-day DMMP/SMS protocol and the 28-day USACE Waterways Experiment Station (WES) protocol). The primary protocol differences are the age/size of worms at test initiation, differences in the feeding regimes, and growth rates. Testing was limited to several labs for each protocol. The limited results, were not conclusive, but did show a more pronounced dose response with the WES protocol. The DMMP have initiated discussions with WES, New York District USACE and EPA Region 2 about their ongoing bioassay comparisons, but due to their regional focus, limited DMMP resources and timelines it does not appear that a robust comparison study will be conducted at this time. The DMMP are interested in evaluating the protocol issues and hope to resolve this issue in the near future. To adequately evaluate the protocol differences properly, the DMMP feel that regional experts should be consulted in the testing design, and the testing conducted should use northwest regional sediments to evaluate test sensitivity, reliability, and variability. Test interpretation guidelines should also be evaluated. Dr. Kendall believes the evaluation should elucidate which protocol is more ecologically relevant and practical as a regulatory test in evaluating sediments. This could result in either no changes, minor changes, or major changes in the DMMP/SMS protocol for the *Neanthes* 20-day bioassay.

Comment: Bill Gardiner of MEC commented that interlaboratory comparisons should be checked for the 28-day to 20-day tests. All labs were proficient in handling the organisms, and the difference in growth rates and responses should be pursued by the agencies. He was also concerned that sediments had been used from Black Rock Harbor, which is a highly contaminated site with fine grain sediments and high levels of organics.

Slides

PP 6.1	*Neanthes* 20-Day Chronic Bioassay Protocol Issues
PP 6.3	DMMP/SMS Protocol
PP 6.4	1999 Draft *Neanthes* AETs
PP 6.5	*Neanthes* Protocol Comparisons
PP 6.6	Feeding Regime Comparison
PP 6.7	Protocol Comparison (*Neanthes*) Battelle NW Laboratory
PP 6.8	DMMP *Neanthes* Protocol
PP 6.9	WES *Neanthes* Protocol
PP 6.10	Test Protocol Comparison Recommendations
PP 6.11	Potential Outcome of Protocol Comparison

7. **Evaluation of Marine/Estuarine Sediment Toxicity Tests in Puget Sound Region: Future Test Clarifications** (Tom Gries, Ecology). Mr. Gries spoke on the subject of "Evaluating Benthic Risk: Future Clarifications." Currently the tools and approaches available are using predictions from the sediment quality guidelines, measuring effects in lab or *in situ* testing, or modeling. One possible problem with the current tools is inconsistent endpoints amongst agencies and programs. Also, there is some concern about the validity of how early benthic community evaluations are performed and whether more tests should be run *in situ* rather than in the lab. The current status of this evaluation of benthic risk has included a comprehensive analysis of the Puget Sound community's database using recent data, investigation of relative sensitivity, and review of the interpretative endpoints.

The relative responsiveness of different amphipod species to a mixture of contaminants is of concern. How do the regional data indicate different responsiveness/sensitivity? The Puget Sound Ambient Monitoring Program (PSAMP) studies in 1997 and 1999 collected 300 random stratified samples of 0-3 cm sediments, only one of which exhibited significant *Ampelisca* mortality. *Ampelisca* may be a less responsive species. EC50 data shows that *Eohaustorius* may be up to eight times more sensitive to some chemicals than *Ampelisca* in the same sediments. Data from the California Environmental Monitoring and Assessment

Program (EMAP) support the hypothesis that *Eohaustorius* may be more responsive than *Ampelisca* when exposed to the same test sediment.

To further clarify this issue, it is important to find more side-by-side data comparisons, both at a regional and national level. Guidelines will then be reviewed and guidance issued.

Acceptance of the performance of larval tests is also being investigated. Criticisms include the possibility that entrainment may cause settling and low counts in lab tests. Evaluation will be performed to revise the protocol if necessary after reviewing the options, such as the sediment water interface screen tube used in California tests.

Mr. Gries and Russ McMillan are looking at the need to make toxicity test interpretive endpoints consistent between the DMMP and SMS programs. They are evaluating the minimum detectable difference for the toxicity tests and comparing interpretive endpoints used by regional sediment management groups. Mr. Gries emphasized the need to reevaluate regional guidelines using current data and update the benthic community data and endpoints.

> ***Question:*** "Dr. Teresa Michelsen of Avocet Consulting commented to support Mr. Gries's concern that *Ampelisca* may not be as sensitive as other amphipod species. She recently worked on a guideline development project in San Francisco Bay where *Ampelisca* ere taken out of the data set because of errors and non-response. Similarly, she noticed a difference in response between *Ampelisca* and other amphipod species in a guideline development project for the Port of Los Angeles. Two other project scientists independently confirmed the finding that the two species responded differently in the same tests, *Ampelisca* being the least sensitive of the species."

Slides

PP 7.1	Evaluating Benthic Risk: Future Clarifications?—Introduction
PP 7.2	Approaches/Tools
PP 7.3	Problem Statements
PP 7.4	Problem Statements, cont.
PP 7.5	Status of Work
PP 7.6	Status of Work, cont.
PP 7.7	Responsiveness of amphipod species
PP 7.8	Responsiveness of amphipod species, cont.
PP 7.9	Responsiveness of amphipod species, cont.
PP 7.10	Graph: California Comparisons

PP 7.11	Stallone vs. Knotts
PP 7.12	Responsiveness of amphipod species, next steps
PP 7.13	Acceptance/performance of larval test
PP 7.14	Acceptance/performance of larval test, next steps
PP 7.15	Acceptance of larval test results
PP 7.16	Optimum and consistent test endpoints
PP 7.17	Graph: Interpretive Guidelines for Amphipod Toxicity
PP 7.18	Optimum and consistent test endpoints, next steps
PP 7.19	Update benthic community data, endpoints
PP 7.20	Update benthic community data, endpoints, next steps
PP 7.21	Update benthic community analyses
PP 7.22	Conclusions

8. **Bioaccumulative Chemicals of Concern Evaluations at Two PSDDA Disposal Sites** (Justine Barton, EPA Region 10). Ms. Barton discussed the results of BCOC evaluations conducted at two PSDDA disposal sites (Elliott Bay and Commencement Bay) using the Bioaccumulation Workgroup lists. List 1, the primary list required for analysis, had some chemicals added or deleted. List 2, the candidate list, includes chemicals of concern that have similar characteristics to the List 1 chemicals, but not enough is known about them.

Monitoring events conducted in Elliott Bay in 2002 and Commencement Bay in 2003 looked for List 1 and 2 chemicals in sediments and *Molpadia* tissue. The Elliott Bay study found most BCOC were not detected except for polycyclic aromatic hydrocarbons (PAHs), which were below the BT level. All laboratory reporting limits met DMMP screening levels. Striplin Environmental and EPA have created a detailed report discussing analytical methods for List 2 BCOCs that is available as of April 12, 2004. The Commencement Bay study in 2003 found detections from the BCOC lists, but all were below BT levels or qualified as estimates. A draft technical appendix is currently in agency review and will available for public review in September 2004.

There were no questions.

Slides

PP 8.1	Bioaccumulative Chemicals of Concern Evaluations at Two DMMP Disposal Sites
PP 8.2	List 1 BCOC
PP 8.3	List 2 BCOC

PP 8.4	DMMP Elliott Bay BCOC Monitoring
PP 8.5	DMMP Elliott Bay Follow-up
PP 8.6	Map of Elliott Bay DMMP Site
PP 8.7	Elliott Bay Conclusions
PP 8.8	Elliott Bay Conclusions, cont.
PP 8.9	Elliott Bay Conclusions, cont.
PP 8.10	DMMP Commencement Bay BCOC Monitoring
PP 8.11	Map of Commencement Bay DMMP Site
PP 8.12	Commencement Bay Conclusions
PP 8.13	Commencement Bay Conclusions, cont.
PP 8.14	BCOC List Follow-Up

9. **PSAMP Sediment Quality Update** (Maggie Dutch, Ecology). Ms. Dutch spoke on the recent findings of the PSAMP sediment sampling and the future direction of work. She started her talk by acknowledging the sediments team and then recapped the sampling methods used by PSAMP. From 1989-2000, only 10 of the original 76 stations were monitored. They were chosen to coincide with other PSAMP monitoring activities that included fish and water monitoring stations.

PSAMP sediment monitoring includes both temporal and spatial monitoring. Temporal monitoring seeks to provide long-term data on sediment characteristics, contaminants, and benthic trends. Recent data have indicated that metals concentrations are decreasing at most stations. Concentrations of PAHs are increasing at many stations, but decreasing at some. Infaunal patterns are changing over time. The Strait of Georgia station is of particular interest as it appears the Fraser River plume is bringing in high levels of fines that have caused the site to decrease in taxa richness but increase in abundance. Temporal monitoring does not provide the "big picture" but does provide valuable data through case studies. Both anthropogenic and natural factors can cause change in community structure. The time series is essential, as it can take decades to see patterns developing.

Spatial monitoring seeks to create a statistically robust sediment quality baseline through stratified, random sampling and to create spatial pattern maps, spatial extent calculations, and a sediment triad index. Conclusions from the spatial sampling found that although a small percentage (1 percent) of sites are degraded, they pose a large threat due to their locations near river mouths and nearshore areas that often function as nurseries for a variety of species. The intermediately degraded (31 percent) areas should be watched, as most are located in harbors and urban bays. The reports for both spatial and temporal monitoring can be found on Ecology's website.

Ms. Dutch discussed the design refinement the program underwent in 2002 with the assistance of EPA and the National Oceanic and Atmospheric Association (NOAA). Eight monitoring regions in Puget Sound were created, and sampling will be rotated on an annual basis among these regions. Five sediment strata were also created based on proximity to populations and urban centers. In 2002-2003, under-monitored areas were sampled in the San Juan Islands, Admiralty Inlet, and east Strait of Juan de Fuca; chemistry and toxicology results are available, but benthic data are not finished. Studies in 2004 will focus on Hood Canal related to the low dissolved oxygen levels the canal is currently experiencing. A Benthic Triad Index is to be developed in 2005 through partnership with the EMAP project. Western EMAP has found that distinct communities exist in Puget Sound.

PSAMP is seeking input and partnerships to help with revisions to the analyte list, such as recommendations that they include polybrominated diphenyl ethers (PBDEs) and endocrine disrupting chemicals (EDCs). Partnerships could also help regional focus studies and the benthic index development, especially if stakeholders' efforts were coordinated and pooled to monitor Puget Sound estuarine quality.

There were no questions.

Slides

PP 9.1	Puget Sound Ambient Monitoring Program
PP 9.2	Marine Sediment Monitoring Team
PP 9.3	PSAMP Sediment Monitoring Recent Activities and Findings
PP 9.4	Sample Collection Methods
PP 9.5	PSAMP Temporal Monitoring 1989-2000
PP 9.6	PSAMP Temporal Monitoring
PP 9.7	Objectives
PP 9.8	Results
PP 9.9	Infauna Patterns
PP 9.10	Strait of Georgia station
PP 9.11	Temporal Sediment Patterns in the Strait of Georgia Map
PP 9.12	Graph: Changing sediment composition in relation to changes in Fraser River flow
PP 9.13	Graph: Changes in sediment and dominant taxa in relation to changes in Fraser River flow
PP 9.14	What the temporal stations tell us

PP 9.15	PSAMP Spatial Monitoring
PP 9.16	Spatial Extent of Sediment Quality Degradation
PP 9.17	What the spatial stations tell us
PP 9.18	PSAMP Spatial Monitoring
PP 9.19	PSAMP Sediment Monitoring
PP 9.20	PSAMP Sediment Monitoring
PP 9.21	8 Sediment Monitoring Regions
PP 9.22	5 Sediment Strata
PP 9.23	PSAMP Sediment Component Spatial Monitoring
PP 9.24	2004 Hood Canal
PP 9.25	2005 Benthic Index Development
PP 9.26	2006-2013 Regional Rotation
PP 9.27	Input/partnerships sought
PP 9.28	Pictures

10. **PSAMP Fish Tissue Monitoring Program Update** (Sandie O'Neill, Washington Department of Fish and Wildlife [WDFW]). Ms. O'Neill discussed the findings of the PSAMP fish monitoring program and the factors affecting exposure and accumulation in fish. Such factors include proximity to contamination sources, habitat, trophic level, gender, age, and lipid content of tissue. Her talk focused on the bioaccumulation of PCBs in English sole, rockfish, herring and salmon. PCB levels are found highest in the Central and Whidbey basins of Puget Sound. The average concentration in English sole was 62 parts per billion (ppb) as compared to the higher level in rockfish at 121 ppb. A large part (72 percent) of the variation in PCB concentrations within English sole was associated with sediment concentration of PCBs. Only 2 percent was due to age. In rockfish, age and sex had a stronger correlation to PCB levels in fish tissue. Males had higher levels than females because females spawn out the contamination, while males have no mechanism to rid themselves of the PCBs.

Next, Ms. O'Neill discussed PCBs in the pelagic food web using herring and salmon. Herring measure what is in the current environment, as they do not retain bioaccumulated PCBs over a long time period. Two to three year old whole body herring were analyzed and it was found PCB levels were highest in the Central Basin. Ms. O'Neill attributes this to the pelagic food web (with sediments as the source of PCBs) rather than water column exposure to phytoplankton. Fish species that bottom feed pass the PCB contamination to their offspring through reproduction. In the early developmental stages, these juvenile fish may spend a portion of their lives as zooplankton. The zooplankton are eaten by adult fish (e.b., Herring), which then accumulate and biomagnify PCBs. In the end, biota become the sink

for the PCB contamination. Salmon are affected by this cycle as well. Wild coho and Chinook were sampled at the river mouths on their return migration. Total PCBs were higher in Chinook, which are older upon return and eat more vertebrates than coho. A concentration gradient was noted from north to south with highest levels in southern Puget Sound. The contamination is encountered in the marine environment, which is illustrated by the fact that PCB concentrations in smolt are 1.4 µg/kg, and when returning as adults they are 130 µg/kg.

Ms. O'Neill concluded her talk by recapping the factors affecting exposure and accumulation in pelagic fish.

Question: Mr. Loren Stern asked if there were any effects on fecundity in salmon related to PCB levels.

Response: Sandie O'Neill replied "No, but we didn't look." She followed up by saying there was a slide in her presentation she skipped that overlaid National Marine Fisheries Service (NMFS) threshold concentrations associated with reproductive effects with the PCB levels that they have measured in salmon. Fish in urban centers were close to or above the thresholds set by NMFS.

Question: Tom Gries then asked if WDFW has measured PCB levels in salmon tissue as they leave through the Straight of Juan de Fuca.

Response: Ms. O'Neill said the farthest north that they monitored was the North Fork of the Nooksack River. The study looked at coded wire tags to track migration patterns of various stocks. The northern stocks tend to spend less time in Puget Sound and head directly to the open ocean. A graduate student at Evergreen State College (Brian Misseldine) is studying the difference in contamination levels of salmon returning to the coastal fisheries versus those coming back to Puget Sound fisheries.

Question: Mr. Gries asked if we know what is being taken out of the Puget Sound system when fish leave for the north Pacific.

Response: Ms. O'Neill referred to a paper that says salmon in the Copper River system have levels comparable to Puget Sound species and can encounter contamination in the open ocean.

Slides

PP 10.1	Factors Affecting Contaminants in Fishes
PP 10.2	Factors Affecting Contaminant Exposure and Accumulation

PP 10.3	Map: Puget Sound Basins
PP 10.4	Map: Average PCB Concentrations in Puget Sound Basins
PP 10.5	English Sole
PP 10.6	Map: PCB in muscle of English sole
PP 10.7	Map: PCB in muscle of English sole-Central Basin highlighted
PP 10.8	Graph: PCB Exposure in English sole muscle (1991-1996) vs. Sediment Concentration
PP 10.9	Graph: PCB accumulation in English sole vs PCB sediment levels and fish age
PP 10.10	Effects of Age and Trophic Level on PCB Accumulation
PP 10.11	Quillback Rockfish
PP 10.12	PCBs by Gender in Quillback Rockfish from Elliott Bay
PP 10.13	PCB Concentration vs. Fish Age Chart
PP 10.14	PCB Accumulation in Benthic and Demersal Fishes
PP 10.15	PCB's in the Pelagic Food Web
PP 10.16	Pacific Herring
PP 10.17	Median PCB Concentration
PP 10.18	Direct Water Source (zooplankton, phytoplankton)
PP 10.19	Sediment source via maternal transfer
PP 10.20	PCB's in Pelagic Food Web
PP 10.21	Do PCB contaminated sediments affect PCB. . .
PP 10.22	Herring in Diet of Other Species
PP 10.23	Coho salmon, Chinook salmon
PP 10.24	PCBs in muscle of adult salmon returning to Puget Sound
PP 10.25	PCB-Lipid Relationship- Wild Coho Salmon
PP 10.26	Lipid Adjusted PCB for Chinook Salmon Returning to Puget Sound Rivers
PP 10.27	Returning adult salmon, outmigrating smolt
PP 10.28	PCB Accumulation in Pelagic Migratory Fish
PP 10.29	Factors Affecting Contaminant Exposure Accumulation
PP 10.30	Blank
PP 10.31	Conceptual Model
PP 10.32	Benthic Pathways
PP 10.33	Benthic Pathways (with macroalgae)
PP 10.34	Pelagic Pathways
PP 10.35	Pelagic Pathways vs. Benthic Pathways
PP 10.36	The Benthic-Pelagic Connection - A One Way Street?
PP 10.37	The Benthic-Pelagic Connection - A One Way Street? Maybe Not

PP 10.38	Salmon in the System
PP 10.39	Species monitored by PSAMP
PP 10.40	Mature male Chinook salmon
PP 10.41	PCBs in Chinook salmon fillets Chart
PP 10.42	Does oceanic distribution affect PCB levels in Pacific salmon. . .
PP 10.43	PCB Accumulation in Pacific Salmon
PP 10.44	Effects of Fish Age and Sediment Hg Concentration on Mercury in English Sole Muscle
PP 10.45	Accumulation of mercury in quillback rockfish individuals, 1995-`98
PP 10.46	Accumulation of mercury in quillback and brown rockfish individuals, 1995-`98
PP 10.47	Accumulation of mercury in quillback and brown rockfish individuals, 1995-`98
PP 10.48	PAH metabolites in Bile
PP 10.49	PAH Metabolites in Bile (Phenanthrene Equiv. ng/ml bile)
PP 10.50	Know your fish (or your local fish biologist)
PP 10.51	Geographic Variation in PCB Levels in Chinook salmon returning to spawn
PP 10.52	Average PCB Concentration in Adult Pacific Salmon from PS Environments (92-95)
PP 10.53	PCBs in Pacific salmon from Alaska

11. **SMS Requirements for TBT Analysis** (Tom Gries, Ecology). Mr. Gries discussed the SMS Requirements for porewater tributyltin (TBT) analysis. He had no slides prepared for this quick talk. He referred participants to the 1996 Issue Paper prepared by Dr. Teresa Michelson on the topic, and stressed that Ecology believes that porewater TBT plays an important role in exposure, and therefore risk, to some organisms. He reiterated that SMS program considers the value derived for the 1996 paper of 0.05 ug/L (as Tin) to be conceptually equivalent to the SQS and is consistently being used as such.

There were no slides.

12. Regional Dredging Team Update (Stephanie Stirling, USACE). Ms. Stirling provided the Northwest Regional Dredging Team (RDT) update. The RDT is composed of the regional leads of the agencies including USACE, NOAA, EPA, United States Fish and Wildlife Service (USFWS), and United States Department of Transportation (USDOT). She began her talk with a few flowcharts of the regional relationship and sediment evaluation in the northwest. Flowcharts are a good measure of progress and help to show where individuals fit in. The Dredged Material Evaluation Framework (DMEF) is undergoing a

chapter-by-chapter revision and has undergone a name change to Sediment Evaluation Framework. The RSET was created to deal with the day-to-day issues in our region. They are leading the revision of the DMEF, dealing with technical, scientific, and policy issues, and helping to set the long-term role of RSET. Ms. Stirling presented a flowchart that explaining the roles and responsibilities of RSET.

RSET is composed of many smaller subcommittees that deal with specific issues. Taku Fuji formerly with Hart Crowser (now with Kennedy Jenks) is the liaison between the subcommittees to keep them communicating. The Policy subcommittee is chaired by Ms. Stirling and focuses on National Environmental Policy Act/Environmental Impact Statement (NEPA/EIS) compliance, public involvement, and the process and organization of RSET. The Contaminant and Analyte List subcommittee is chaired by Todd Thornburg of Anchor Environmental. This committee focuses on how to go about adding or deleting analytes from the list and comparing summation techniques. The Sediment Quality Guidelines subcommittee, chaired by Brett Betts, is focusing on freshwater guidelines consistency, SEDQUAL database usage, and consistency with marine levels in the sediment quality guidelines. The Biological subcommittee, chaired by Bill Gardiner of MEC/Weston, is working to ensure protection of Endangered Species Act (ESA)-listed species, evaluating rapid screening methods, and short-term vs. long-term freshwater bioassays. The Bioaccumulation subcommittee, co-chaired by Teresa Michelsen (Avocet Consulting) and David Kendall (Corps), will focus on developing a bioaccumulation endpoint for screening levels, establishing tissue levels protective of ESA species, and developing a second freshwater bioaccumulation protocol. Each subcommittee will be creating white papers on the above topics. Some are currently on the DMMP website (under RSET, not SMARM).

Recent developments within RSET include the Lewiston meeting, which included working sessions for the subcommittees and sought to regionalize the process by including Idaho. There will be another RSET meeting in Portland, Oregon in late September 2004.

There were no questions.

Slides

PP 12.1	Sediment Management Annual Review Meeting
PP 12.1	Sediment Management Annual Review Meeting
PP 12.3	Regional Dredging Team
PP 12.4	Northwest Regional Dredging Team
PP 12.5	Regional Relationships
PP 12.6	Sediment Evaluation in the NW
PP 12.7	DMEF Becomes SEF

PP 12.8	Regional Sediment Evaluation Team
PP 12.9	RSET Roles & Responsibilities
PP 12.10	Subcommittees Policy
PP 12.11	Subcommittees Containment and Analyte List
PP 12212	Subcommittees Sediment Quality Guidelines
PP 12.13	Subcommittees Biological Testing
PP 12.14	Subcommittees Bioaccumulation
PP 12.15	White Papers
PP 12.16	White Papers, A number of them available on website
PP 12.17	Recent Developments
PP 12.18	Lewiston Meeting
PP 12.20	Interactions of RSET with RDT
PP 12.21	What's next?
PP 12.22	Preliminary PNW Regional Sediment Evaluation Framework Timeline

TOPICAL PRESENTATIONS

13. U.S. Navy PSNS Cleanup Update (Ted Benson, Ecology). Mr. Benson discussed the cleanup plan for Puget Sound Naval Shipyard (PSNS) on Sinclair Inlet. PSNS was added to the Superfund list in 1994. The cleanup consisted of utilizing a confined aquatic disposal (CAD) site at the edge of the property line for containment of contaminated dredge material. Post-disposal monitoring included sediment grab samples that had elevated levels of PCBs and mercury outside the boundaries of the CAD pit. SVPS imagery was conducted on transects radiating from the pit and found that dredge material had spread 100-200 yards beyond the pit boundary and into WDNR lands. Ecology was called in to resolve the issue. More sediment testing was conducted on WDNR land and again found elevated levels of PCBs and mercury. The Navy issued a statement concurring with the findings, but specified that, due to a lack of monitoring during disposal, they do not know which activity led to the contamination. After discussing a variety of remediation possibilities, enhanced natural recovery was chosen because the layer of contamination was thin. A thin-layer cap was placed on the contaminated area with PCB levels greater than 9 mg/kg-organic carbon (OC) using sediments from the turning basin in Sinclair Inlet. Placement was verified using pre- and post-disposal precision bathymetry. It took 40 barge loads to cover the area. Subsequently, the CERCLA line was adjusted to include the overflow of dredged material from the CAD pit into WDNR lands.

Question: An unidentified woman from the middle of the room asked if the cause of the dispersal outside of the CAD was due to placement or migration over time.

Answer: Mr. Benson explained that in 40 feet of water, the water column has great effects as material falls. He used the metaphor that it's like pouring paint into a bucket from the second story roof. He also said you cannot compare the spread at the open water disposal site in Commencement Bay to the CAD site in Sinclair Inlet, due to different geography and water depths.

Question: The same woman then asked if there are any recommendations to preventing the spread in the future.

Answer: Mr. Benson said monitoring during the disposal and using temporary berms could have prevented or minimized the spread beyond the CAD.

Question: Joe Germano asked if any post capping sampling had been performed.

Answer: Mr. Benson replied that it had not yet.

Slides

PP 13.1	CSI: Contaminated Sediment Investigators
PP 13.2	Episode 12
PP 13.3	Sinclair Inlet
PP 13.4	Confined Aquatic Disposal Cell
PP 13.5	Area of Interest
PP 13.6	Barge Disposal (Conceptual)
PP 13.7	A Brief Review of the Physics of Dredged Material Disposal
PP 13.8	Post-Disposal
PP 13.9	Joe Germano Deploying the Sediment Profile Imaging System
PP 13.10	Reduced Dredged Material Sediment Graphic
PP 13.11	PSNS—Ambient Bottom
PP 13.12	PSNS—Inside CAD
PP 13.13	Deployment Almost Resulted in Over-Exposure
PP 13.14	PSNS—Dredged Material
PP 13.15	PSNS—Results
PP 13.16	Revealing the Goods
PP 13.17	Ted Benson Brought in to Assist
PP 13.18	Chemical Analysis of Samples
PP 13.19	Analysis of Data
PP 13.20	Results

PP 13.21	Navy Statement
PP 13.22	Characterization of Surface Contamination
PP 13.23	Surface Characterization Methodology
PP 13.24	The Remedial Alternatives Were Discussed in Planning Sessions
PP 13.25	Remedial Alternatives
PP 13.26	Ecology is Persuaded by Navy and EPA
PP 13.27	Selected Solution
PP 13.28	Agreed Action
PP 13.29	Enhanced Natural Recovery for Operational Unit B Marine
PP 13.30	Potentially Available Material
PP 13.31	Cover Material Dredged from Turning Basin
PP 13.32	Assessment of Effectiveness
PP 13.33	Barge Placement
PP 13.34	Planned Barge Placement
PP 13.35	Location of Barges—Week 1
PP 13.36	Bathymetric Data Analysis Was Expected
PP 13.37	Cover Thickness—At Conclusion of First Week
PP 13.38	Location of Barges—Week 2
PP 13.39	Final Cover Thickness
PP 13.40	Data Interpretation
PP 12.41	Sediment Placement
PP 13.42	Cross Section
PP 13.43	Bremerton Naval Complex
PP 13.44	Blame Cartoon
PP 13.45	Acknowledgements
PP 13.46	Questions?

14. ***Armandia brevis*** **Bioaccumulation Evaluation** (Dr. Susan McGroddy, Windward Environmental). Dr. McGroddy described a study involving the evaluation of TBT bioaccumulation in *Armandia brevis*. The study was conducted to elucidate the differences between the two polychaetes (*Armandia brevis* and *Nephthys caecoides)* and how they bioaccumulate TBT from sediments and porewater. The question occurred after testing of sediments from Harbor Island West Waterway showed differences in TBT bioaccumulation as compared to that observed at other nearby sites, such as the East Waterway and Todd Shipyard. The study also sought to clarify whether test conditions (static vs. flow-thru) influence bioaccumulation of TBT. The exposure concentrations of test species were between 149-180 ppb TBT dry weight (0.21 – 0.42 ugTBT/L in pore water). *Armandia* and *Nephthys* are grossly

different in size, 3.5 mg/dry wt/individual compared to 81 mg/dry wt/individual, respectively. This meant that a lot more time was spent acquiring *Armandia* for the study. Three tests were run on each of two sediment samples (*Nephtys* flow-through, *Armandia* static, and *Armandia* flow-through). Porewater TBT concentrations were positively correlated with dry weight sediment TBT concentrations. *Armandia* exposed in static conditions had the highest tissue concentrations of TBT (77 – 370 ppb wet weight). TBT concentrations in *Armandia* (flow-through and static) were consistently higher than those found in *Nephthys*.

Question: Ms. Erika Hoffman inquired about the lab issues since *Armandia brevis* is a new species to work with and about the collection issues.

Answer: Mr. Bill Gardiner replied that there were not that many issues other than a small problem with temperature control. Species collection on the other hand is quite difficult. It took 5 days to get enough individuals to test and only for TBT. It took 200 animals per chamber to equal a biomass of 2 grams.

Question: Mr. Jack Anderson asked if the relationship of bioaccumulated TBT to the sediment TBT was a 1:1 ratio.

Answer: Dr. McGroddy replied that some statistics have been calculated, but not much information is there. There are differences between dry sediment and wet tissue weights that make the statistics difficult.

Question: Ms. Justine Barton mentioned that Dr. McGroddy should point out the difference between mono and di-butyltin.

Answer: Dr. McGroddy said they had measured these and saw similar patterns that had even more dramatic differences between species/exposure systems.

Question: Dr. Peter Rude of Landau Associates asked why the difference between the two species.

Answer: Dr. McGroddy pondered whether it was due to differences in feeding mechanisms, but stated that we really don't know.

Response: Ms. Erika Hoffman further touched on the issue of metabolite data. She said *Armandia* have much higher levels of TBT metabolites (MBT and DBT) than *Nepthys* which indicates that they are more actively accumulating TBT, but they don't have a good sense of why.

Question: Dr. Germano followed up by asking what the implications of this study would be.

Answer: Dr. McGroddy responded that she did not know but was glad to at least have data to include in the discussion.

Response: Ms. Hoffman replied that there is a camp of people who thought the wrong bioaccumulation species may have been used in earlier TBT testing, and this is partially what led to the study of species and chamber conditions. Based on these tests, if areas of TBT concern are located within the East Waterway Superfund Site, *Armandia* could potentially be substituted as the bioaccumulation test species.

Slides

PP 14.1	*Armandia Brevis* Bioaccumulation Evaluation
PP 14.2	Work funded by the Port of Seattle with assistance from:
PP 14.3	Goal
PP 14.4	Exposure concentrations
PP 14.5	Three bioaccumulation tests were conducted with each sediment:
PP 14.6	*A. brevis* and *N. caecoides*
PP 14.7	Summary of polychaete survival for the East Waterway
PP 14.8	TBT tissue concentrations
PP 14.9	Conclusions

15. **When will Contaminated Sediment Cleanups be Completed?** (John Dohrmann, Puget Sound Water Quality Action Team [PSWQAT]). Mr. Dohrmann briefly discussed why we are here and asked when the cleanups will be done. He touched on the fact that we contaminated our sediments and now we have to clean them up, but every year it seems we still have the same number of acres left. So why, if we have all the pieces in place, are the numbers not falling? Finally, we are starting to see a decrease in the acreage designated for clean up. He stressed that we need to make sure we are not just getting by, and that source control must be part of the plan. He hopes we can work ourselves out of jobs. He will talk with the agencies over the next year to see how we are progressing with the bay cleanups.

There were no questions.

There were no slides.

PUBLIC ISSUE PAPERS

16. **Upcoming Meetings of Interest to Sediment Management World** (Clay Patmont-Anchor Environmental). Mr. Patmont spoke on coming together to transfer technology within Puget Sound cleanups and with the rest of the country. He reminded us that as the leaders, we are being watched by the rest of the country. A meeting has been set up for late September in Seattle to come together and talk about the lessons we have learned thus far in the efforts to clean up Puget Sound. In the meeting, he would like to see discussions on: what is working and what is not, what we have accomplished, and what are the water quality impacts in the short term and long term. We are known as the capping region nationally when working on remediation projects. What is happening with disposal sites in the long term? The meeting will be jointly sponsored by the Sediment Management Work Group from the east coast, the EPA Contaminated Sediments Technical Advisory Group and possibly the CSMP. He mentioned other workshops that are coming up that will deal with contaminated sediment issues. He thinks that, in addition to discussing case histories from within Puget Sound, that there will be time for question and answer forums, site tours, socializing, and a joint agency presentation of data. You can sign up now and no money is needed.

There were no questions.

Slides

PP 16.1	Puget Sound Sediment Cleanup Technology Transfer
PP 16.2	The idea
PP 16.3	Joint Sponsorship?
PP 16.4	Other Jointly Sponsored Workshops
PP 16.5	When?
PP 16.6	Case Histories?
PP 16.7	Sitcum Waterway, Commencement Bay
PP 16.8	Presentation Format?
PP 16.9	Sign Up Now?

17. **Saving Project Chemistry Costs by Screening with EPA Method 4425** (Jack Anderson, Battelle NW). Mr. Anderson spoke on saving money by using EPA method 4425 to monitor for dioxin-like compounds instead of method 8290. He addressed the basis, purpose, methods, and experience of using EPA 4425, which uses the P450 human reporter gene system. Test results can be obtained in less than 4 days using this method. Sediments from across the region can be compared because the organics are stripped from the sediments, alleviating matrix effects.

The test results were developed from a large NOAA database. Less than 11 ppm yielded no effects, 11-32 and 32-60 ppm yielded intermediate effects, and greater than 60 ppm had severe effects.

There were no questions.

Slides

PP 17.1	Saving Project Chemistry Costs By Screening with EPA Method 4425
PP 17.2	Introduction
PP 17.3	P450 Human Reporter Gene System
PP 17.4	P450 HRGS Procedure
PP 17.5	Daily Testing of Dioxin/Furan Standards
PP 17.6	Interpreting Results
PP 17.7	Threshold Values
PP 17.8	NOAA Studies
PP 17.9	Analysis of Sediments from Northern Puget Sound and Everett Harbor
PP 17.10	Puget Sound Samples
PP 17.11	Data Table
PP 17.12	Relationship Between B[a]P Equivalents and Total PAHs in Sediments
PP 17.13	TEQ Correlations by Nihon Environmental
PP 17.14	Correlation Between TEQs by 4425 and 8290 for Confirmation Samples
PP 17.15	Recommended 4425 Screening
PP 17.16	Conclusion
PP 17.17	Conclusion—Dioxins

GENERAL QUESTIONS AND COMMENTS

Comment: Lincoln Loehr of Heller Ehrman commented on the complications experienced with stormwater discharge permits in relationship to pollution control. Stormwater permits under NPDES are reviewed every 5 years. He believes that there needs to be more coordination within Ecology of the programs, so permits are not automatically denied without looking at the implications.

Response: Dr. David Kendall of USACE replied that Ecology will respond to Mr. Loehr's comment.

SUMMARY AND CLOSING

Mr. Wagner thanked everyone for coming and staying through the whole day. He remarked that the meeting was a success and looked forward to next year's meeting.

Attachment 1

DMMP Responsiveness Summary

DMMP Responsiveness Summary

Comment: Lincoln Loehr of Heller Ehrman commented on the complications experienced with stormwater discharge permits in relationship to pollution control. Stormwater permits under NPDES are reviewed every 5 years. He believes that there needs to be more coordination within Ecology of the programs, so permits are not automatically denied without looking at the implications.

Response: Ecology continues to improve internal procedures between the Water Quality and Toxics Cleanup Programs in order to coordinate on discharge permits and make the most appropriate determinations regarding issuance. Because the SMARM forum is not for site specific issues, Mr. Loehr's concerns of that nature were addressed separately by letter dated July 6, 2004.

Attachment 2

Agenda

Sediment Management Annual Review Meeting (Final Agenda)

May 5, 2004
Comfort Inn Conference Center, Tumwater
Hosted by Washington State Department of Ecology

1 REGISTRATION AND COFFEE ……8:30-9:00

2 WELCOME TO SMARM 2003 (COL. DEBRA LEWIS, SEATTLE DISTRICT COMMANDER; MEETING MODERATOR: WAYNE WAGNER, CORPS/CHIEF OD-TS[1]) ……9:00-9:10

3 OPENING REMARKS (LINDA HOFFMAN, DIRECTOR, WA DEPART. OF ECOLOGY).9:10-9:20

4 AGENCY SUMMARY REPORTS……9:20-10:50

- Corps (Summary of DMMP Testing Activities, Lauran Warner, Corps)
- DNR (Summary of DNR Disposal and Monitoring Activities, Peter Leon, DNR)
- Ecology (Summary of SMS Cleanup/Source Control Activities, Freshwater Guidelines Development, Kathryn DeJesus, Ecology)
- EPA (Summary of Regional CERCLA Activities, Lori Cohen, EPA)

5 BREAK……10:50-11:05

6 DMMP/SMS PRESENTATIONS……11:05-12:00

- Summary Overview of Clarification and Status Papers (Stephanie Stirling, Corps)
- *Neanthes* 20-Day Chronic Bioassay Protocol Issues (David Kendall, Corps)
- Evaluation of Marine/Estuarine Sediment Toxicity Tests in Puget Sound Region: Future test clarifications (Tom Gries, Ecology)
- Questions and Answers (on any of the above presentations)

7 LUNCH (ON YOUR OWN)……12:00-1:00

8 DMMP/SMS PRESENTATIONS (CONTINUED)……1:00-2:15

- Bioaccumulative Chemicals of Concern evaluations at two PSDDA Disposal Sites (Justine Barton, EPA)
- PSAMP[2] Sediment Quality Update (Margaret Dutch, Ecology)
- PSAMP Fish Tissue Monitoring Program Update (Sandie O'Neill, WDFW)
- SMS Requirements for TBT Analysis (Tom Gries, Ecology)
- Questions and Answers

9 REGIONAL DREDGING TEAM UPDATE……2:15-2:45

Stephanie Stirling (Corps)

10 BREAK……2:45-3:00

11 TOPICAL PRESENTATIONS……3:00-4:00

- U.S. Navy PSNS cleanup update (Ted Benson, Ecology)

[1] Operations Division/Technical Support Branch
[2] Puget Sound Ambient Monitoring Program

- *Armandia brevis* bioaccumulation evaluation (Susan McGroddy, Windward)
- When will contaminated sediment cleanups be completed? (John Dohrman, PSWQAT)

12 PUBLIC ISSUE PAPERS……4:00-5:00

- Up coming meetings of interest to Sediment Management World (Clay Patmont, Anchor Environmental)
- Saving Project Chemistry Costs by Screening with EPA Method 4425 (Jack Anderson, Battelle NW)

13 SUMMARY AND CLOSING……5:00:5:15

Deadline for written Comments on SMARM 2004: June 7, 2004

Attachment 3

List of Attendees

List of Attendees at SMARM'04

Last Name	First Name	Affiliation	Mailing Address	Email
Aasen	Sandra	WA Dept of Ecology, EAP	PO Box 46700, Olympia, WA 98504	sgei461@ecy.wa.gov
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List of Attendees at SMARM'04

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