SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING

FINAL

MEETING MINUTES

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APPENDICES

Appendix 1: DMMP Response to Public Issues raised at the 2010 SMARM

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LIST OF ACRONYMS AND ABBREVIATIONS

AFDW	ash free dry weight
BMP	best management practice
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CSL	cleanup screening level
CSMP	Cooperative Sediment Management Program (Washington State)
DMMP	Dredged Material Management Program
DNR	Washington State Department of Natural Resources
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FPM	Floating Percentile Method
HPAH	high molecular weight polycyclic aromatic hydrocarbon
LPAH	low molecular weight polycyclic aromatic hydrocarbon
MTCA	Model Toxics Control Act
OEA	EPA Office of Environmental Accountability
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PLP	Potentially Liable Party
PPCP	pharmaceuticals and personal care products
ppt	parts per trillion
PSEP	Puget Sound Estuary Program
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RSET	Regional Sediment Evaluation Team
SAP	Sampling and Analysis Plan
SEF	Sediment Evaluation Framework
SEIS	Supplemental Environmental Impact Statement
SL	screening level
SMARM	Sediment Management Annual Review Meeting
SMS	Sediment Management Standards
SQS	Sediment Quality Standards
SQV	Sediment Quality Value
SRM	Sediment Reference Material
SVOC	semi-volatile organic compound
TEQ	toxic equivalence
TOC	total organic carbon
TSS	total suspended solids
USACE	United States Army Corps of Engineers
WAC	Washington Administrative Code
WDOE	Washington State Department of Ecology
WPPA	Washington Public Ports Association

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, 2010. The Washington Department of Ecology (WDOE) hosted the 2010 Sediment Management Annual Review Meeting (SMARM), and the U.S. Army Corps of Engineers (USACE) facilitated. The meeting was held at the USACE Federal Center South location in Seattle, Washington. The Dredged Material Management Program (DMMP) is an interagency cooperative program that includes USACE, Seattle District; the Environmental Protection Agency (EPA), Region 10; the Washington Department of Natural Resources (DNR); and the Washington Department of Ecology (WDOE). The DMMP response to public issues raised at the SMARM (Appendix 1), meeting agenda (Appendix 2), list of attendees (Appendix 3), the speakers' PowerPoint presentations (Appendix 4), and the 2010 SMARM Public Issue Papers (Appendix 5), and the Post-SMARM Public Comment Letters on the Dioxin Guideline Revisions with embedded DMMP responses (Appendix 6) are included in attached Appendices as noted.

WELCOME AND OPENING REMARKS

Stephanie Stirling, USACE, served as the moderator for the annual review meeting. She welcomed everyone to the 22nd annual SMARM meeting. She introduced the first speaker, ***Stuart Cook, USACE, Chief, Operations Division***.

Stuart Cook, USACE, thanked everyone for attending the 22nd annual SMARM. He stated how SMARM is an excellent example of a collaborative effort between people and agencies with many different competing interests and expectations. He said that in spite of these differences, the involved parties still meet and determine ways to move forward.

Mr. Cook further explained how the USACE is prioritizing restoration work in Puget Sound. Colonel Wright keeps a list of the top five USACE priorities in the Seattle District. Recently, Puget Sound restoration has been moved on to this top five list.

Stephanie Stirling ran through some housekeeping items. Refreshments were provided by WDOE. She mentioned that the meeting is trying to stress sustainability, so please recycle waste whenever possible. The deadline for comments on the issue papers and dioxin issues is June 18, 2010 (Note, subsequent to the meeting, the comment deadline was extended to June 30, 2010).

Stephanie Stirling

PP0.1 Sediment Management Annual Review Meeting
PP0.2 Welcome to the Meeting
PP0.3 Large Flowchart

Jim Pendowski, WDOE, began by saying WDOE had spent much of the last year tending to the basics and trying to keep important Puget Sound issues moving forward despite more limited resources. In addition to Puget Sound, increased focus is also being paid to freshwater resources.

He thanked the people at the state level who have worked hard to restore the WDOE budgets. WDOE has gone from a year where there was a struggle to get work done to one of more restored budgets. There is money available to do some of the necessary work even if there is less staff available to do it.

Mr. Pendowski believes that the DMMP guidelines will be approved for dioxins, and that Ecology will play a role in evaluating how these work out. He ended by welcoming everyone to what will be a productive day.

AGENCY SUMMARY REPORTS, PART I

1. EPA, Summary of Regional CERCLA Activities, Allison Hiltner

Allison Hiltner, EPA, presented a summary of Comprehensive Environmental Response Compensation and Liability Act (CERCLA) activities including an update of Region 10 sediment projects and what has been learned from the five year reviews. Ms. Hiltner presented a summary of the last 20 years worth of effort, which has included cleanup of 728 acres and removal of 3.8 million cubic yards of contaminated sediment.

There was not much sediment cleanup work done in the last year, but it should start picking up. She gave a list of upcoming projects including T-117, Slip 4, Hylebos/Occidental Waterways and more. Some of these projects, such as the ASARCO sediment cleanup, were previously limited by funding. Ms. Hiltner presented some of the deadlines for work on the Lower Duwamish, Hylebos/Occidental, and East Waterway. However, these dates are still tentative at this point.

Next, Ms. Hiltner discussed the five year review process. Five year reviews are required under CERCLA for sites that leave contaminated sediments in place to assure that established human health and environmental standards are met. EPA recently completed a five year review of the Commencement Bay remedy. It is expected to be protective of human health and the environment when completed.

EPA has learned numerous lessons from the five year reviews. Although these contaminated sites are cleaner than before action was taken, they are still not perfect. Source control is one of the largest concerns with any environmental cleanup. EPA recognizes that recontamination can be expected in many situations; even when best efforts are made to control sources of contamination. The goal of source control is to balance cleanup activities with known incoming sources.

There are many means of protecting a contaminated site once cleanup action has been taken. Institutional controls are necessary for the long term maintenance of cleanup actions, but are difficult to enforce. Institutional controls include proprietary controls, regulated navigation areas (such as not anchoring on a sediment cap), and fish advisories.

Ms. Hiltner ended with a list of the point of contact for several different cleanup sites.

Comments and Questions

Question: Heather Trim, People for Puget Sound; What do you mean when you say more money is needed to conduct the five year reviews?

Response: Often, we are not able to collect enough data during the five year reviews. Fish data in particular is often lacking.

Question: Heather Trim, People for Puget Sound; Should more money have been requested at the time of cleanup or at the time of the review?

Response: There isn't necessarily a specific point to have made a request. We need to apply lessons learned from current reviews to new sites so we can better anticipate the review costs.

Allison Hiltner

PP1.1	What's New in EPA's Contaminated Sediment Cleanup Program
PP1.2	What's New
PP1.3	Puget Sound Superfund Site Status Report
PP1.4	EPA Superfund Cleanup Progress in Puget Sound to Date
PP1.5	Watch for…
PP1.6	Watch for…
PP1.7	Estimated Dates for In-Water Sediment Remediation
PP1.8	Commencement Bay Five Year Review – December 2009
PP1.9	Commencement Bay Five Year Review – December 2009 (cont.)
PP1.10	Commencement Bay Five Year Review Recommendations
PP1.11	5-year reviews – what have we learned
PP1.12	Source Control
PP1.13	Institutional Controls
PP1.14	Institutional Controls
PP1.15	EPA Contacts
PP1.16	EPA Contacts, cont'd
PP1.17	For More Information

2. USACE, Summary of Testing Activities, David Fox

David Fox, USACE, summarized the USACE activities to date for the dredging year ending June 15, 2010. Mr. Fox listed some completed actions and some ongoing projects including Chelan PUD, Grays Harbor O&M, and the South Park Bridge. He presented a map with the 2010 suitability determinations and another showing all other DMMP actions. In recent years, there has been a trend towards more projects.

He summarized the biological testing results, and noted that the only bioassay failures were in the Lower Duwamish Waterway. Because of the bioassay failures in the Duwamish and chemical exceedances at three other projects, a total of 63,579 cubic yards of sediment were deemed unsuitable for open water disposal.

Both 2008 and 2009 were big years for sediment characterization due to large development projects on the Blair Waterway and testing for the federal navigation project in Grays Harbor. The characterized volume in 2010 was much lower, but still near the annual average for Puget

Sound. For most years, the proportion of sediment unsuitable for disposal has remained low. Mr. Fox stated that summary material for all projects is available on the DMMP website.

Comments and Questions

Comment: David Kendall, USACE; The DMMP project specific dredged material testing and disposal actions for the last two years are summarized in the recently released Biennial Report for Dredging Years 2008 and 2009 (http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/BR_08-09_DMMP_final_Mar19.pdf).

David Fox

PP2.1 Dredging Year 2010 DMMP Testing Activities
PP2.2 Dredging Year 2010 Definition
PP2.3 Dredging Year 2010 Project Summary
PP2.4 Dredging Year 2010 Project Summary
PP2.5 Dredging Year 2010 Project Summary
PP2.6 DY10 Suitability Determinations
PP2.7 DY10 Other DMMP Actions
PP2.8 Dredging Year 2010 Volume Summary
PP2.9 Multi-Year Comparison Completed Actions
PP2.10 Dredging Year 2010 Testing Summary
PP2.11 Biological Testing – SDs
PP2.12 Dredging Year 2010 SD: Unsuitable Material
PP2.13 Multi-Year Comparison SD Volumes
PP2.14 For more DMMP information

MORNING BREAK

Stephanie Stirling returned to the podium and said that due to being ahead of schedule, the meeting will take a ½ hour break and resume at 10:15. After the break, Ms. Stirling introduced the panel at the front table.

Stuart Cook, USACE
Jim Pendowski, WDOE
Rick Parkin, EPA
Kristin Swenddal, DNR

AGENCY SUMMARY REPORTS, PART II

3. WDOE, Proposed Changes to MTCA/SMS, Chance Asher and Laura Inouye

Chance Asher, WDOE, began by summarizing the progress made since last year on updating the SMS rule revisions. In the last year, WDOE has:

- Authored and published issue papers
- Developed preferred options based on feedback

- Decided rule scope and schedule
- Formed two external rule-advisory groups
- Held rule-advisory group meetings
- Worked on public outreach including conferences, listserv, and the website

Goals of the rule revisions include the integration of Sediment Management Standards (SMS) and Model Toxics Control Act (MTCA). Another goal is to clarify the SMS other deleterious substances narrative standard in MTCA. Promulgation of freshwater standards, clarifying the effects of bioaccumulatives for the protection of human health and ecological risk, and how to incorporate background concentrations of ubiquitous chemicals when setting cleanup standards.

Ms. Asher said that a MTCA/SMS advisory group and a sediment workgroup have been created in support of the revisions. The advisory group is focusing on the policy issues of MTCA and SMS and the bigger picture of how to bring the two together. The workgroup is a group of sediment experts and is focusing on the technical and scientific issues. The workgroup is composed of eight people, including a mix of consultants, tribes and public representatives.

Output from the advisory group meetings has provided some guiding principals Ecology is considering when making rule revisions. Specific concepts include:

- Protectiveness should be the goal of any revisions; Liability resolution is an important incentive for potentially liable parties (PLPs). It will be difficult to get PLPs to move forward without a clear process and feasible standards for cleanup;
- The SMS revisions should be simple, and not made more confusing than they already are;
- All cleanups need to be structured so they are feasible;
- A degree of flexibility needs to be built in. All sites are different so no single approach will be appropriate;
- Source control must be integrated as part of the solution; and
- The rule revisions must be created in a way that they can be implemented.

Ecology needs to harmonize the SMS and MTCA rules to provide clear processes, consistent language, and a reliable decision framework for sediment cleanup. Terminology, definitions, processes, and a decision framework all need to be evaluated in regards to harmonizing SMS and MTCA. Sorting through the terminology will be a big issue, as some terms in SMS have different meanings in MTCA, and vice versa. The whole process of a cleanup should be smoother; The PLP shouldn't have to toggle between SMS and MTCA requirements. The decision framework should be based on cost and technical feasibility and environmental protection.

Ms. Asher took a break in the presentation to take any questions.

Comments and Questions

Question: Kathy Kreps, TestAmerica; Are the chemical criteria based on SMS or MTCA, or something new?

Response: The focus will mostly be on SMS revisions, with some tweaks to MTCA. This question will be discussed further in an upcoming slide.

Question: Fred Felleman, Friends of the Earth; Can you list some examples of terms that will change?

Response: There are different terms between SMS and MTCA for an RI cleanup action plan and the term remediation level in MTCA has no SMS equivalent.

Comment: Pete Adolphson, WDOE; An obvious example is the definition of sediment. When originally drafting SMS, the definition of sediment wasn't included. It will be part of the revision.

Comment: Chance Asher, WDOE; In addition, the definition of sediment will be broken down further into zones such as biologically active zone, etc.

Question: Fred Felleman, Friends of the Earth; Can you explain more about the remediation levels?

Response: They will be presented in an upcoming slide.

Question: Unknown; Did you post public comments to the issue papers on the website?

Response: Yes, they are posted on our rule page.

Question: Rick Parkin, EPA; Are you doing anything about the terms background vs. non-anthropogenic background?

Response: I'll provide more detail later, but these will be defined.

Question: Sally Fisher, BergerABAM; Will there be changes to the concentration terms in MTCA for CSL? Will PAH evaluation change to TEQ instead of LPAH and HPAH?

Response: Marine numeric criteria for SMS will not change. We are evaluating how to clarify protection of human health in the SMS rule but are not looking to promulgate numeric criteria for protection of human health. There are no proposed changes for evaluating PAHs.

Ms. Asher continued her presentation discussing other deleterious substances. Currently, MTCA defers to SMS for all sediment cleanups. While SMS has a standard analyte list, confirmatory bioassays are conducted to test for possible impacts due to other deleterious substances that are not chemical criteria. In all cases, bioassay results trump the chemistry results. This confirmatory designation used in SMS needs further clarification in MTCA.

One of the reasons for making this clarification for other deleterious substances is that all six embayments that Ecology is working on in the Puget Sound have substantial amounts of wood waste that are impacting benthic invertebrates. There is no direct chemical method to measure the impact of wood waste. In these cases, confirmatory bioassays have been conducted to test for possible benthic impacts.

Comments and Questions

Question: Larry Dunn, Lower Elwha Klallam Tribe (LEKT); Will impacts to organisms beyond the benthic invertebrates be addressed?

Response: Yes, this will be discussed.

Question: Teresa Michelsen, Avocet; The question of other deleterious substances has come up in regards to both MTCA and CERCLA. A couple years ago, a lawsuit was filed on

whether other deleterious substances were considered hazardous. In this case, a judge ruled for CERCLA, but left MTCA open. Do you want the failure of bioassay tests written into the definition of other deleterious substances? What is the preferred alternative?

Response: We can't answer to the best approach, but we're still having discussions and are working with the attorney general's office on a solution.

Question: Eric Johnson, WPPA; If wood waste is incorporated into MTCA, who is responsible? Is it DNR for leasing the land, logging companies for towing the rafts? This brings a lot of new parties into the regulations. MTCA may be the wrong tool for regulating future logging work. Have you talked with any of the people who may be involved? Have you talked with DNR?

Response: We have had some discussions with DNR and the industry. We are not using the term wood waste as a hazardous substance. There is no specific criteria for wood waste. Rather bioassay failures in an area that contains wood waste will trigger further action. We have talked with DNR and will continue to do so.

Question: Unknown; Would designating something such as a wood waste criteria limit options for disposal of sediment? Could wood waste containing sediment go for beneficial reuse?

Response: We are not looking to classify specific substances as hazardous substances, but rather clean up areas based on bioassay failures. Disposal criteria would be the same as any other contaminated sediment types. There is a case of where wood waste was brought upland and sparged before reuse. Wood isn't necessarily harmful everywhere.

Question: Unknown: Dredged material can only be qualified as fill if suitable for open water disposal. This is the current designation. This could limit beneficial reuse of material that isn't necessarily toxic.

Response: The previous reply stands, but we will continue to think about this issue.

Ms. Asher resumed her presentation discussing bioaccumulative chemicals. SMS was promulgated to protect benthic invertebrates and assumed to address bioaccumulation. This has been shown to not always be the case. The question is how to address bioaccumulative chemicals to provide clear and predictable cleanup standards to protect human health and biological resources.

The plan is to develop a narrative standard to address this exposure pathway, not necessarily to create numeric criteria. The goal is to keep any revisions simple. Complicated narrative standards could lead to difficulties with small sites and added expenses.

Comments and Questions

Question: Sherry Rone, Navy; If there is no numeric criteria, what is the structure for cleanup?

Response: That is the question Ecology is struggling with right now. We are looking to detail out a process of how to conduct a risk assessment for bioaccumulatives.

Question: Jennifer Sutter, ODEQ; What considerations have you give towards Oregon's guidance?

Response: We have them in hand and are considering this guidance in developing our narrative standard.

Question: Sally Fisher, BergerABAM; Seems like the standard may be moving towards a conceptual site model as used in RSET?

Response: That is a possibility, but again, the goal is simplicity.

Question: Chance Asher, WDOE: My question to you is what level of organism are we looking to protect (how high up the food chain)?

Response: Larry Dunn, LEKT; Human health risk should be the driver.

Comment: Chance Asher; Yes. We're still working on the issue of how high up the food chain to go.

Comment: Teresa Michelsen, Avocet; For RSET, we looked at big RI/FS documents around the state with regards to organisms to consider. I would encourage Ecology to pull from existing documents and guidance for bioaccumulation without reinventing the wheel.

Question: Debra Williston, King County; How are you going to address organisms with a large home range at a small site?

Response: We are working on that. We want to produce a draft document to incorporate all of these issues.

Comment: Unknown; We do know that bioaccumulation doesn't impact benthic invertebrates to the same degree as higher trophic levels.

Comment: Heather Trim, People for Puget Sound; Need to incorporate emerging chemicals when building this narrative.

Ms. Asher resumed the presentation discussing human health issues. The current SMS narrative standard states that there should be no significant human health threats. However, the bioaccumulation pathway is still unclear. The issue of natural background concentrations of many chemicals of concern is a big one to take into account with human health risks. Risk based sediment levels may be below natural background concentrations. This leads to technical issues about meeting cleanup levels. These are very important issues as sediments are typically a sink for many of the bioaccumulative chemicals of concern. PLPs are concerned about their liability due to recontamination and the feasibility and costs associated with a potential cleanup at these low levels.

Comments and Questions

Question: Greg Fesko, Navy; If sediments are the sink of many of these contaminants, the definition of background will change over time. How will this changing background be addressed?

Response: This needs to be a flexible process, where background is re-calculated over time. The hope is that continued cleanup and source control efforts will reduce background concentrations.

Question: Greg Fesko, Navy; If human health risks are a concern with the sediment revisions, could changing backgrounds impact cleanup standards?

Response: There will be finality with the PLP once the site specific cleanup standard is met with regards to one site and a changing background.

Question: Jim Pendowski, WDOE; Please comment on what we would have for guidance and what the time limits are? Rule and guidance should be available at the same time.

Response: Very specific details and equations will go in guidance. The definition of background will go in the rule. We are planning on developing guidance and will make every effort to publish it in coordination with the rule revisions.

Question: Sherry Rone, Navy; Will the guidance and the rule be separate documents?

Response: Yes.

Question: Thos Winter, People for Puget Sound; If it benefits the PLPs, will they want to want to make decisions before the guidance is available?

Response: This is very site specific. We don't want to be holding up any cleanup activities, just to make sure decisions are in line with future rule revisions..

Question: Leslie Connor, Port of Tacoma; When the MTCA rule revisions changed, there was a grandfather clause for cleanups that had already started. Will there be one for this round of revisions?

Response: Dave Bradley, WDOE; There will be a period of transition before the new rules come into effect, so a similar process to the grandfather clause may be needed.

Ms. Asher then discussed the current regulatory framework in MTCA and SMS. MTCA has a single cleanup level, but land use restrictions or compliance points allow for some flexibility. SMS uses a range of two levels for benthic toxicity and a site specific cleanup standard is determined between the range allowing for some minor effects. For the revisions, WDOE has proposed frameworks based on a single cleanup standard or a range with regional background concentrations as the upper level and natural background as the lower level. The advisory group's decision making framework encompasses a range of levels protective of both human health and benthic organisms. In a cleanup scenario under the advisory group's framework, the highest risk areas would be cleaned up and source control actions would reduce bay wide background concentrations to below natural background over a longer period of time.

Comments and Questions

Comment: Jennifer Sutter, ODEQ; Make sure the source control component is geared towards meeting a lower background level as a long term goal.

Question: Fred Felleman, Friends of the Earth; What is regional background?

Response: It is a higher background concentration than natural background, but lower than area background, that is not due to a specific PLP. It is influenced by non-point source contamination.

Question: Fred Felleman, Friends of the Earth; What if multiple PLPs were contributing? Would they be responsible for a higher regional background?

Response: Generally, it is difficult to apportion responsibility of large area wide or baywide contaminated sediment on just a few parties when there are likely hundreds of sources and

responsible parties. A higher cleanup standard may be used in areas with higher regional background concentrations.

Question: Unknown; Would monitoring continue as long as the regional background was elevated?

Response: Yes, for the site being cleaned up that is the plan.

Question: Larry Dunn, LEKT; Is regional background established on a site by site basis? If there was one site where multiple PLPs were known to cause all of the contamination, would it still be considered a regional background?

Response: If it could be verified that specific PLPs are responsible, then regional background would not include the influence of the PLP sources. Regional background includes the diffuse sources, such as non point source pollution, that are not necessarily identifiable.

Comment: Chance Asher, WDOE; The goal of regional background is to allow an attainable cleanup standard for sites influenced by urban areas.

Comment: Erika Hoffman, EPA and Greg Fesko, Navy; both contributed further towards defining regional background.

Question: Bob Elsner, Port of Anacortes; For a site listing criteria, would you use an SQS equal to the cleanup objective?

Response: The CSL would be used to list sites. The SQS would be the cleanup objective.

Ms. Asher continued with a comparison of human health protections and benthic organism protections.

Comments and Questions

Comment: Jennifer Sutter, ODEQ; This framework is exactly what was done for Columbia Slough. The framework for this cleanup involved cities and multiple PLPs. This may be a good guide for you to use.

Question: Unknown; Has a specific decision been made off the contents of the slide?

Response: No specific decisions yet. These are still proposals.

Question: Unknown; Has a risk range for human health concerns been proposed yet?

Response: No range yet, but we're looking into it. It has been suggested by the advisory groups to use a range between one in a million and one in a hundred thousand.

Ms. Asher continued with a discussion of freshwater standards and how SMS can be revised to provide sediment cleanup standards in freshwater. Ecology is working towards the promulgation of both chemical and biological standards. Ms. Asher summarized the timeline of actions taken towards creating freshwater standards and then gave the microphone to Dr. ***Laura Inouye, WDOE***.

Dr. Laura Inouye described the efforts made since 2007 to collect more bioassay data for use in evaluating freshwater criteria. In 2003, the freshwater guidance screening values were created using 901 bioassay data points from western Washington. Most of the bioassay data points were

10-day tests and Microtox. In 2010, there were 1,850 bioassay data points from eastern and western Washington. Included in the 2010 data were 28-day *Hyalella azteca* mortality and growth tests. Microtox testing was excluded from the 2010 data set.

In this timeframe, the quality assurance (QA) and adverse effects levels for some tests changed. A bioassay hit is now a comparison of the test and control, rather than the test and reference. In addition, the control performance was tightened to allow a greater difference between the control and test.

Calculations were run for each assay endpoint and both SQS (SL1) and CSL (SL2) effects levels. These results were compared with the chemistry data. It was expected that bioassay endpoints would be clustered around similar levels of chemical concentrations for minor effects (SL1) and higher concentrations for more severe (SL2) hit levels. This was not the case. Instead, bioassay endpoints were more dependent on species. As a result of these findings, a species sensitive approach may be more useful for determining freshwater sediment toxicity.

There were issues with the screening levels meeting reliability goals as proposed in Regional Sediment Evaluation Team (RSET) for other sediment quality guidelines. The floating percentile method (FPM) seems to be more reliable. FPM resulted in a greater amount of false negatives, but a much lower rate of false positives. This is an acceptable compromise for better reliability.

The freshwater standards will undergo a series of reviews including a peer review by the sediment workgroup and a review of the SQVs by a scientific panel. EPA and formal public reviews will follow.

Comments and Questions

Question: Pete Rude, City of Seattle; In the tables on your slides, what does %PredHit mean? The value is so much lower than the other columns.

Response: Teresa Michelson, Avocet; This is the percent of time that a prediction made about the toxicity of sediment is correct. It is easier to predict no bioassay hits than it is to predict bioassay hits. That is why %PredHit is lower than %PredNoHit. The message is that you should not use past bioassay results to predict future bioassay results if you think there could be issues.

Comment: Burt Shepard, EPA; %PredHit is how often you would be correct when predicting the toxicity of sediments with suspected toxicity. The opposite is true for %PredNoHit.

Comment: Teresa Michelson, Avocet; False positives and false negative values in these tables are real numbers based off actual samples, whereas %PredHit and %PredNoHit numbers are calculated values based off the number of hits in the database.

Chance Asher and Laura Inouye

PP3.1 Sediment Management Standards Rule Revisions
PP3.2 Sediment Management Standards Rule Revisions
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PP3.4 SMS Rule Revisions – Issues
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PP3.32	Freshwater Standards Methodology Details
PP3.33	Results Table
PP3.34	Freshwater Standards: Setting the Values
PP3.35	Challenges – Criteria Selection
PP3.36	Challenges – Criteria Selection
PP3.37	Freshwater Standards: Setting the Values
PP3.38	Results Table
PP3.39	Freshwater Standards Reliability
PP3.40	Freshwater Standards Reliability
PP3.41	Freshwater Standards Reliability
PP3.42	Freshwater Standards Next Steps
PP3.43	Questions? Comments?
PP3.44	Supplementary material follows
PP3.45	Floating Percentile Method
PP3.46	Features
PP3.47	Graph
PP3.48	Reliability
PP3.49	Data Set – Bioassay Endpoints
PP3.50	FPM Runs & Issues Tested

LUNCH

Stephanie Stirling reminded everyone to sign in.

AGENCY SUMMARY REPORTS, PART III

4. RSET Update, James McMillan (Portland District, USACE) for Northwestern Division

James McMillan, USACE-Portland, discussed the 2009 sediment evaluation framework (SEF). There were two purposes to the document. One was to evaluate the suitability of dredged material for disposal. The other was to evaluate the post dredged surface sediment.

After one year of evaluation, work is needed on four chapters in the SEF. In chapter 4, there are no thresholds for rank-based removal of material. The Portland District is working on guidelines similar to those used by the DMMP. The Walla Walla District will form a review team when a project is begun under the 2009 SEF.

Chapter 6 changes include revisions to the marine screening levels to remove errors and make sure the levels reflect the most recent data. Freshwater screening levels are still awaiting review by WDOE and OR-DEQ.

The biggest issue in chapter 8 is coming up with a consistent bioaccumulation trigger for dioxin/furan congeners, DDT analogs, PCBs, organotins, and mercury. Tissue values are available, but sediment values are not widely accepted.

Chapter 11 deals with QA/QC. This chapter was not completed for the interim SEF. It needs to be expanded and will likely be modeled after the DMMP guidance.

Mr. McMillan summarized the steps to be taken for completing revisions to each of these chapters.

Comments and Questions

Question: Justine Barton, EPA; Given that the changes are just edits, is it possible to provide updates in a table rather than wait for an updated document?

Response: That is the plan.

Question: Unknown; When is the supplemental guidance on the SAP due out?

Response: We will work on it this summer with a final version due in mid-October.

Question: Lawrence McCrone, Exponent; With the absence of guidance on bioaccumulatives, and no expectations for more funding to complete them, how do you make decisions for testing?

Response: State has sediment based bioaccumulation triggers to use.

Comment: Jonathan Freedman, EPA; For the projects that have come up so far, open water disposal isn't normally an issue, so the issue hasn't come up that often.

James McMillan

PP4.1 2009 Sediment Evaluation Framework: Updates Identified after the 1st Year of Implementation
PP4.2 2009 Sediment Evaluation Framework for the PNW (SEF)
PP4.3 Work needed on four chapters:
PP4.4 Chapter 4 (Framework/SAP) Improvements
PP4.5 Chapter 6 (Physical and Chemical Testing) Improvements
PP4.6 Chapter 8 Bioaccumulation
PP4.7 Chapter 11 QA/QC
PP4.8 Next Steps for the SEF
PP4.9 Questions?

5. Summary of Monitoring and Disposal Site Management Information, David Vagt, DNR

David Vagt, DNR, began by saying he just started at this position six months ago, and is still getting up to speed. Currently, monitoring is being conducted at the Port Gardner open water disposal site. The personal service contract is up this year, and will have to be renewed for next year. The existing personal services contract, ensures that DNR can move quickly on any issue if needed.

Commencement Bay is in the process of getting a new shoreline permit. The process was started in late November. Due to Pierce County staff shortages, the permit renewal has been slow, although Pierce County subsequently issued the new Shoreline Permit for this site on July 22, 2010. Port Townsend, Port Angeles, Rosario Straits, and Elliot Bay need new permits next year, and DNR will be working with the DMMP agencies to accomplish these tasks.

There is not likely to be a fee increase this year. This will be re-evaluated in the fall, but the disposal fee will probably remain the same.

Comments and Questions

Question: Heather Trim, People for Puget Sound; What is the next step for Port Gardner?

Response: We have started the camera work, and will soon decide on a full or partial monitoring.

Comment: David Kendall, USACE; A tiered full monitoring will be conducted (Full Monitoring answers 3 Questions and 6 testable hypotheses). This is being conducted as an initial partial monitoring event (Partial Monitoring answers the first 2 monitoring questions and first 4 testable hypotheses) with archival of extra samples (e.g., sediments, *Molpadia* tissue, and benthic infaunal samples) to address the remaining monitoring question and two testable hypotheses to complete the full site monitoring if necessary. Results collected to address the first two questions and four testable hypotheses will inform the DMMP decision on whether to analyze the archived samples.

STATUS REPORTS

6. Development of a Regional Sediment Reference Material (SRM), John Hicks, USACE and Justine Barton, EPA[1]

John Hicks, USACE, discussed the creation of a low level PCB and dioxin/furan congener sediment reference material (SRM) from regional sediments. This SRM will also serve as a bridge between PCB Aroclor and congener analyses.

The goal is to create a 10 year supply and conduct a full statistical analysis including validation. The SRM will consist of independent material, meaning the sediment is not linked to a specific site. Collection of data results from the SRM will be ongoing as newly analyzed aliquots from the SRM are compared with previous results.

The proposed SRM is being created in response to issues discussed at the 2009 SMARM. DMMP guidelines require low reporting limits. Since the region contains a unique mix of dioxins and PCBs, a regional standard is needed to make sure the reporting limits are met for this mix. In addition, QA/QC challenges are best addressed by using a known reference material.

The DMMP is working with the EPA Office of Environmental Assessment (OEA) to produce the SRM. CLP laboratories, Manchester EPA, and Ecology commercial laboratories will be involved in the analytical round robin of the SRM.

Justine Barton, EPA, continued by outlining the target concentrations of PCBs and dioxins and some of the areas targeted for collection. Target areas include Budd Inlet, the Duwamish River, and Carr Inlet. Sampling will be conducted using a double Van Veen grab off the R/V *Skookum*. A total of 500 kg of sediment will be collected. SRM processing steps will reduce this amount to 100 kg of final material. The material will be subdivided and sent to ten CLP laboratories and local commercial laboratories.

Sampling was to occur the last week of April, but funding is still needed to initiate field sampling. The entire process from field sampling to testing is expected to last six months. Some issues still need to be resolved such as storage requirements, sample management procedures, and database location and format.

Comments and Questions

Question: Erika Hoffman, EPA; Talk about how the data will be managed for users that have to deal with it.

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[1] Work on the SRM project is active and ongoing. Subsequent to the SMARM, the DMMP agencies secured needed funding via EPA's Puget Sound estuary program. Sediment sampling was conducted using Ecology's vessel R/V Skookum, with sediments collected September 23rd from Duwamish Waterway T-117, September 24th from Budd Inlet, and September 27th from Carr Inlet. In all, twenty seven 5-gallon buckets were shipped to QATS/Shaw Environmental in Las Vegas for processing. The drying and mixing process is ongoing at this time, with grain size and chemistry analyses pending. A full update/report will be presented at SMARM 2011.

Response: Laboratories will submit a data sheet to the central data base so that performance can be tracked over time.

Question: Russ McMillan, WDOE; Would WDOE certified laboratories be able to look at the SRM?

Response: We'll contact the appropriate source at WDOE to make sure the laboratories get added to the list.

Question: Tad Deshler, Windward; There is a one year hold time for samples. Could this SRM be used to evaluate sample hold times?

Response: Yes. PCBs and dioxins tend to persist for a long time.

Response: Laura Inouye, WDOE; Field samples aren't freeze dried like the SRM will be. (NOTE: The SRM will not be freeze-dried unless found necessary during SRM preparation).

Comment: Roger McGinnis, Hart Crowser; A couple points--The hold times for PCBs and dioxins are more contractual than practical. How would you evaluate the hold times based off the results of the SRM?

Question: Unknown; What is the frequency of analysis? Will it be one SRM per batch?

Response: They will be analyzed per batch.

Comment: Sue Dunihoo, ARI; The quantity of SRM you plan on preparing will be used up quick if it is analyzed per batch.

Comment: John Hicks, USACE; Perhaps only one per project will be analyzed.

Comment: A back and forth discussion ensued about whether individual Aroclors will be intentionally ratioed in the samples and another discussion about different laboratories' abilities to detect and identify Aroclors.

John Hicks and Justine Barton

PP6.1 Regional Sediment Reference Material (SRM)
PP6.2 What is a Regional SRM?
PP6.3 Why an SRM?
PP6.4 Why is DMMP doing this?
PP6.5 Who is involved?
PP6.6 Who is involved?
PP6.7 Process
PP6.8 Field Sampling
PP6.9 SRM Processing
PP6.10 Status
PP6.11 Still to be resolved…

7. Dioxin Guidelines Update, David Fox, USACE

David Fox, USACE, gave an update on the proposed dioxin guidelines. He began with a brief timeline of the actions taken in the last three years towards creating the guidelines. Currently, the revised interim guidelines are posted for public review. The 60-day review period started April 19 and ends June 18. (NOTE: This was subsequently extended to June 30, 2010).

The proposed guidelines include a site management objective of 4 pptr TEQ at both dispersive and non-dispersive disposal sites. The screening level for dispersive sites is set equal to the site management objective of 4 pptr TEQ because these sites cannot be monitored, while at non-dispersive sites individual DMMUs can range as high as 10 ppt as long as the volume-weighted average is less than 4 pptr TEQ. The guidelines include expanded reason to believe considerations for expanded dioxin testing. They also include some flexibility for disposal at non-dispersive sites for case-by-case and small business considerations.

Some of the case-by-case considerations include a bioaccumulation test out option, sequencing and best management practices (BMP), site use frequency, and cumulative effects due to other bioaccumulative chemicals of concern present. Small businesses may not need to meet the 4 pptr volume-weighted average guideline if the business meets the WAC definition of a small business, if the project is less than 4,000 cubic yards, if the disposal is at a non-dispersive site, and if dioxin is less than 10 ppt TEQ.

These guidelines are still considered interim. If implemented, they will make dioxin/furan concentrations at non-dispersive sites consistent with Puget Sound background, contribute to reduced dioxin body burdens in marine biota, make disposal requirements more consistent with other estuaries, and test the use of background based disposal guidelines for other persistent pollutants.

The DMMP agencies will continue to seek stakeholder involvement in the development of technical protocols for the proposed guidelines as well as suitability guidelines for other bioaccumulative chemicals. Part of this evaluation will include a discussion of PCBs and whether they should be evaluated as part of the TEQ approach or if similar guidelines need to be developed for PCBs and other bioaccumulative compounds. All comments were welcomed and written responses to all comments with embedded DMMP responses are attached to the SMARM minutes (Appendix 6), and will be posted to DMMO website.

Comments and Questions

Question: Tad Deschler, Windward; How would addition of PCBs impact the guidelines if implemented? How would this be implemented?

Response: Laura Inouye, WDOE; Human health portion of PCBs carcinogenicity is driven by TEQ. We would like to develop a TEQ based approach rather than separately evaluating PCBs against background and dioxins against background.

Question: Larry Dunn,LEKT; How do you address new dredging sites? Do you use reason to believe sampling? Test all projects?

Response: New reason to believe guidelines have been instituted. The presence of high PCB concentrations, hog fuel burning, phenoxy herbicide storage, chlor-alkali processing will result in dioxin testing. Non-urban areas won't necessarily require testing.

Question: Larry Dunn, LEKT; How did you come up with 4 ppt TEQ?

Response: This number was taken from background concentrations which were determined using the Bold Survey data. There was no statistical difference between Puget-Sound-wide background stations and those in reference bays.

Question: Eric Johnson, WPPA; How do the guidelines differ from regulations? How much flexibility do you propose?

Response: An example project from a previous year was given and how it was debated. BMP practices such as sequencing are an example of flexibility. Sequencing is the disposal of the more contaminated sediment from a project first to allow for burial by cleaner sediment. Also, if many projects are scheduled for one year and only one has higher dioxin concentrations, burial may occur over the course of a dredging season.

Question: Eric Johnson, WPPA; The WAC code for small businesses is a state code. How do the federal agencies feel about using a state code for small business exemptions?

Response: The DMMP is an interagency program.

Question: Unknown, Anchor QEA: How is TOC incorporated into the interim guidelines?

Response: It is not.

Response: Laura Inouye, WDOE: The Bold data set showed there was no strong correlation between TOC and dioxin/furan concentrations.

Question: Unknown, Anchor QEA; Carbon does influence the bioavailability of these compounds.

Response: Laura Inouye, Ecology; That is why the test out option exists.

Comment: Heather Trim, People for Puget Sound; The dioxin reason to believe standard isn't tight enough. All samples should be tested.

Question: Unknown; Why recommend a Level IV validation on all dioxin data? Isn't a 10% check valid?

Response: We determined a Level IV validation is worth the effort and expense.

Comment: John Wakeman, USACE Seattle: We are usually dealing with small batch sizes, so 10% can be 100%.

Question: Lawrence McCrone, Exponent; Is the bioaccumulation test out needed on all DMMUs?

Response: Don't know if all DMMUs need to be done or just the worst of them.

David Fox

PP7.1	Update on Proposed Revisions to Dioxin Guidelines
PP7.2	Process Recap
PP7.3	Where we are in the process
PP7.4	The proposed guidelines
PP7.5	Changes made since the 2009 SMARM Proposal
PP7.6	Changes made since the 2009 SMARM Proposal
PP7.7	Changes made since the 2009 SMARM Proposal
PP7.8	What this change in interim guidelines will accomplish
PP7.9	Next steps
PP7.10	Comments on proposed guidelines
PP7.11	Role of Stakeholders in Upcoming Work
PP7.12	Questions?

8. Commencement Bay NEPA/SEPA SEIS Completion, David Kendall, USACE

Dr. David Kendall, USACE, spoke about the status of the Commencement Bay Disposal Site NEPA/SEPA review. The Supplemental Environmental Impact Statement (SEIS) is now finalized and all finalized documents (e.g., Final Supplemental Environmental Impact Statement and Technical Appendices, Record of Decision Amendment, Public Notice 40 CFR 230.80) are available on the Corps DMMO website (http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=DMMO&pagename=CB_SEIS). The SEIS evaluates the disposal site's environmental impacts and site's ability to accommodate dredged material volumes greater than 9 million cubic yards up to a disposal ceiling of 23 million cubic yards.

So far, slightly more than 8 million cubic yards of material has been disposed of at the Commencement Bay disposal site, and the existing mound height is currently at 122 feet. The SEIS outlines two alternatives that would shift coordinates within the disposal site Target Area at various cumulative disposal volume intervals to better manage the growth of the mound height. The alternative not selected, would have one additional coordinate shift within the Northwest corner of the Target Area at 18 million cubic yards, which would result in an estimated mound height of 232 feet after cumulative disposal of 23 million cubic yards. For the preferred alternative, two coordinate shifts would occur within the Target Area, the first after disposal of 13 million cubic yards (Northwest corner of Target Area), and the second after 18 million cubic yards (Northeast corner of Target Area). For this alternative, the coordinate shifts would dampen the mound height to an expected 155 feet after reaching the disposal ceiling of 23 million cubic yards.

David Kendall

PP8.1 SMARM Status Briefing on Commencement Bay Disposal Site Reauthorization
PP8.2 All Documents now Finalized
PP8.3 Record of Decision Amendment
PP8.4 Public Notice (40 CFR 230.80) Advanced Identification of Disposal Sites
PP8.5 SEIS Completion Schedule
PP8.6 Final SEIS, Supporting and Concluding Documents Availability
PP8.7 Disposal Site Figure
PP8.8 2 Action Alternative evaluated in Supplemental EIS

AFTERNOON BREAK

PUBLIC ISSUE PAPERS

9. Corbicula as a Practical Dose-Response Indicator; Michael Salazar, Applied Biomonitoring

Burt Shephard, EPA, spoke for Michael Salazar, who is convalescing following a severe illness, on the use of *Corbicula fluminea* as a practical dose response indicator for freshwater bioaccumulation studies. There are many factors that favor using *C. fluminea* in freshwater bioaccumulation studies. It is tolerant of many contaminants, but not insensitive. It is a filter

and deposit feeder and is present across much of the U.S., making it ecologically relevant. It is easy to collect, cage, and measure. Its response time is similar to the more commonly used *Macoma nasuta*. Previous studies have provided important information for use on bioaccumulation potential.

Comments and Questions

Question: Erika Hoffman, EPA; What did RSET have to say about *Corbicula*? From your talk it sounds like they gave an indictment of *Corbicula*.

Response: Not an indictment. Rather they raised questions about using them for bioaccumulation studies. RSET focused on the downside without presenting the upside.

Comment: Teresa Michelsen, Avocet; Speaking for the author of the RSET paper, it wasn't meant to downplay *Corbicula*.

Question: Teresa Michelsen, Avocet; Is *Corbicula* more prone to toxic effects rather than bioaccumulation?

Response: I don't think so. It isn't the most sensitive organism.

Burt Shephard

PP9.1 *Corbicula* as a Practical Dose-Response Indicator
PP9.2 Abstract
PP9.3 RSET Bioaccumulation Subcommittee Questions on *Corbicula*
PP9.4 Circumstantial Evidence?
PP9.5 Laboratory Testing Subcommittee Constrained by Very narrow Focus
PP9.6 Summary Figures
PP9.7 *Corbicula* Field Bioassay
PP9.8 *Corbicula* distribution map
PP9.9 *Corbicula* Relationships Similar to Other Bivalves
PP9.10 How Can Tissue Benchmarks Work for Metals?
PP9.11 How Can Tissue Benchmarks Work for Metals?
PP9.12 Water & Sediment Chemistry
PP9.13 Reevaluating Water Quality Criteria Development
PP9.14 Effects of Growth on Bioaccumulation
PP9.15 Summary Figures
PP9.16 Summary Figures
PP9.17 Irrefutable Evidence
PP9.18 Irrefutable Evidence
PP9.19 Conclusions & Summary

10. Sediment Larval Test Interpretation Guidelines; Clay Patmont, Anchor QEA

Clay Patmont, Anchor QEA, discussed sediment larval test interpretation guidelines. The sediment larval tests typically determine confirmatory marine bioassay test outcomes and there is frequently no correlation with other bioassay tests. Even the reference samples often do not meet performance standards. There may be up to 20-30% false positives in determining hits. There

don't appear to be any correlations to testing conditions that can explain why so many tests are failing.

No larval reference performance standards were included in promulgated SMS regulations, while the other bioassays included reference standards. The larval variability was widely recognized at the time. Reference performance standards were later included in Ecology guidance to provide for greater conservatism of tests.

Possible solutions for the problem include reviewing and revising the test methods, abandoning the reference performance standard, and better explaining the reference variability with regard to the larval test.

Clay Patmont

PP10.1 Sediment Larval Test Interpretation Guidelines
PP10.2 The Situation
PP10.3 Example – 2006 to 2008 Larval Data
PP10.4 SMS Regulatory History
PP10.5 Initial Larval Reference Data Analysis
PP10.6 Possible Solutions

11. Bioassay Testing Issues; Jack Word, Newfields

Bill Gardiner, ***Newfields,*** reviewed some possible refinements for biological test methods. Methods included the *Neanthes arenaceodentata* growth test, bivalve larval test, and Microtox test.

For the *Neanthes* test:

- Reference failures are common with fine grained sediments.
- Varying amounts of sediment are appearing in the worms.
- Coarse sand is used as a control substrate.
- Other biomass tests use ash free dry weight (AFDW).

In the larval test:

- There were indiscriminate failures in sediment with flocculent layers, high proportions of fines, or certain types of woody debris.
- Test results were not predictive based on percent fines.
- In general there were low recoveries of larvae.

A larval experiment was setup comparing three tests, including the standard PSEP test, a re-disturbance test, and a screen-tube test. Of the three, the standard PSEP test consistently had the highest mortalities. Larvae did better when not covered in sediment.

Sediment testing was conducted in 2008 with three standard tests including 10-day amphipod, acute larval, and Microtox. Amphipod and larval tests passed SQS, while 7 of 13 Microtox tests failed. Sediment samples were reevaluated in 2009 based on the premise that the failures were

caused by something other than the chemicals of concern. It was found that sediment holding times dramatically affected the Microtox test. Ammonia and sulfide fluctuated over time. As a result, aeration is recommended for Microtox.

Recommendations for each test include using AFDW for *Neanthes*, use re-disturbance or screen tube procedures for larval tests, and minimize storage times for Microtox.

Comments and Questions

Question: Sally Fisher, BergerABAM; What about the holding time is affecting the Microtox?

Response: There is no clear answer. It could be ammonia or sulfides. We also think holding times are impacting the larval tests.

Question: Laura Inouye, WDOE: Were all these tests marine sediments?

Response: I believe they are all marine sediment with some exceptions for Microtox.

Question: Justine Barton, EPA; Describe the method for re-disturbance of sediment again.

Response: Summary of method. It involves re-suspending the sediment to release any larva trapped in the floc layer.

Question: Erika Hoffman, EPA; Are you proposing ashing to deal with sediment in the gut? Isn't there a purging time to deal with this? Have you explored this?

Response: We do use ashing to determine sediment in the gut. Currently use purging for bioaccumulation testing, not for *Neanthes*. Not sure if *Neanthes* would depurate in the absence of sediment.

Bill Gardiner

PP11.1 Refinements of Biological Test Methods
PP11.2 Outline Slide
PP11.3 Neanthes Growth Test
PP11.4 Neanthes Growth Test
PP11.5 Neanthes Growth Test
PP11.6 Larval Test
PP11.7 Larval Test
PP11.8 Results Table
PP11.9 Larval Test
PP11.10 Microtox
PP11.11 Microtox
PP11.12 Ammonia Levels in Microtox Samples
PP11.13 Microtox
PP11.14 Recommendations

12. The Impact of Sample Salinity on the Analysis of Pharmaceuticals and Personal Care Products (PPCPs); Dave Herbert, TestAmerica Laboratories, Inc.

Dave Herbert, TestAmerica, described the analysis of pharmaceuticals and personal care products (PPCPs). PPCPs are being found more and more often in drinking water. Many of the processes for treating drinking water don't adequately remove PPCPs.

The list that TestAmerica analyzes for includes 70 compounds such as anti-inflammatories, steroids, and hormones. RCRA has regulations for the disposal of pharmaceuticals by manufacturers and the health care industry. However, there are no regulations for disposal of PPCPs from non-point sources. Currently, the EPA and other federal, state, and local agencies are sponsoring studies on the presence, fate, treatment, and impact of PPCPs.

Analytical methods were developed for soils, sediments, fish and water. Sea water is a difficult matrix due to the number of organic and inorganic interferences.

Several water samples have been collected around Puget Sound. Preceding analysis of PPCPs, samples were analyzed for pH, specific conductance, and salinity to aid in the extraction process and normalize the salinity of the samples.

The results show that freshwater rivers have detections for some PPCPs. Most of the sites with detections were located near outfalls. Mr. Herbert ended by saying TestAmerica is capable of analyzing PPCPs in these difficult matrices, and gave a list of technical contacts.

Comments and Questions

Question: Heather Trim, People for Puget Sound; Can you analyze for PBDEs?

Response: They are not part of this method. Other samples have been analyzed and summarized elsewhere.

Dave Herbert

PP12.1 Ultra Trace Pharmaceuticals and Personal Care Products by LC/MS/MS and GC/MS
PP12.2 Introduction
PP12.3 PPCPs Often in the News
PP12.4 Drinking Water for the Future
PP12.5 Emerging Contaminants of Concern – What Are They???
PP12.6 Emerging Contaminants – They Take Many Forms!!
PP12.7 Common Emerging PPCP Contaminants
PP12.8 Origins and Fate of PPCPs in the Environment
PP12.9 Ongoing Studies…
PP12.10 Regulatory Framework for PPCPs
PP12.11 Analytical Challenges of Water with High Salinity
PP12.12 Water Bodies Low in Salinity in the Puget Sound Region
PP12.13 Water Bodies High in Salinity in the Puget Sound Region
PP12.14 Analytical Plan
PP12.15 General Chemistry Results

PP12.16 PPCP Analytical Results EPA Method 1694
PP12.17 Steroid and Hormone Results EPA Method 1698
PP12.18 Discussion Pharmaceuticals
PP12.19 Conclusion
PP12.20 Technical Contacts

13. Experiments to Evaluate the Release of Hydrophobic Pollutants during Dredging and Resuspension Events; Frank Dunnivant, Whitman College

Frank Dunnivant, Whitman College, discussed the potential for the release of hydrophobic pollutants during dredging and resuspension events. During dredging, contaminants from the sediment suspended in the water desorb to the water column. As the amount of TOC in the sediment increases, the amount of PCBs and other SVOCs desorbed to the water decrease.

A concern is that SVOCs from contaminated sediment layers desorb and resorb to cleaner sediments elsewhere in the core. Mr. Dunnivants showed that when only contaminated sediment is resuspended, a portion of the pollutants can be reintroduced into the water column. When contaminated and uncontaminated sediments are mixed, little to none of the pollutants appear to reenter the water column.

Comments and Questions

Question: Teresa Michelsen, Avocet; Can you compare sediments contaminated for three months versus those that have been in place since the 1970's?

Response: Once ten half-lives have been reached, the sediment and contaminants are assumed to be at equilibrium.

Question: Unknown; Organic carbon itself changes over time and the three month equilibrium may not take this into account.

Response: We had to start with clean sediments to know what was added.

Question: John Wakeman, USACE; Were these all freshwater systems? Will salinity change the findings?

Response: They were conducted in a mix of water. Salinity will change desegregation rates.

Comment: Clay Patmont, Anchor QEA; Cited some recent studies relevant to the paper and gave a list of references from the Midwest and Eastern U.S.

Frank Dunnivant

PP13.1 Experiments to Evaluate the Release of Hydrophobic Pollutants during Dredging and Resuspension Events
PP13.2 Resuspension Events
PP13.3 Modeling
PP13.4 Simplifications
PP13.5 Desorption Profiles
PP13.6 Are Rate Laws First Order? (Independent of TSS)
PP13.7 Trends

PP13.8 But what about reversible reactions?
PP13.9 When adsorption overrides desorption
PP13.10 Moral of Story
PP13.11 Bioconcentration A Real-World Numeric Example
PP13.12 Bioconcentration A Greed-Driven Numeric Example

14. Effects of the Proposed Nisqually Reach Aquatic Reserve on the Anderson-Ketron and Port Townsend Disposal sites; Eric Johnson and Johan Hellman, WPPA

Eric Johnson, WPPA, discussed a proposal by the DNR to create an aquatic reserve overlapping the Anderson-Ketron non-dispersive disposal site. He is concerned that proponents of the aquatic reserve nomination are interested in shutting the site down. The dredging community including the DMMP was not made aware of this proposal.

An additional aquatic reserve is suggested near the Port Townsend dispersive site. The northern boundary has been moved and may encompass parts of the site. (NOTE: It was later clarified that the proposed reserve boundary does not include the Port Townsend dispersive disposal site.)

It is very important that decisions about disposal sites should not be made outside the DMMP process.

Comments and Questions

Comment: Kristin Swenddal, DNR; The DNR posted a clarifying paper on this issue last night. The paper shows the process for establishing an aquatic reserve. She indicated that DNR supports keeping the Anderson-Ketron disposal site open. See Appendix 5.

SUMMARY AND CLOSING

Stephanie Stirling ended the meeting by making a request for all issue papers. All issue paper comments should be sent to David Kendall.

Stephanie Stirling

PP15.1 Let Us Know What You Think
PP15.2 Thanks
PP15.3 Cartoon

MEETING ADJOURNED

APPENDIX 1

DMMP RESPONSE TO PUBLIC ISSUES

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Appendix 1. DMMP Response to 2010 SMARM Public Issues

1. Bioassay Testing Issues presentation by Jack Word and Bill Gardiner (NewFields). SMARM presentation focused on protocol adjustments for the Bivalve Sediment Larval Test and *Neanthes* Growth Test.

   DMMP Response. The DMMP agrees with NewFields that methods to reduce false positive responses and make these tests more reliable and less equivocal would be helpful to the DMMP program. The DMMP agencies are actively evaluating the efficacy of the protocol adjustments to the Bivalve Sediment Larval Test (Resuspension) and the *Neanthes* Growth bioassay (e.g., ash-free weight versus dry weight) by running side-by-side tests on Federal O&M projects. The larval resuspension adjustment and *Neanthes* ash-free dry weight adjustment were recently used to evaluate two samples from Grays Harbor O&M testing, alongside the standard protocols. They were also evaluated at the Port Gardner disposal site monitoring completed this past summer. The DMMP agencies will continue to collect data on these protocol adjustments for these two bioassays, to evaluate their effectiveness in DMMP evaluations, before making a formal recommendation to implement these adjustments to the DMMP.

2. Aquatic Reserve Issue Paper presented by Eric Johnson and Johan Hellman (WPPA). Ongoing actions to set up aquatic reserves in the vicinity of the Anderson/Ketron Island and Port Townsend disposal sites were raised by the WPPA as a potential concern to the DMMP agencies, as a potential threat to these sites.

   DMMP Response. In response to the SMARM issue paper, the DMMP agencies met with Kyle Murphy (DNR) to get a background summary on the Aquatic Reserve process at the June 2010 monthly DMMP meeting, especially relative to the proposed Nisqually Reach Aquatic Reserve. As a result of that discussion, the DMMP agencies provided a DMMP overview presentation on July 16, 2010 to the Nisqually Reach Aquatic Reserve interagency planning group meeting, to provide an information exchange and opportunity to address concerns expressed by some planning group participants about the DMMP disposal site in South Puget Sound.

3. *Corbicula* as a practical Dose Response Indicator for Bioaccumulation Testing, Michael Salazar. Michaels issue paper was presented by Burt Shephard (EPA) due to unexpected illness.

   DMMP Response. It is recognized that a second freshwater species for bioaccumulation testing for dredged material is sorely needed; currently, *Lumbriculus* is the only organism in use and there are constraints because of this species' low body mass. The RSET group had reviewed existing data on *Corbicula* as a potential organism for laboratory bioaccumulation testing for dredged material, and determined that more information was required before it could be

adopted into standardized use. They cited concerns that *Corbicula* body burdens were not reaching steady-state in the 28-day exposure period, and regarding the extent to which *Corbicula* feeds on bedded sediments versus via filter feeding.

The public issue paper presented at the 2010 SMARM addressed several issues, including the extent to which *Corbicula* feeds from sediments versus filter feeding. It was shown that the species performed similar to *Macoma*, an accepted bioaccumulation species for marine sediment bioaccumulation testing. However, it is important to point out that neither *Corbicula* nor *Macoma* reach steady-state body burdens in a 28-day exposure. For *Macoma*, a methodological change was implemented to permit the test to be extended to 45 days, allowing the organisms to reach or approach steady-state body burdens.

The DMMP requires addition of sediments during the exposure period, which provides sufficient nutrients for *Macoma* such that the organism does not decline physically during the extended 45-day exposure period. Given that *Corbicula* is supposed to also feed from sediments, a similar approach could work, but research needs to be conducted to show that (1) extended exposure with sediment additions does not result in physical decline in the test organism, and (2) that an extended exposure period is sufficient to allow *Corbicula* tissues to either reach steady-state with the sediments or to allow prediction of steady-state concentrations. Alternatively, methods could be developed to allow correction of 28-day tissue levels to obtain predicted steady-state values.

The DMMP agencies will continue to evaluate the efficacy of *Corbicula* use for bioaccumulation testing within DMMP, and the effects of extending the exposure beyond 28-days to achieve steady state tissue levels for chemicals such as PCBs, TBT, Hg, DDT, and Fluoranthene. Although *Corbicula* is not a standardized test species, it can still be used for bioaccumulation testing as long as the study design includes an evaluation of steady-state and comparison to an appropriate (agency-approved) reference.

APPENDIX 2

MEETING AGENDA

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2010 SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING
FINAL AGENDA

May 5, 2010
Federal Center South, Seattle
Hosted by the Washington Department of Ecology

8:30 Registration and Coffee

9:00 Welcome – Stuart Cook, Chief, Operations Division, Seattle District

9:10 Meeting Road Map – Stephanie Stirling, Moderator

9:15 Opening Remarks – Jim Pendowski, Toxics Clean-up Program Manager Washington Department of Ecology

9:30 Agency Summary Reports, Part I

- EPA, Summary of Regional CERCLA Activities, Allison Hiltner
- Corps, Summary of Testing Activities, David Fox

10:10 BREAK

10:30 Agency Summary Reports, Part II

- Ecology, Proposed Changes to MTCA/SMS – Chance Asher

12:00 LUNCH

12:50 Agency Summary Reports, Part III

- RSET Update, James McMillan (Portland District, Corps) for Northwestern Division
- Summary of Monitoring and Disposal Site Management Information, David Vagt, DNR

1:30 Status Reports

- Development of a Sediment Reference Material, John Hicks, Corps & Justine Barton, EPA
- Update on Dioxin Guidelines, David Fox, Corps
- Completion of Commencement Bay NEPA/SEPA SEIS, David Kendall, Corps

2:30 BREAK

2:45 Public Issue Papers

- *Corbicula* as a Practical Dose-Response Indicator; Michael Salazar; Applied Biomonitoring
- Sediment Larval Test Interpretation Guidelines; Clay Patmont, Anchor QEA

(continued on back)

Public Issue Papers (continued)

- Bioassay Testing Issues; Jack Word, NewFields
- The Impact of Sample Salinity on the Analysis of Pharmaceuticals and Personal Care Products (PPCPs); Dave Herbert, TestAmerica Laboratories, Inc.
- Experiments to Evaluate the Release of Hydrophobic Pollutants during Dredging and Resuspension Events; Frank Dunnivant, Whitman College
- Effects of the Proposed Nisqually Reach Aquatic Reserve on the Anderson-Ketron and Port Townsend Disposal Sites; Johan Hellman, WPPA

4:15 Summary and Closing

DMMP Agency Papers

Title	Type of Paper	Author(s)
Standard Reference Material	Status	Barton/Hicks
Sediment Exposed by Dredging (Z-Layer) Testing	Clarification	Inouye
Update on Dioxin Guidelines	Status	Fox
Freshwater Screening Levels	Status	Inouye
DNR Fee Increase	Status	Vagt
Update to Dioxin QAPP	Clarification	Hoffman
Commencement Bay NEPA/SEPA	Status	Kendall

DEADLINE FOR SMARM COMMENTS IS JUNE 18 2010

APPENDIX 3

LIST OF ATTENDEES

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APPENDIX 4

POWERPOINT SLIDES FOR EACH SPEAKER

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Sediment Management Annual Review Meeting

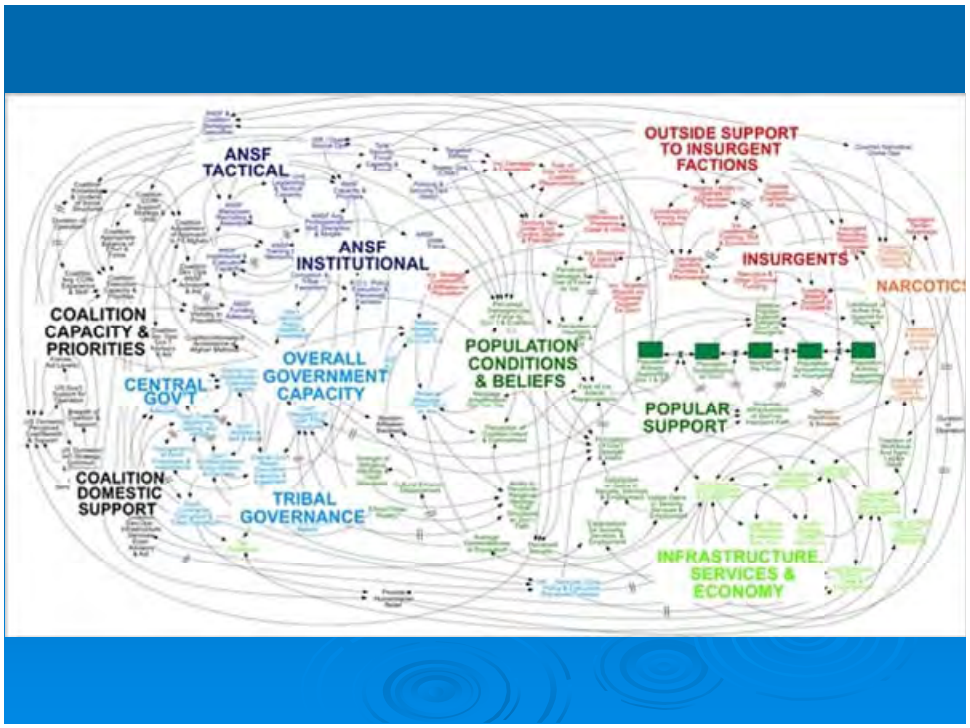
May 5, 2010

0.1

Welcome to the Meeting

- Housekeeping
- If your cell phone rings ……..
- Please identify yourself when speaking
- Comment deadline is June 18, 2010

0.2


ANSF TACTICAL
ANSF INSTITUTIONAL
COALITION CAPACITY & PRIORITIES
CENTRAL GOV'T
OVERALL GOVERNMENT CAPACITY
COALITION DOMESTIC SUPPORT
TRIBAL GOVERNANCE
POPULATION CONDITIONS & BELIEFS
POPULAR SUPPORT
OUTSIDE SUPPORT TO INSURGENT FACTIONS
INSURGENTS
NARCOTICS
INFRASTRUCTURE, SERVICES & ECONOMY

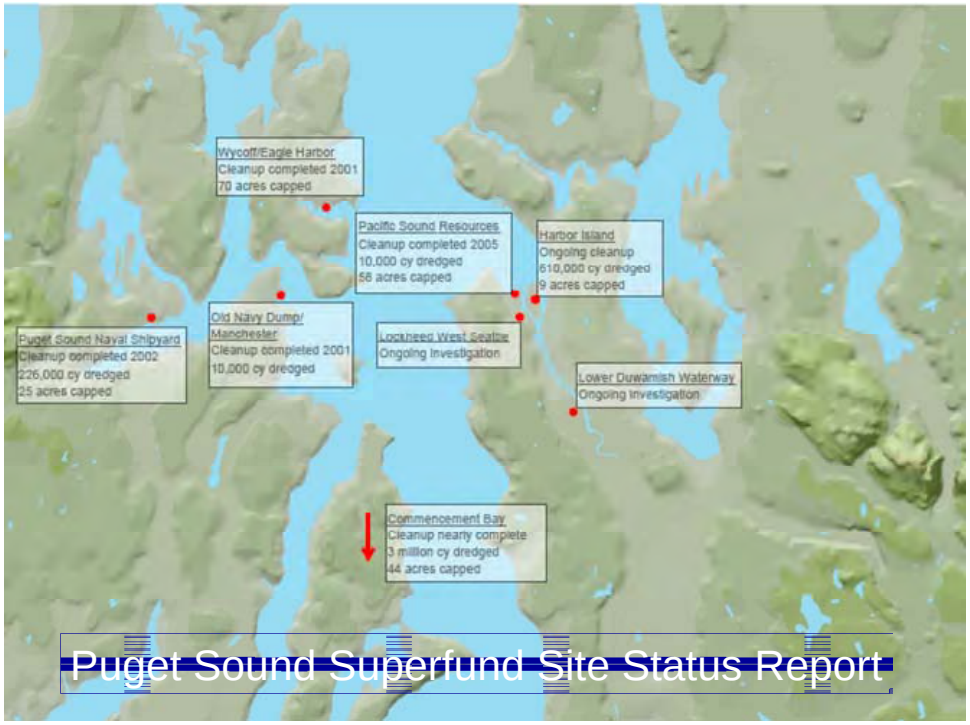
0.3

1.1

What's New

- Update on EPA Region 10 contaminated sediment projects
- 5-year reviews at sediment sites – what have we learned?

1.2



1.3

EPA Superfund Cleanup Progress in Puget Sound to Date

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

1.4

Watch for…

- June 2010: T-117 Lower Duwamish Early Action - Draft EE/CA and cleanup proposal for public review. Includes sediments and uplands.
- September 2010: Harbor Island Five-Year Review complete.
- October 2010: Lower Duwamish Waterway – Second Draft Feasibility Study – will be available for public review.

1.5

Watch for….

- 2010 – Boeing Plant 2: Approval of the Interim Measure Remedial Plan for bank and sediments
- ASARCO yacht basin – design for cleanup revived with settlement funding.

1.6

Estimated Dates for In-Water Sediment Remediation

- 2011: T-117, Slip 4
- 2012: Hylebos/Occidental, Boeing Plant 2, Jorgensen Forge, Rhone Poulenc
- 2013-2014: East Waterway, ASARCO?.
- 2014 and beyond: Lower Duwamish Waterway, Portland Harbor

1.7

Commencement Bay Five Year Review – December 2009

- 5-year reviews required under CERCLA for all cleanups where waste is left in place to assure that human health and the environment are being protected by the remedy
- Commencement Bay remedy expected to be protective of human health and the environment when completed.
  - Sediment cleanup to be completed in Hylebos Waterway (Occidental) and ASARCO yacht basin.
  - Additional source control actions needed in Thea Foss and Hylebos Waterways.

1.8

Commencement Bay Five Year Review – December 2009 (cont.)

- St. Paul, Sitcum, Olympic View Resource area – no recontamination.
- Middle Waterway – some recontamination due to erosion and large burrowing organisms – mercury.
- Thea Foss/Wheeler Osgood Waterways – some recontamination – phthalates, PAHs

1.9

Commencement Bay Five Year Review Recommendations

- Additional monitoring for Middle Waterway
- Additional source controls for Thea Foss
- Complete implementation of Institutional Controls for cap protection (Thea Foss and Middle)
- Control discharges to Hylebos from Arkema site
- Baywide fish tissue sampling

1.10

5-year reviews – what have we learned?

- Sites we've cleaned up are much cleaner than they were before, but not perfect
- Source control remains a long-term problem
  - We are seeing some recontamination, but in limited areas and at relatively low levels
- Institutional controls are difficult to implement and enforce
- We need to do more monitoring to fully understand the effects of cleanup

1.11

Source Control

- How do we balance the long time needed to address sources with the need to move forward with removing contaminants from sediments?
- How do we integrate regulatory programs within a watershed?

1.12

Institutional Controls

- Needed to protect or supplement remedies when waste is left in place, e.g., prevent erosion of caps
- Superfund 5-year reviews are revealing deficiencies in our institutional controls
  - Decision document language unclear
  - Where implemented, often not effective
  - Little to no means of enforcement

1.13

Institutional Controls

- ICs are particularly difficult for sediment sites
- Possible ICs include:
  - Proprietary Controls
  - Regulated Navigation Areas
  - Fish Advisories

1.14

EPA Contacts

- Sheila Eckman, Unit Manager, 206-553-0455
- Hylebos, Occidental - Jonathan Williams, 206-553-1369
- Lockheed West Seattle, T-117 - Piper Peterson Lee, 206-553-4951
- Middle Waterway, McCormick and Baxter - Nancy Harney, 206-553-6635
- Lockheed, Todd, Quendall Terminals - Lynda Priddy, 206-553-1987
- PSR, Harbor Island, East Waterway – Ravi Sanga, 206-553-4092

1.15

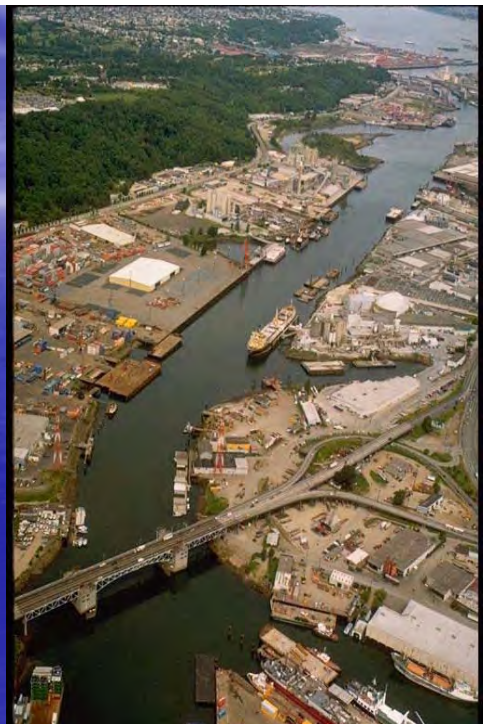
EPA Contacts, cont'd

- Duwamish RI/FS - Allison Hiltner, 206-553-2140
- Slip 4, Sitcum, St Paul - Karen Keeley, 206-553-2141
- Portland Harbor RI/FS – Chip Humphrey, 503-326-2678, Eric Blischke, 503-326-4006
- Portland Harbor Early Actions – Sean Sheldrake, 206-553-1220
- Thea Foss – Kira Lynch, 206-553-2144
- ASARCO – Howard Orlean, 205-553-2851

1.16

For More Information

www.epa.gov/r10earth



SEDIMENT MANAGEMENT
ANNUAL REVIEW MEETING
May 5, 2010

Dredging Year 2010
DMMP Testing Activities

David Fox
U.S. Army Corps of Engineers

2.1

Dredging Year 2010 Definition

June 16, 2009

to

June 15, 2010

2.2

Dredging Year 2010 Project Summary

- 36 projects
  - 24 completed actions
  - 12 on-going projects

2.3

Dredging Year 2010 Project Summary

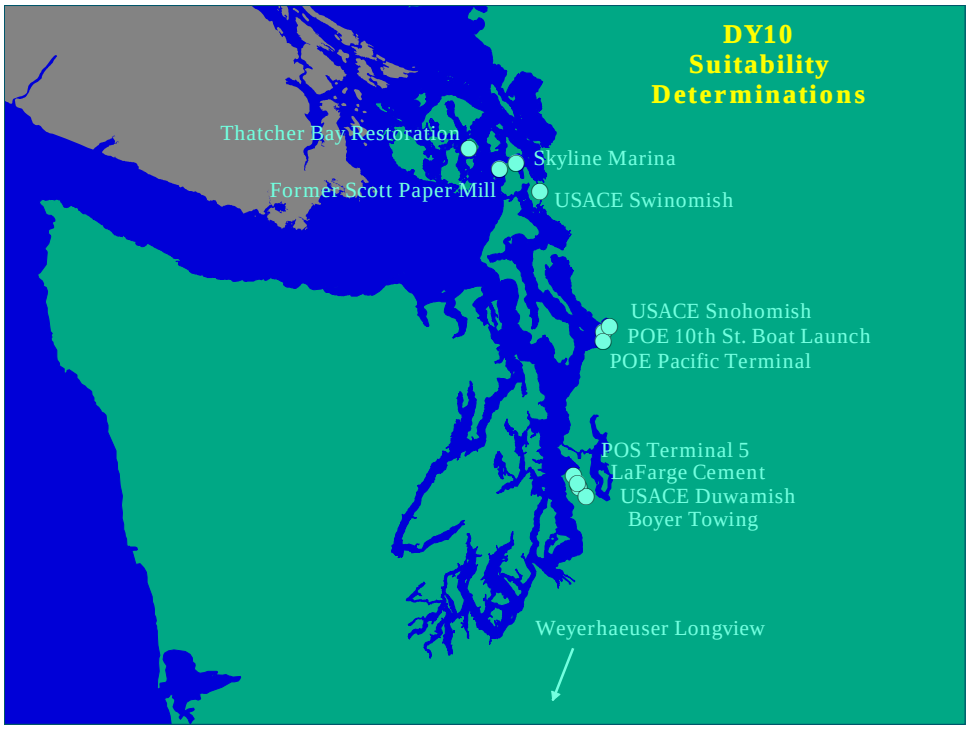
- completed actions
  - 12 suitability determinations (SD)
  - 5 antidegradation determinations
  - 1 partial characterization
  - 1 MTCA evaluation
  - 1 recency extension
  - 1 volume revision
  - 1 disposal site revision
  - 2 no-test determinations

2.4

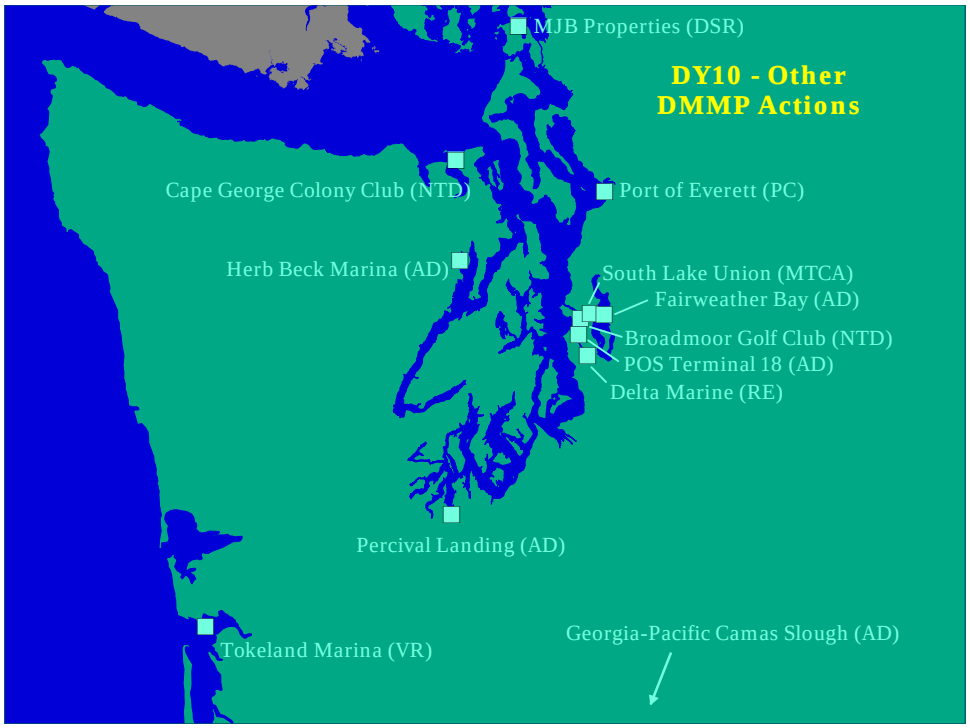
Dredging Year 2010
Project Summary

- on-going projects
  - Chelan PUD
  - Chinook Ventures
  - Shelter Bay
  - Steamboat Landings
  - NAS Whidbey Fuel Pier
  - Kittitas Boat Launch
  - Grays Harbor O&M
  - Olympia Harbor
  - SR520 Pontoon Const.
  - POB Gate 3
  - Nippon Paper
  - South Park Bridge

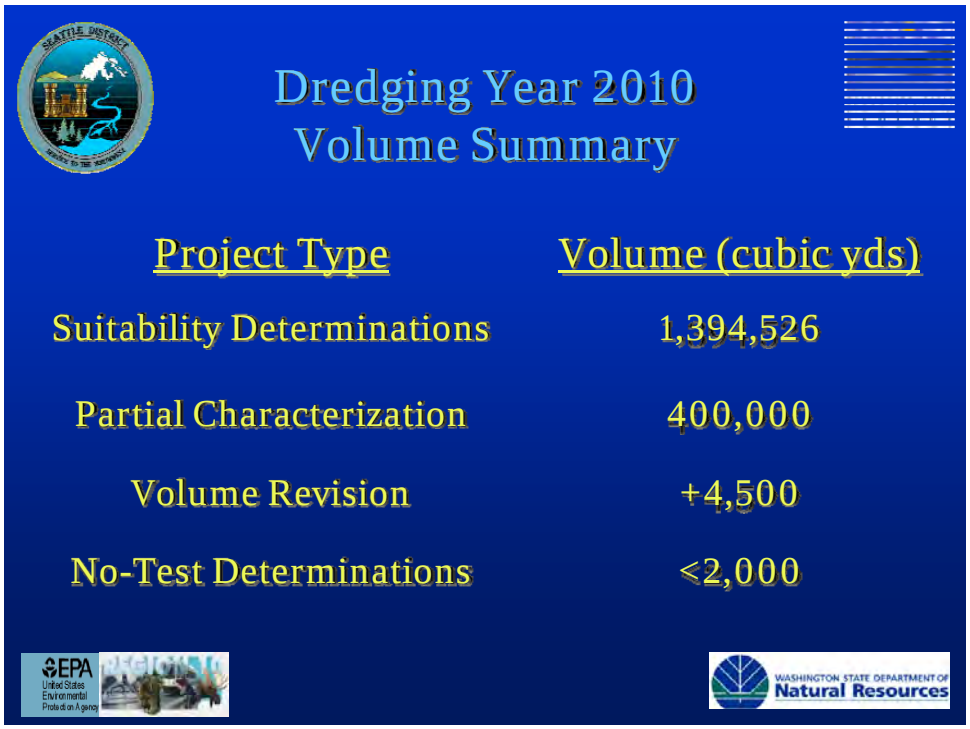
2.5



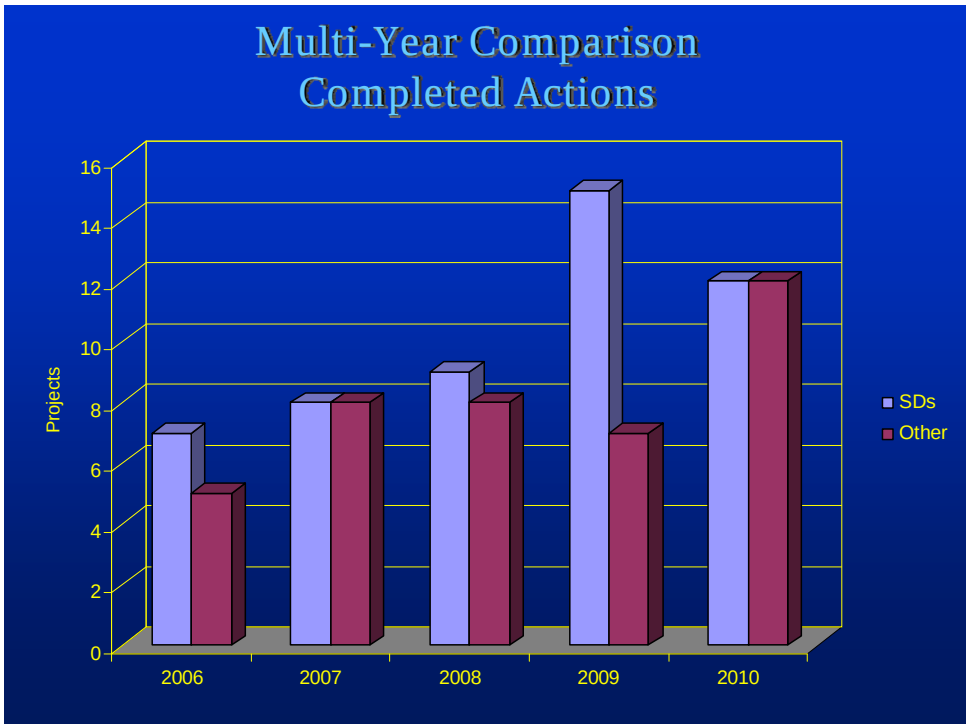
2.6


MJB Properties (DSR)
DY10 - Other DMMP Actions
Cape George Colony Club (NTD)
Port of Everett (PC)
Herb Beck Marina (AD)
South Lake Union (MTCA)
Fairweather Bay (AD)
Broadmoor Golf Club (NTD)
POS Terminal 18 (AD)
Delta Marine (RE)
Percival Landing (AD)
Tokeland Marina (VR)
Georgia-Pacific Camas Slough (AD)

2.7


Dredging Year 2010
Volume Summary
Project Type
Volume (cubic yds)
Suitability Determinations
1,394,526
Partial Characterization
400,000
Volume Revision
+4,500
No-Test Determinations
<2,000
EPA
United States Environmental Protection Agency
WASHINGTON STATE DEPARTMENT OF
Natural Resources

2.8



2.9

Dredging Year 2010 Testing Summary

- 19 of 24 completed actions required testing
  - 15 projects included dioxin testing
  - 3 projects required bioassays
  - no bioaccumulation testing this year
  - SDs included 63,579 cy of unsuitable material

2.10

Biological Testing - SDs

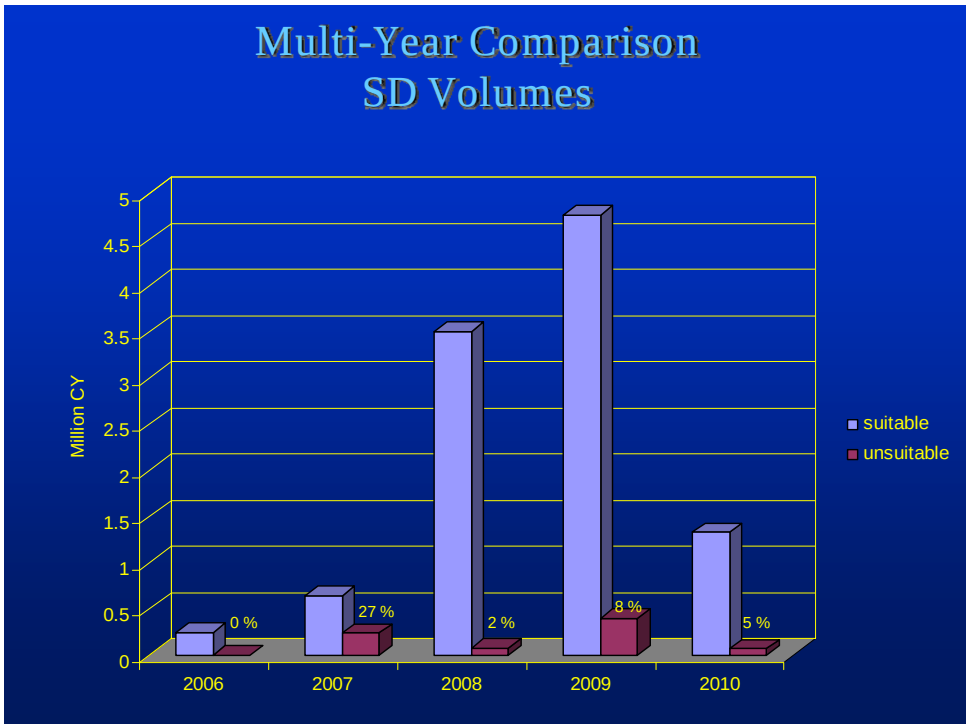
- Two projects with 15 DMMUs tested; 7 DMMUs in 1 project failed
- Hits occurred for *Mytilus* and *Dendraster* larval development, and *Neanthes* growth bioassays

2.11

Dredging Year 2010
SD: Unsuitable Material

Project	Unsuitable Volume (cy)	Reason
Scott Paper	3,980	dioxin
POS Terminal 5	1,210	TBT
USACE Duwamish	34,389	bioassays
LaFarge Cement	24,000	dioxin, DDT, As, PCBs
Total:	63,579	

2.12


Multi-Year Comparison
SD Volumes
Million CY
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0 %
27 %
2 %
8 %
5 %
2006
2007
2008
2009
2010
suitable
unsuitable

2.13

For more DMMP information
http://www.nws.usace.army.mil
Click on "Dredged Material Management"
EPA
United States Environmental Protection Agency
WASHINGTON STATE DEPARTMENT OF
Natural Resources

2.14

Sediment Management Standards Rule Revisions

Chance Asher
Toxics Cleanup Program

3.1

Sediment Management Standards Rule Revisions

Introduction to the Issues

What have we been doing for the last year?

3.2

SMS Rule Revisions
Since the last conference…

1. Developed and published issue papers
2. Developed preferred options based on public feedback.
3. Decided rule scope and schedule.
4. Formed two external rule advisory groups.
5. Rule advisory groups meetings (11/09).
6. Public outreach: conferences, listserv, website, advisory group meetings.

3.3

SMS Rule Revisions - Issues

1. SMS/MTCA Integration:
   - Cleanup Decision Framework
   - Terms and Definitions
2. Other Deleterious Substances
3. Bioaccumulatives: Ecological Risk
4. Bioaccumulatives: Human Health
5. Background - ubiquitous chemicals
6. Freshwater Standards

3.4

Rule Advisory Groups

MTCA/SMS Advisory Group:

- MTCA: Focus on MTCA technical and policy issues.
- SMS: Bring together MTCA/SMS issues
  - Focus on larger SMS policy issues.
  - How SMS issues relate to MTCA.
  - Generally a bigger picture focus.

Sediment Workgroup: Rolls up sleeves

- Working on technical/policy details.
- Helping solidify concepts and issues.
- Scientific peer review.

3.5

Sediment Workgroup Members

Paul Fuglevand	Dalton, Olmsted & Fuglevand
Lon Kissinger	U.S. EPA Region X
Teresa Michelsen	Avocet Consulting
Clay Patmont	Anchor QEA
Pete Rude	Seattle Public Utilities
Glen St. Amant	Muckleshoot Indian Tribe
Joanne Snarski	Port of Olympia
Jack Q. Word	NewFields Northwest

3.6

Here's What We've Heard

- Protectiveness - Should be goal.
- Liability resolution – Critical for incentive.
- Simplicity – Don't complicate the rule.
- Feasibility – Ability to achieve cleanup.
- Flexibility – Site specific factors.
- Source Control – Must be integrated.
- Implementation – Must be able to implement rule revisions.

3.7

SMS/MTCA Integration

How should Ecology harmonize the SMS and MTCA rules to provide:

- Clear processes
- Consistent language
- Consistent decision framework for sediment cleanup

3.8

SMS/MTCA Integration

- Terminology
  - Same terms, different meaning
  - Different terms, similar meaning
- Definitions
- Processes
  - MTCA and SMS requirements as a package
- Decision Framework
  - Cost/Technical Feasibility
  - Permanence

3.9

SMS/MTCA Integration
Decision: Revise MTCA & SMS

- Focus on SMS revisions <u>primarily</u>
  - Terminology – adopt MTCA terms where relevant
  - Adopt permanent remedy/maximum extent practicable preference
- Clarify where and how MTCA defers to SMS.
- Working with Advisory Groups.

3.10

Other Toxic, Radioactive, Biological or Deleterious Substances

How can Ecology best clarify the regulatory connection between:

- Other …deleterious substances provisions in the SMS and
- The definition of "hazardous substances" under MTCA

3.11

Other …Deleterious Substances Issue

- MTCA defers to SMS for sediment cleanup.
- Biological criteria trumps chemistry in SMS.
- Confirmatory designation in SMS needs further clarification in MTCA.

3.12

Bioaccumulatives: Ecological Risk Issue

How should we address bioaccumulative chemicals to:

- Provide clear and predictable clean up standards
- Protect biological resources

3.13

Bioaccumulatives: Ecological Risk Issue

- SMS criteria promulgated to protect the benthic community.
- SMS numeric criteria do not include bioaccumulative exposure pathway.
- MTCA has a terrestrial ecological evaluation process.

3.14

Bioaccumulatives: Ecological Risk Decision: Revise SMS

- Develop a narrative standard to address:
  - Ecological risk and exposure pathway
  - Provide structure to set cleanup levels
- Working with Sediment Workgroup:
  - Keep it simple
  - Provide detail for consistency
  - Concern small sites and expense

3.15

Human Health and Background Two Intertwined Issues

How should Ecology:

- Provide clear and predictable cleanup standards that protect human health?
- Consider contaminant *background* concentrations when setting cleanup standards?

3.16

Human Health Issue

- Narrative standard "no significant human health threats".
- Bioaccumulative exposure pathway unclear.
- 2 tiered SMS model and cost/feasibility.
- MTCA is more specific for soil and water – natural background.

3.17

Background Issue

- SMS rule unclear how background levels are considered for cleanup standards.
- How to determine natural and area background levels.
- Risk-based sediment levels may be below background.
- Technical feasibility issues.

3.18

Why Are These Issues Important?

- Sediment: Sink effect
  - Ubiquitous bioaccumulatives.
  - Highly carcinogenic/toxic.
  - More being discovered.
- PLP liability concerns:
  - Recontamination
  - Technical feasibility
  - Cost

3.19

Approach for Rule Revisions

- Agree on and document <u>how</u> you determine human health protection and background at sediment cleanup sites.
- Some parts will be guidance, links to references.
- Some parts rule revision.
  - Decision making framework
  - Level of protection
  - Background definition

3.20

Current framework for a single contaminant

MTCA

MTCA has a single cleanup level, but land-use restrictions or compliance points allow some flexibility.

Remediation Level or Area Background

Interim Action

Method C Cleanup Level

Method A or B Cleanup Level

Highest of:
1) Human health risk of 10^{-6} and Hazard Quotient =1
2) Natural Background
3) Practical Quantitation Limit

SMS

SMS uses a range for benthic toxicity. A site-specific cleanup standard is determined, allowing some minor effects.

Severe effects

Minimum Cleanup Level (MCL)

Site-specific Sediment Cleanup Standard based on cost and feasibility

Minor effects

Sediment Quality Standards (SQS)

No effects

3.21

Ecology Proposed Decision Frameworks

Single cleanup standard **or** ***Range***

Upper level: Regional Background

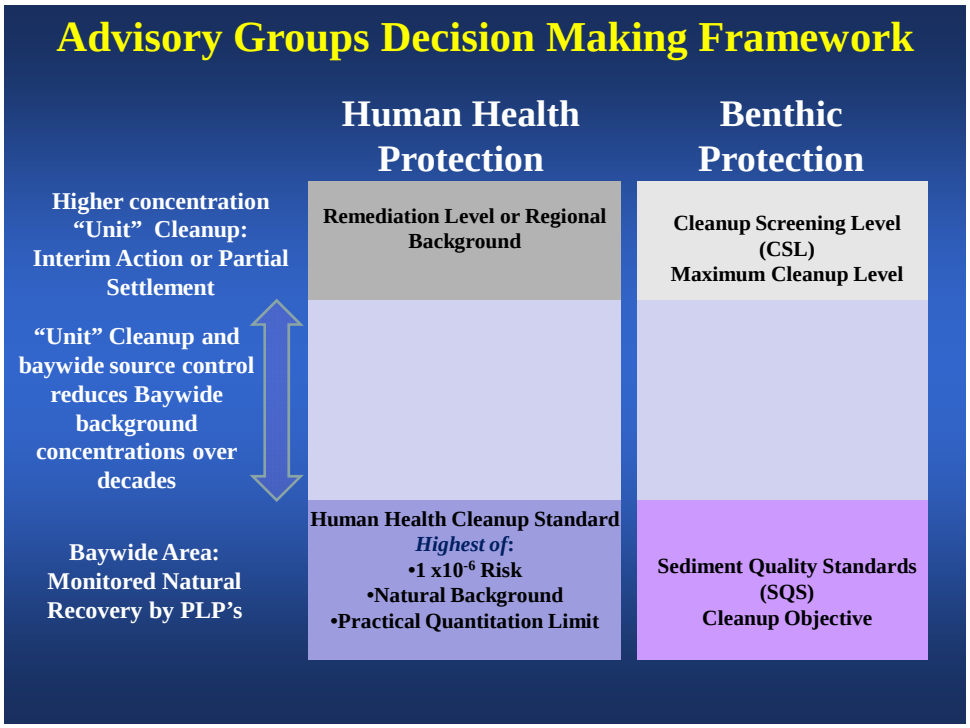
Site-specific Sediment Cleanup Standard within an allowable range.

Lower level: Natural Background

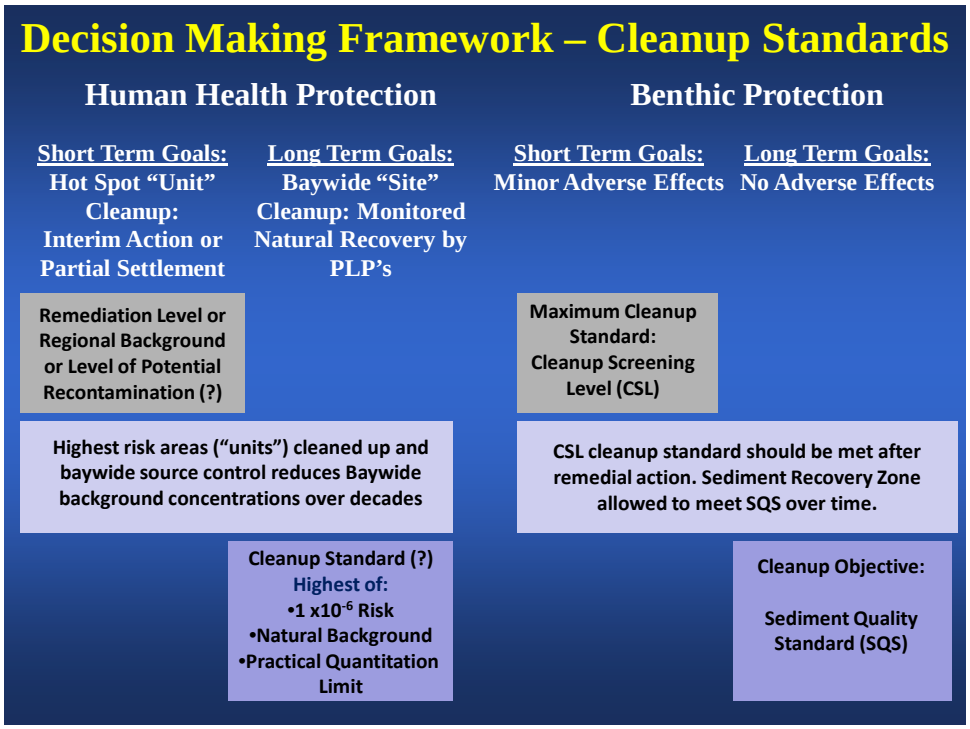
Sediment Cleanup Standard

22

3.22


Advisory Groups Decision Making Framework
Human Health Protection
Benthic Protection
Higher concentration "Unit" Cleanup: Interim Action or Partial Settlement
"Unit" Cleanup and baywide source control reduces Baywide background concentrations over decades
Baywide Area: Monitored Natural Recovery by PLP's
Remediation Level or Regional Background
Human Health Cleanup Standard
Highest of:
•1 x10-6 Risk
•Natural Background
•Practical Quantitation Limit
Cleanup Screening Level (CSL)
Maximum Cleanup Level
Sediment Quality Standards (SQS)
Cleanup Objective

3.23


Decision Making Framework – Cleanup Standards
Human Health Protection
Benthic Protection
Short Term Goals:
Hot Spot "Unit" Cleanup: Interim Action or Partial Settlement
Long Term Goals:
Baywide "Site" Cleanup: Monitored Natural Recovery by PLP's
Short Term Goals:
Minor Adverse Effects
Long Term Goals:
No Adverse Effects
Remediation Level or Regional Background or Level of Potential Recontamination (?)
Maximum Cleanup Standard: Cleanup Screening Level (CSL)
Highest risk areas ("units") cleaned up and baywide source control reduces Baywide background concentrations over decades
CSL cleanup standard should be met after remedial action. Sediment Recovery Zone allowed to meet SQS over time.
Cleanup Standard (?)
Highest of:
•1 x10-6 Risk
•Natural Background
•Practical Quantitation Limit
Cleanup Objective:
Sediment Quality Standard (SQS)

3.24

Decision Making Framework - Requirements

Human Health Protection

Short Term Goals:
"Unit" Cleanup:
Interim Action or
Partial Settlement

Long Term Goals:
Baywide Area
Monitored Natural
Recovery by PLP's

Remediation Level or Regional Background or Level of Potential Recontamination?

•PLP must conduct S/C for PLP sources.
•After Construction Goal: Regional Background.
•Sediment Recovery Zone for "unit" allowed to meet Regional Background over time?
•PLP monitoring of unit/site/PLP sources.

Sediment Recovery Zone allowed for site to meet Long Term goal over time (?)

Cleanup Standard
Highest of:
•1 x10^{-6} Risk
•Natural Background
•Practical Quantitation Limit

Benthic Protection

Short Term Goals:
Minor Adverse Effects

Long Term Goals:
No Adverse Effects

Cleanup Standard:
Cleanup Screening Level (CSL)

•PLP must conduct S/C for PLP sources.
•After Construction Goal: CSL.
•Sediment Recovery Zone allowed to meet SQS over time (within 10 years).
•PLP monitoring of site.

Sediment Recovery Zone allowed for site to meet Long Term goal over time

Cleanup Objective:

Sediment Quality Standard (SQS)

3.25

Freshwater Standards Rule Revision

How can the SMS be revised to provide sediment cleanup standards in fresh water environments?

3.26

Freshwater Standards Issue

- Lack of freshwater chemical or biological criteria.
- Limited to a narrative standard.
- Limited to freshwater sediment quality values.
- Use of BPJ and BAS – site specific, no predictability for PLP.

3.27

Freshwater Standards Decision

- Work towards promulgation of both chemical and biological criteria.
- Clarify where in SMS chemical and biological criteria apply.

3.28

Freshwater Standards History

- 1991: SMS rule promulgated narrative.
- 1997: Ecology develop draft FW SQVs.
- 1999: End SMS FW rule revision.
- 2003: Ecology published new SQVs, uses as guidance screening values.
- 2007: Ecology working w/RSET to update 2003 SQVs.

3.29

Freshwater Standards What Have We Done Since?

- 2008: Ecology starts FW rule revisions.
- 2009: Internal Ecology peer review of SQVs.
- 2009/2010: ODEQ and Sediment Workgroup review to strengthen SQV reliability.
- 2010: Draft SQV technical report complete, undergoing final review by ODEQ and Sediment Workgroup.

3.30

Freshwater Standards Methodology details

- Data Gathering
  - Increased geographical coverage
  - Increased sub-lethal endpoint inclusion

2003 runs: 901 bioassay data points	2010 runs: 1850 bioassay data points
Western side only	Both Eastern and Western sides
381 Hyalella 10-mortality	*366 Hyalella* 10-mortality
0 *Hyalella* 28-mortality	312 *Hyalella* 28-mortality
0 *Hyalella* 28-day growth	79 *Hyalella* 28-day growth
238 Chironomus 10 mortality	*568 Chironomus* 10 mortality
179 Chironomus 10 growth	*525 Chironomus* 10 growth
103 Microtox	0 Microtox

3.31

Freshwater Standards Methodology details

- Definition of a Hit:
  - Compared to control due to insufficient reference comparison data.
  - Sediment Workgroup suggestion- tighten control performance to allow greater difference between control and test (as compared to allowed difference from reference).

3.32

Table 2-2. Quality Assurance and Adverse Effects Levels for Biological Tests

Test	QA Control	QA Reference	SQS/SL1	CSL/SL2
Hyalella azteca 10-day mortality	C ≤ 20%[a]	R ≤ 25%	T – C > 15%	T – C > 25%
Hyalella azteca 28-day mortality	C ≤ 20%	R ≤ 30%	T – C > 10%	T – C > 25%
Hyalella azteca 28-day growth	CF ≥ 0.15 mg/ind	RF ≥ 0.15 mg/ind	T / C < 0.75	T / C < 0.6
Chironomus dilutus 10-day mortality	C ≤ 30%[a]	R ≤ 30%	T – C > 20%	T – C > 30%
Chironomus dilutus 10-day growth	CF ≥ 0.48 mg/ind	RF/CF ≥ 0.8	T / C < 0.8	T / C < 0.7

QA = Quality Assurance
SQS/SL1 = Sediment Quality Standard/Screening Level 1, CSL/SL2 = Cleanup Screening Level/Screening Level 2
C = Control, CF = Control Final, R = Reference, RF = Reference Final, T = Test Sample
[a] These control mortality limits are currently in the process of being reviewed by ASTM and may be lowered in the next few years (Ingersoll et al. 2008)

2003 runs compared to Reference, not control

EXAMPLE, *Hyalella* 10-day mortality:

control 20% mortality, Reference 25% mortality, Test 35% mortality

Previously, T-R= 35-25=10%, considered a HIT

Currently proposed, T-C= 35 – 20 = 15%, still considered a HIT.

3.33

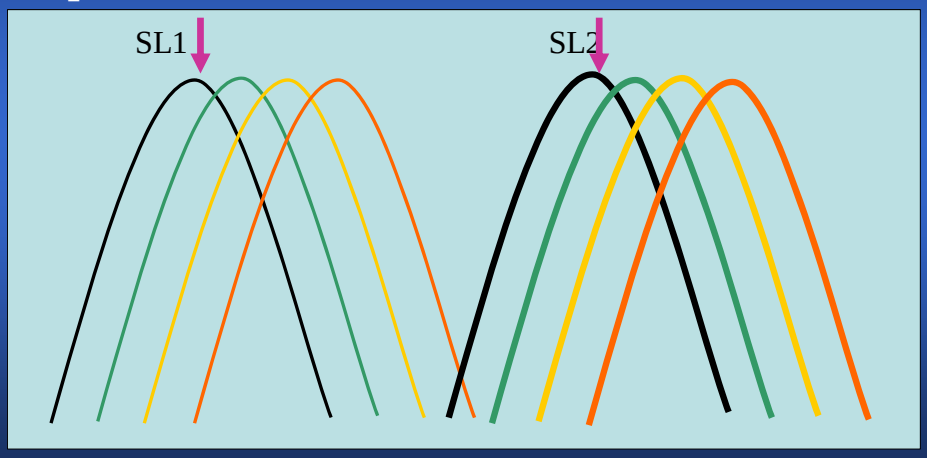
Freshwater Standards: Setting the Values

- **Calculations run for each assay endpoint and both SQS/SL1 and CSL/SL2 hit levels**
- **Variability due to differences in assay endpoints were greater than differences due to the different hit definitions.**

3.34

Challenges – Criteria Selection

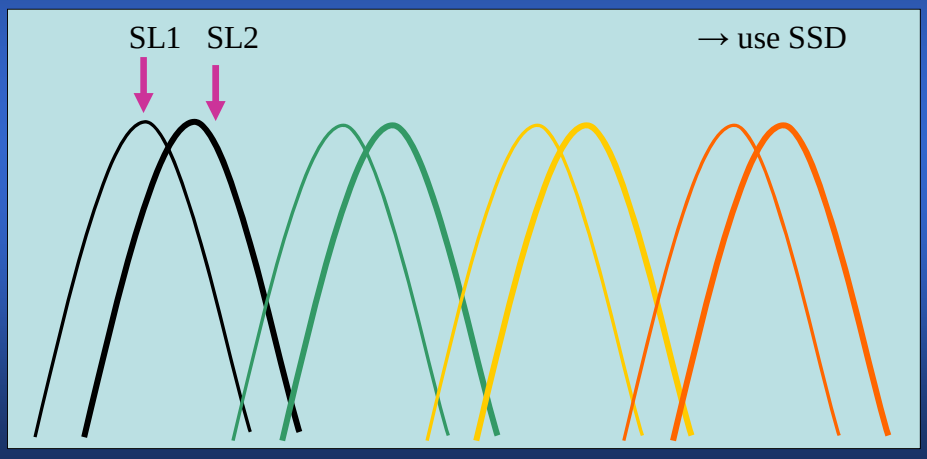
Expectation: SL1 values clustered below SL2 values



3.35

Challenges – Criteria Selection

Bioassay endpoints did not behave as expected



3.36

Freshwater Standards: Setting the Values

- Combined ALL values (for both SQS/SL1 and CSL/SL2 definitions), ordered from low to high, lowest value = SQS/SL1, next lowest = CSL/SL2

Table 3-7. Selection of Recommended Sediment Quality Guidelines

Analyte	Distribution of Floating Percentile Model Values[a]										SL1/SQS[b]	SL2/CSL[c]
Conventional Pollutants (mg/kg)												
Ammonia	230	300	> 780	> 780	> 780	> 780					230	300
Total sulfides	39	61	340	340	360	540	920	920			39	61
Metals (mg/kg)												
Antimony	0.3	0.3	12	42	42	42	42					
Arsenic	14	14	16	16	120	120	120					
Cadmium	2.1	2.1	5.4	6.3	6.3	13	13					
Chromium	72	72	82	88	220	220	220	> 350	> 350		72	82
Copper	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		400	1200
Le[illegible]										> 1400	360	> 1300
M[illegible]											0.66	0.8
Ni[illegible]										> 590	26	110
Se[illegible]											[illegible]	[illegible]
Silver	0.58	0.64	1.7	1.7	4.1	4.1					0.58	1.7
Zinc	3200	3200	3200	> 4200	> 4200	> 14400	> 14400	> 14400			3200	> 4200
Organic Chemicals (µg/kg)												
4-Methylphenol	260	260	2000	2000	2400	2400	> 6300	> 6300			260	2000
Benzoic acid	2900	3800	3800	4100							2900	3800

360 > 1300

0.58 0.64 1.7 1.7

- “>” values- no toxicity observed for that endpoint up to the listed concentration. Sample concentrations at or above this level should undergo toxicity testing.
- BPJ call regarding selection of CSL/SL2: “next significantly different value”.

Freshwater Standards Reliability

Legend for all tables:

- Does not meet reliability goals
- Borderline reliability (within 5% of goals)
- Meets reliability goals
- Meets reliability goals; selected for development of SQGs

FPM FN Percentiles – False negative target for the modeling run

SQGs – Existing Sediment Quality Guidelines:

ERL - Effects Range Low, TEL - Threshold Effects Levels, TEC - Threshold Effects Concentrations, LEL - Lower Effects Levels, ERM - Effects Range Median, PEL - Probable Effects Levels, PEC - Probable Effects Concentrations, and SEL - Severe Effects Levels

3.39

Freshwater Standards Reliability

e. Hyalella 28-day mortality **CSL/SL2**

FPM FN Percentiles	% False Negatives	% False Positives	% Hit Reliability	% NoHit Reliability	% PredHit Reliability	%PredNoHit Reliability	% Overall Reliability
5	3.7	11.6	96.3	88.4	44.1	99.6	89.1
10	7.4	7.7	92.6	92.3	53.2	99.2	92.3
15	14.8	4.6	85.2	95.4	63.9	98.6	94.6
20	18.5	4.2	81.5	95.8	64.7	98.2	94.6
25	22.2	3.5	77.8	96.5	67.7	97.9	94.9
30	29.6	1.8	70.4	98.2	79.2	97.2	95.8

SQGs	% False Negatives	% False Positives	% Hit Reliability	% NoHit Reliability	% PredHit Reliability	%PredNoHit Reliability	% Overall Reliability
ERM	37.0	45.3	63.0	54.7	11.6	94.0	55.4
PEL	25.9	47.7	74.1	52.3	12.8	95.5	54.2
PEC	33.3	34.0	66.7	66.0	15.7	95.4	66.0
SEL	29.6	28.1	70.4	71.9	19.2	96.2	71.8

ERM - Effects Range Median, PEL - Probable Effects Levels, PEC - Probable Effects Concentrations, and SEL - Severe Effects Levels

3.40

Freshwater Standards Reliability

For SL1

	% False Negatives	% False Positives	% Overall Reliability
acute endpoint (mortality)			
FPM	19	22	79
others	7	86	33
sub-lethal endpoints (growth)			
FPM	20	18	82
others	8	88	29

Values are averages across relevant assays

For SL2

	% False Negatives	% False Positives	% Overall Reliability
acute endpoint (mortality)			
FPM	22	15	84
others	36	36	64
sub-lethal endpoints (growth)			
FPM	18	13	87
others	40	37	63

3.41

Freshwater Standards Next Steps

- **Sediment Workgroup will continue peer review of draft SQV technical report.**
- **Science Panel peer review of SQVs.**
- **Complete draft rule language.**
- **EPA review.**
- **Formal public review.**

3.42

Questions?

Comments?

3.43

Supplementary material follows

3.44

Floating Percentile Method

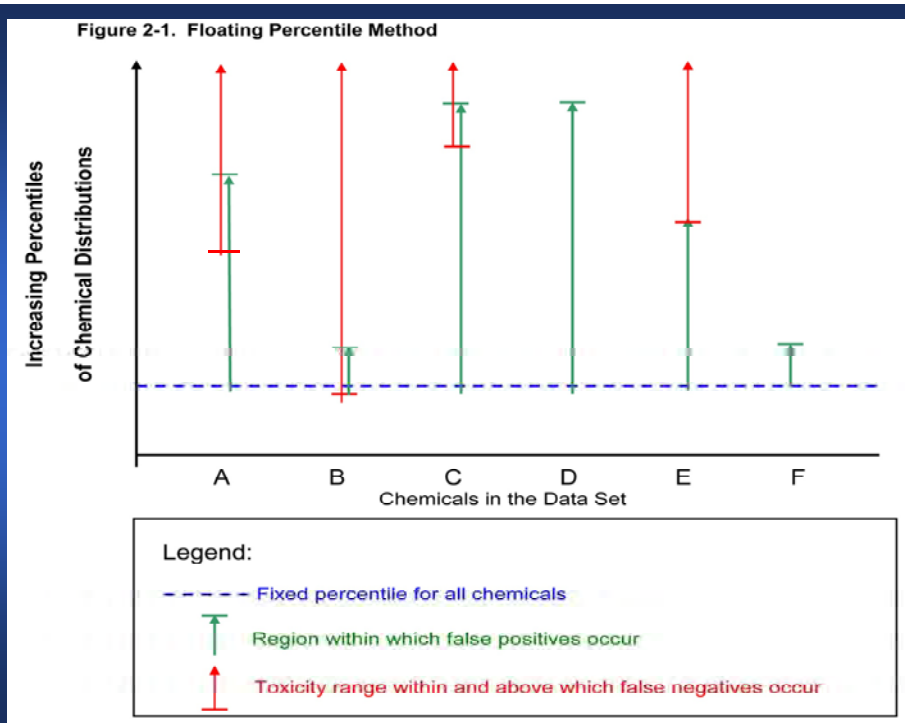
- **Goal: Minimize false negatives and false positives simultaneously**
- **Approach:**
  - **Data screening and summing**
  - **Initial range-finding**
  - **Iterative multivariate optimization routine treating each chemical or sum as an independent variable**

3.45

Features

- Multivariate → considers all chemicals at once
- Addresses covariance
- ANOVA screening of analytes for toxicity
- Selection of false negative targets
- Optimization of false positives
- Repeat for a range of false negative targets
- Thoroughly evaluates reliability
- Now mostly automated

3.46



3.47

Reliability

- Sensitivity (100% – false negatives)
- Efficiency (100% – false positives)
- Predicted no-hit reliability
- Predicted hit reliability
- Overall reliability

All measures of reliability were used for ALL effects levels (see p. 14 for diagram)

3.48

Data Set – Bioassay Endpoints

- Hyalella 10-day mortality – 366
- Chironomus 10-day mortality – 550
- Chironomus 10-day growth – 504
- Hyalella 28-day mortality – 319
- Hyalella 28-day growth – 79

3.49

FPM Runs & Issues Tested

- East side vs. west side vs. combined
- TPH vs. PAH vs. combined
- Microtox – include?
- *Hyalella* growth – include Portland Harbor?
- Ammonia and sulfides issues
- N-qualified pesticides
- Blank-correction standardization
- Control vs. reference
- Revision of bioassay interpretive criteria

3.50

US Army Corps of Engineers

2009 Sediment Evaluation Framework: Updates Identified after the 1st Year of Implementation

James M. McMillan
Project Review Group Lead
Portland District Corps of Engineers

for

Northwestern Division

Sediment Management Annual Review Meeting
May 5, 2010

BUILDING STRONG℠

5.1

US Army Corps of Engineers

2009 *Sediment Evaluation Framework for the PNW* (SEF)

- 1° Purpose: Evaluate the suitability of dredged material for unconfined, aquatic disposal
- 2° Purpose: Evaluate the post-dredge surface*
- Finalized in May 2009 (but it's a "living document")
- Developed by the Regional Sediment Evaluation Team (RSET) for the NW Regional Dredging Team

* - when there is reason to believe contaminants may be present

BUILDING STRONG℠

5.2

US Army Corps of Engineers

Work needed on four chapters:

- CH 4 – Eval. Framework/ Sampling & Analysis Plan
- CH 6 – Freshwater Screening Levels
- CH 8 – The “B” Word: Bioaccumulation
- CH 11 – QA/QC

BUILDING STRONG℠

5.3

US Army Corps of Engineers

Chapter 4 (Framework/SAP) Improvements

- Minimum dredged material management unit (DMMU) removed; interagency review teams (e.g., DMMP) will determine minimums
- DMMP already has guidance (DMMP Users’ Manual)
- Portland District’s Project Review Group is developing guidance similar to the DMMP’s – due to be released this summer
- Walla Walla District – no projects under the 2009 SEF yet; an interagency review team will be formed when needed

BUILDING STRONG℠

5.4

US Army Corps of Engineers

Chapter 6 (Physical and Chemical Testing) Improvements

- Marine Screening Levels
  - o Errors in the marine screening levels are being revised
  - o Coordination with the Chemistry Technical Subcommittee to ensure that SLs reflect the latest studies
- Freshwater Screening Levels
  - o Trying to get three states to agree on freshwater benthic toxicity screening levels is hard…
  - o Currently being reviewed by WA-Ecology and OR-DEQ
  - o When Ecology and DEQ agree, RSET will publish revised SLs

BUILDING STRONG℠

5.5

US Army Corps of Engineers

Chapter 8 Bioaccumulation

- The 1° issue: bioaccumulation triggers for sediment across 3 states – funding not currently available for SEF update
- Dioxin/ furans, DD(T, D, and E) contamination, Aroclors (PCBs), organotins, and Hg are the primary bioaccumulatives
- Tissue values are available, BUT sediment values are not widely accepted
- Some state guidance exists (if available) or site background is used (if known)

BUILDING STRONG℠

5.6

US Army Corps of Engineers

Chapter 11 QA/QC

- Never completed for Interim SEF; needs to be expanded
- Likely to be modeled after WA Dredged Material Management Program (DMMP) Users' Manual

BUILDING STRONG℠

5.7

US Army Corps of Engineers

Next Steps for the SEF

- CH4 – Districts preparing supplemental guidance to SEF:
  - Review by RSET
  - Public Notice, response to comments, finalize
- CH6 – Marine SLs revised soon; FW SLs are near completion
- CH8 – No funding sources identified; RSET will work towards a regional approach to address bioaccum., likely based on the dioxin work in Puget Sound
- CH11 – Corps (NWD) will hire a contractor soon to finalize

BUILDING STRONG℠

5.8

Questions?

Regional Sediment Reference Material (SRM)

6.1

What is a Regional SRM?

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

6.2

Why an SRM?

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

6.3

Why is DMMP doing this?

- DMMP providing tool
  - Working with EPA OEA to produce the SRM
  - Difficulty in finding dioxin and Aroclor reference materials
  - Focus on troublesome constituents at levels close to screening levels

6.4

Who is involved?

- DMMP Interagency Team
  - Department of Ecology
    - Environmental Assessment Program
    - Shoreline and Environmental Assistance Program
  - EPA
    - Sediment Management Program
    - Office of Environmental Assessment (OEA)
    - Quality Assurance Technical Services (QATS)-Las Vegas
  - Corps of Engineers
    - Dredged Material Management Office (DMMO)
    - Navigation Section

6.5

Who is involved?

- CLP Labs/Manchester EPA and Ecology Labs
- Commercial (Local) Labs
  - Analytical Resources, Inc (ARI)
  - Columbia Analytical (CAS)
  - TestAmerica
  - Weyerhaeuser
  - Pacific Rim

6.6

Process

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

6.7

Field Sampling

- Double Van Veen sampling on R/V Skookum (500 Kg total)
- Sieve to 10mm into 5-gal HDPE buckets
- Overnight ship to QATS, Las Vegas

6.8

SRM Processing

- Air dry & homogenize each target location separately
- Initial range finding chemical analyses (Aroclors and Dioxins/Furans, Grain Size, TOC)
- After analysis, sieve if needed, combine and homogenize in selected ratios to create SRM (100 Kg final SRM)
- Subdivide to containers, send to Round Robin labs
- Data validation

6.9

Status

- Sampling was to occur last week of April, samples to round robin labs in mid-July, with SRM available Nov 2010
- Currently searching for funding ($50K) -- will then initiate field sampling

6.10

Still to be resolved….

- Storage requirements and long-term location
- Sample management and procedures
- Database location/format

Update on Proposed Revisions to Dioxin Guidelines

David Fox (USACE)
Erika Hoffman (EPA)

7.1

Process Recap

- 2007: questionnaire, letters to tribes, public meetings, technical workshops
- 2008: Bold survey and statistics workshop
- 2009: technical workshop, tribal coordination meeting, draft proposal at SMARM, post-SMARM technical workshops
- 2009/2010: agency deliberation on input received, development of revised guidelines

7.2

Where we are in the process

- Revised interim guidelines posted for public review
  http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=DMMO&pagename=Dioxin_Work_Group
- Supporting documents
  - Fact Sheet
  - Project Impact Analysis Tech Memo
  - Additional Steps Memo
- 60-day review period started April 19 and ends June 18, 2010.

7.3

The proposed guidelines

- Site Management Objective = 4 pptr TEQ for both dispersive and non-dispersive sites (background-based goal).
- Screening levels
  - 4 pptr TEQ for disposal at dispersive sites
  - 4/10 pptr TEQ for non-dispersive sites.
- Expanded reason-to-believe considerations - increased dioxin testing
- *Some additional flexibility for non-dispersive disposal using case-by-case and small-business considerations*

7.4

Changes made since the 2009 SMARM Proposal

1. Case-by-Case Considerations:
   - Bioaccumulation test data,
   - sequencing and BMPs,
   - site-use frequency,
   - cumulative effects due to other BCOCs.

7.5

Changes made since the 2009 SMARM Proposal

2. Small business consideration - Projects may not need to meet the VWA guideline (4 pptr TEQ) if:
   - meet WAC definition as a "small business"
   - proposing disposal at a non-dispersive site
   - project involves less than 4,000 cy
   - dioxin is less than 10 pptr TEQ

7.6

Changes made since the 2009 SMARM Proposal

3. Proposed Guidelines are "interim"

7.7

What this change in interim guidelines will accomplish

- Make dioxin at open-water disposal sites consistent with background observed at non-urban locations in Puget Sound.
- Contribute to reducing dioxin body burdens in marine biota including seafood species.
- Make Puget Sound dioxin disposal requirements more consistent with those in other major estuary systems.
- Test the use of background-based guidelines for highly toxic and persistent pollutants.

7.8

Next steps

- All stakeholder input will be considered.
- A written response to comments will be posted.
- DMMP directors will decide whether to approve the proposed guidelines as is, or make additional revisions.
- If approved, the guidelines will be implemented as the new "interim" guidelines.

7.9

Comments on proposed guidelines

- Draft revised interim guidelines: http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=DMMO&pagename=Dioxin_Work_Group
- Written comments need to be submitted by June 18, 2010
- Comments should be sent to dioxinproject@usace.army.mil

7.10

Role of Stakeholders in Upcoming Work

- Workgroup to finalize technical protocols for proposed guidelines
- Workgroup to discuss total TEQ approach, including PCBs
- Workgroup to develop guidelines for PCBs and other bioaccumulatives.

7.11

Questions?

7.12

SMARM Status Briefing on Commencement Bay Disposal Site Reauthorization:

Final EIS Supplement
Record of Decision Amendment
Public Notice: Advanced Identification

David Kendall, Ph.D.

8.1

All Documents now Finalized

- Supplemental Environmental Impact Statement (SEIS) **Finalized.** focused on reauthorization of the Commencement Bay Dredged Material Disposal Site to accommodate additional volume over the 9 mcy ceiling authorized in the 1988 EIS up to 23 million cubic yards (mcy)
- Two supporting and concluding documents signed by District Commander and EPA Regional Administrator:
  - **Record of Decision Amendment**
  - **Public Notice: Advanced Identification of Disposal Sites (40 CFR 230.80)**

8.2

Record of Decision Amendment

- The Record of Decision Amendment is necessary to conclude the NEPA Supplemental EIS for the Reauthorization of Dredged Material Management Program Disposal Site in Commencement Bay
- The NEPA/SEPA evaluation was required as a **necessary** step by Pierce County for DNR's shoreline permit renewal for this disposal site.
- It documents the environmental impacts of 20 years of site monitoring, verifying compliance with the DMMP site management objectives.
- It evaluates the site's ability to accommodate dredged material volumes >9 mcy up to a disposal ceiling of 23 mcy

8.3

Public Notice (40 CFR 230.80) Advanced Identification of Disposal Sites

- This public notice (PN) is required to update and amend the initial advanced identification PN that began on May 6, 1986, and concluded on July 15, 1988 for the initial siting of the Commencement Bay disposal site.
- The PN provides additional notification to the regional stakeholders (concerned citizens, business community, agencies, and local governments) on the continued use of this disposal site.
- Only projects meeting DMMP requirements complying with Section 404(b)(1) Guidelines would be permitted for disposal at this site.

8.4

SEIS Completion Schedule

- The SEIS was prepared with $200k of DNR funding (through EPA / Corps Interagency Agreement) under Corps contract
- Draft SEIS 45 day public review (24 April 2009)
- Final SEIS 30 day "Wait Period" (17 August 2009)
- SEPA completed (23 October 2009)
- Corps/EPA conducted additional coordination with 3 Tribes with Usual and Accustomed Fishing Grounds in the vicinity of Commencement Bay disposal site (December 18, 2009)
- Record of Decision Amendment and Public Notice: 40 CFR 230.80 (Advanced Identification) completed and signed by Corps on February 12, 2010, and by EPA on February 17, 2010

8.5

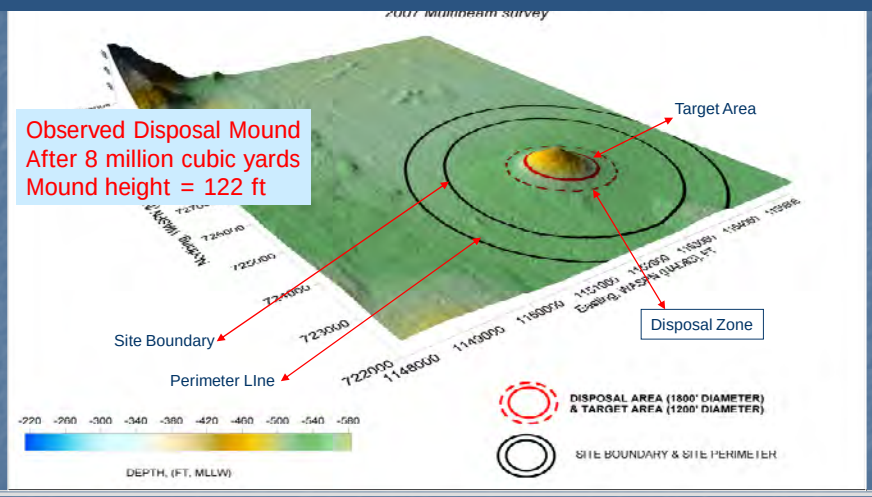
Final SEIS, Supporting and Concluding Documents Availability

- Final copies of SEIS distributed on CD to Federal, State Local Agencies, Environmental Interest Groups, and Native American Tribes
- SEIS, Technical Appendices, ROD Amendment, Public Notice 40 CFR 230.80 (Advanced Identification) are available on Seattle District website: http://www.nws.usace.army.mil

Click on Dredged Material Management, and then from webpage click on Commencement Bay SEIS to link to documents (11 mb)

8.6

The DMMP agencies recently completed a NEPA/SEPA SEIS evaluation of the **Commencement Bay Disposal site,** which also included an analysis of Climate Change impacts. The SEIS reauthorization establishes new volume ceiling of 23 mcy

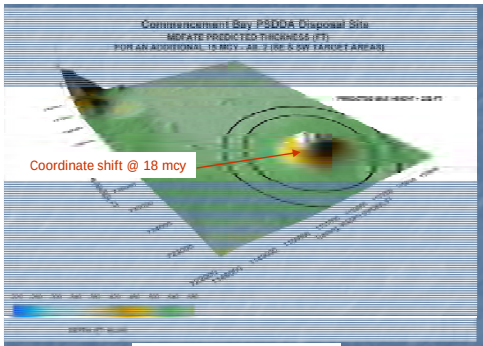


8.7

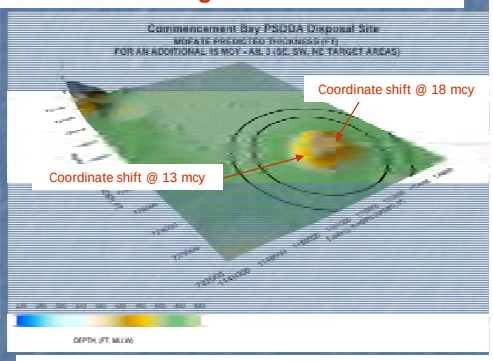
2 Action Alternatives evaluated in Supplemental EIS

(a) Predicted: 23 Mcy with 1-shift mound height = 232 ft

(b) Predicted: 23 Mcy with 2-shifts mound height = 155 ft



Alternative 1



Alternative 2 (Preferred/Selected)

8.8

CORBICULA AS A PRACTICAL DOSE-RESPONSE INDICATOR

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

Sediment Management Annual Review Meeting
Seattle, WA, May 5, 2010

Abstract

The Applications Subcommittee of the SETAC-sponsored Tissue Residue Effects Workshop summarized uses of bivalves as practical, quantitative, and useful dose-response Indicators. Emphasis was placed on ecological risk assessment applications and the utility of bivalves to characterize exposure and effects, the two most important elements of ecological risk assessment. The freshwater bivalve *Corbicula* was also proposed as a dose-response indicator for in-situ testing by the Bioaccumulation Subcommittee of the Regional Sediment Evaluation team (RSET). Surprisingly, the RSET Laboratory Testing Subcommittee did not recommend *Corbicula* for assessing the bioaccumulation potential of contaminated freshwater sediments. Nevertheless, *Corbicula* has been widely used around the world for decades in a variety of monitoring applications for testing toxicity and bioaccumulation potential in the lab and the field. A critical review of the Laboratory Testing Subcommittee white paper reveals that the evidence against using *Corbicula* to assess bioaccumulation potential is not persuasive. The following questions were asked by the subcommittee: 1) Are uptake kinetics of *Corbicula fluminea* similar to *Lumbriculus variegatus*?; 2) Is *Corbicula* able to avoid exposure to chemicals in sediment through valve closure?; 3) Is *Corbicula* able to biologically regulate chemicals internally and thereby underestimate bioaccumulation potential?; 4) Is *Corbicula* able to reach steady state with sediment chemicals in a standard 28-day bioaccumulation test?; 5) Can steady state uptake be accurately modeled? While these questions appear reasonable, they may not be the most appropriate questions. Furthermore, it seems that all the candidate species for assessing bioaccumulation potential of marine and freshwater sediments should be measured by the same yardstick. This includes *Corbicula*, *Macoma*, and *Lumbriculus*. In a recent sediment evaluation in New Orleans for example, there were no significant differences in bioaccumulation when comparing *Macoma* and *Corbicula*. Additional evidence and a different toxicological interpretation will be provided to help answer all the above questions.

RSET Bioaccumulation Subcommittee Questions on *Corbicula*

1. Are uptake kinetics of *Corbicula fluminea* similar to *Lumbriculus variegatus*?
2. Is *Corbicula* able to avoid exposure to chemicals in sediment through valve closure?
3. Is *Corbicula* able to biologically regulate chemicals internally and thereby underestimate bioaccumulation potential?
4. Is *Corbicula* able to reach steady state with sediment chemicals in a standard 28-day bioaccumulation test?
5. Can steady state uptake be accurately modeled?

9.3

Circumstantial Evidence?

Circumstantial evidence is a very tricky thing. It may seem to point very straight to one thing, but if you shift your own point view a little, you may find it pointing in an equally uncompromising manner to something entirely different.

1891 – Sir Arthur Conan Doyle – the Bascombe Valley Mystery.

Draft RSET White Paper on lab bioaccumation freshwater species = Biased Analysis: Emphasis on negative aspects of Crobicula as an indicator of bioaccumulation potential. For example: When summarizing Tatem (1986), it correctly points out that steady-state was not reached in 28-days. Good information can be obtained even if steady-state not reached.

9.4

Laboratory Testing Subcommittee Constrained by Very Narrow Focus

They missed the forest Through the trees

"But while great advances were being made in the development of techniques for doing such experiments, it is not apparent that the thinking or the philosophy, underlying most of the tests being performed and having to do with application of the results in solving practical problems of pollution control was advancing nearly as dramatically, Indeed, I am not sure that it has improved at all in recent years."
Doudoroff, 1977

In-the-box Thinking = In-the box Solutions!

It's more than:
- **just enough tissue**
- **similarity to Lumbriculus!**

It's about establishing links:
- **Exposure & Effects**
- **Lab-Field & Bio-Chem**

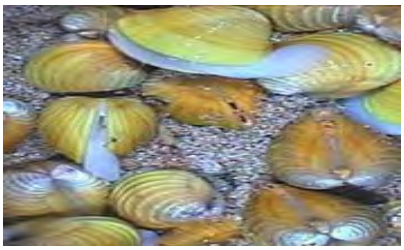
9.5

The Real Problem

Lab Protocols

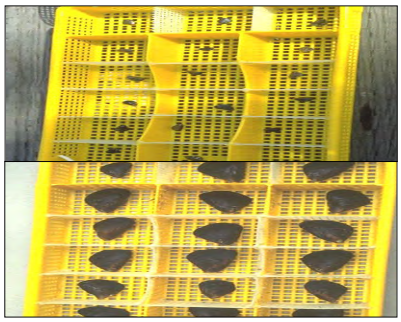
"Few of these investigators have demonstrated much awareness of, or interest in, the essential differences between the experimental conditions created by them in laboratory and the natural conditions of existence of their test subjects." Duodoroff, 1977

Not a Problem



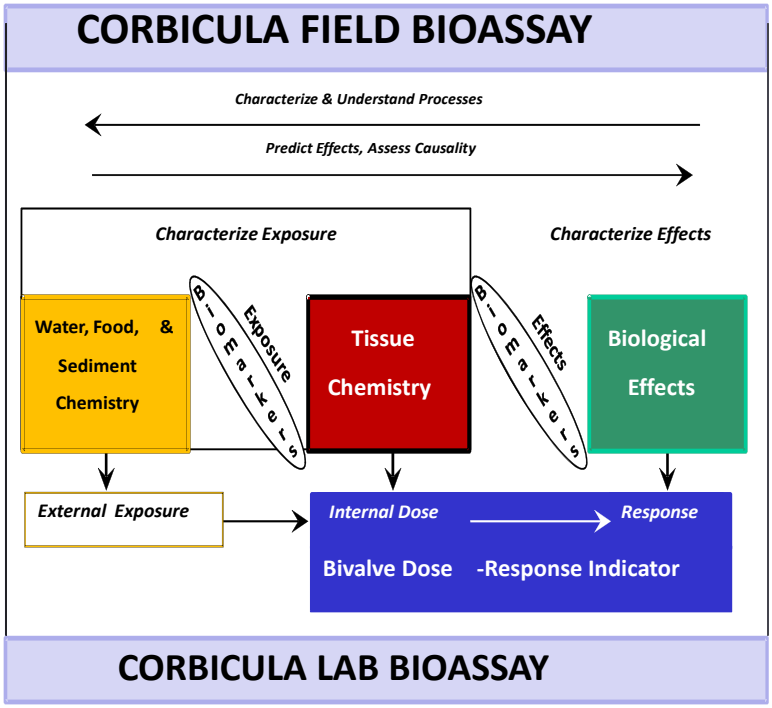
Corbicula fluminea:
- **High filtration rates**
- **High growth rates**
- **Therefore, better than *Macoma* for bioaccumulation potential**

Corbicula grows Faster than Mytilus!



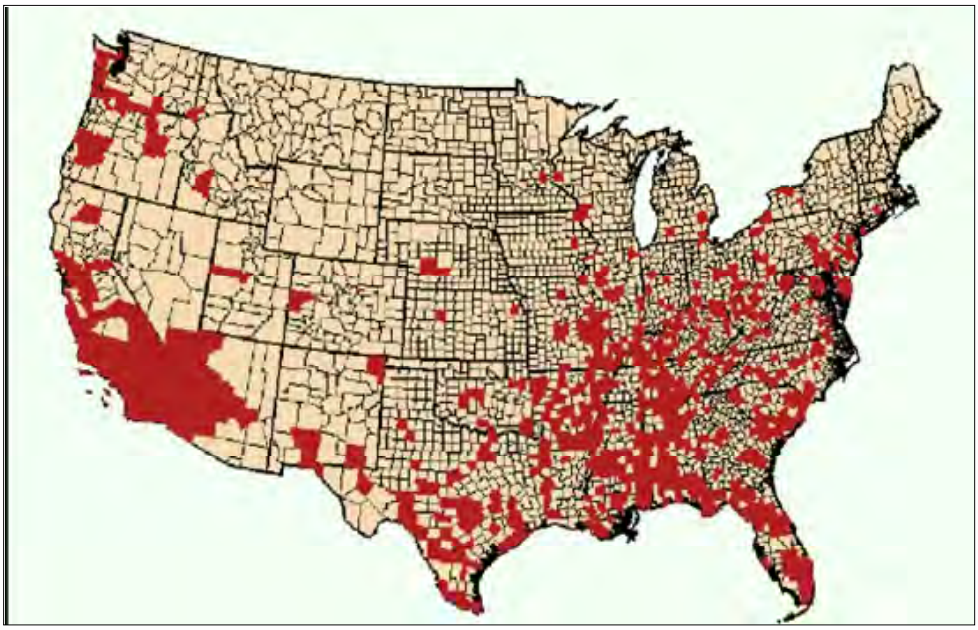
Maximum *Mytilus* growth rates = 2.5 mm/wk; in 12 week field exposures.
Corbicula growth rates greater!

9.6



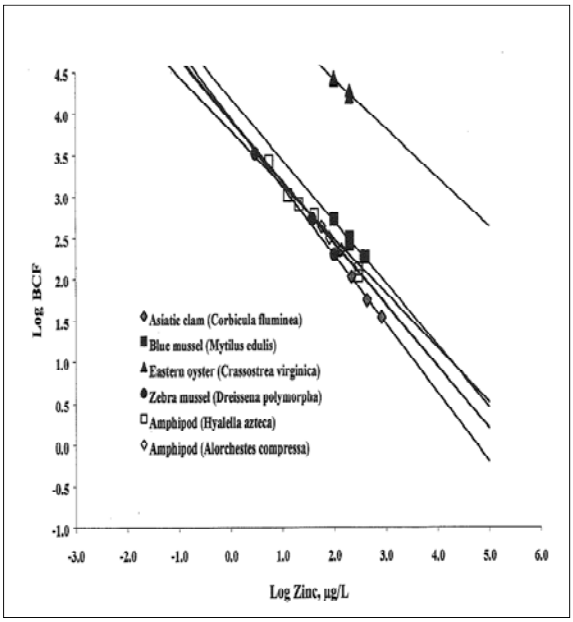
Conceptual framework for using in-situ bioassays with caged bivalves and in-situ monitoring of native bivalves for TRA in support of ERA. Emphasis is placed on bivalves as dose response indicators, the essence of the tissue-residue-effects paradigm.

9.7



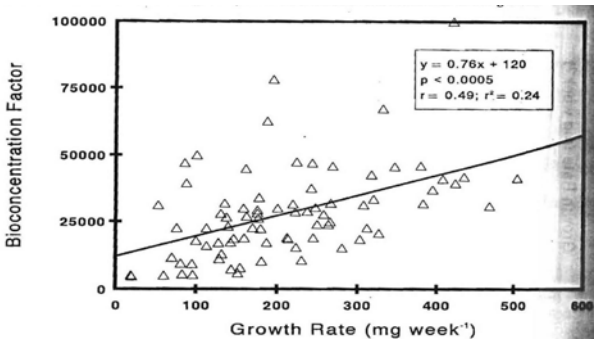
Corbicula distribution by county. From Counts (1986) and others. March 1999.

9.8



Relationship between zinc water concentration and BCF.
Similar for many bivalves, probably similar for BSAR also.

Corbicula Relationships Similar to Other Bivalves



Effects of Growth Rate on BCF.

How Can Tissue Benchmarks Work for Metals?

- *Metal toxicity a function of 3 metabolic rates:*
  1) *species specific uptake,*
  2) *detoxification*
  3) *and excretion rates*
- *If rate of metal uptake exceeds combined rate of detoxification and excretion, metal will be accumulated in metabolically available forms*
- *Internal accumulation of metabolically available metal forms determine metal toxicity*
- **Therefore, like organic chemicals, metal toxicity depends on an internal tissue burden**
  - **The only alternative to this conclusion is that metals are external toxicants**

How Can Tissue Benchmarks Work for Metals?

- *Whole body benchmarks are a surrogate for metabolically active metal levels available to bind at site of toxic action*
- *Whole body benchmarks will serve us until complexities of organism biology and metal chemistry are better understood (e.g. biotic ligand model)*
- **Are whole body benchmarks a sufficiently accurate surrogate that they provide useful information for use in dredging bioassessment (the question that has to be answered before proceeding with with tissue benchmark development)**
- *Do not mix questions about toxicokinetics (uptake, distribution, transformation and elimination) with toxicodynamics (biological response at site of toxic action and subsequent higher level adverse effects)*

9.11

Water & Sediment Chemistry

Surrogate for Threatened Unionids

- Prodigious Filtration
- Community Dominance
- Unlimited Supply

CORBICULA AS A DOSE-RESPONSE INDICATOR

- Tolerant, but not insensitive
- Easy to collect, cage, measure
- Response time similar to *Macoma*
- Ecological relevance
- Quantitative, predictable relationships
- Part of a test battery
- Clam, worm, amphipod

Parallel Testing Lab & Field

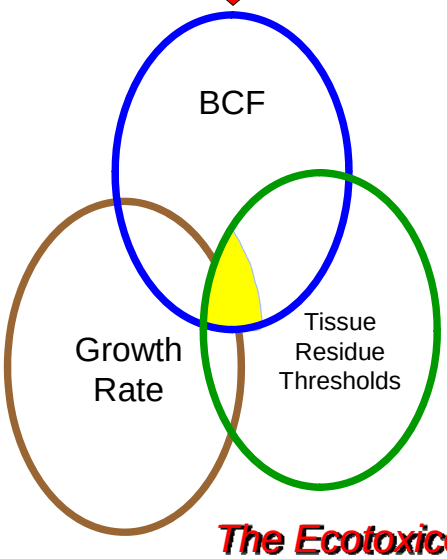
- Ecosystem Engineering
- Similar to Other Bivalves
- Well Studied

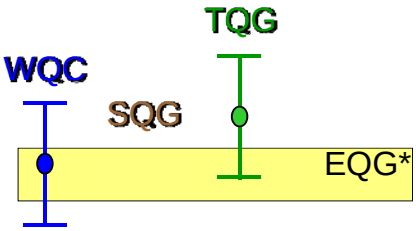
Exposure & Effects

9.12

Reevaluating Water Quality Criteria Development:

Need for Harmonization of Water, Sediment, Tissue Guidelines



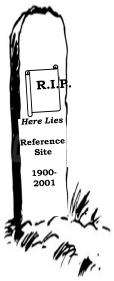


*EQG = Ecological Quality Guidelines

The Ecotoxicological Quality Triad

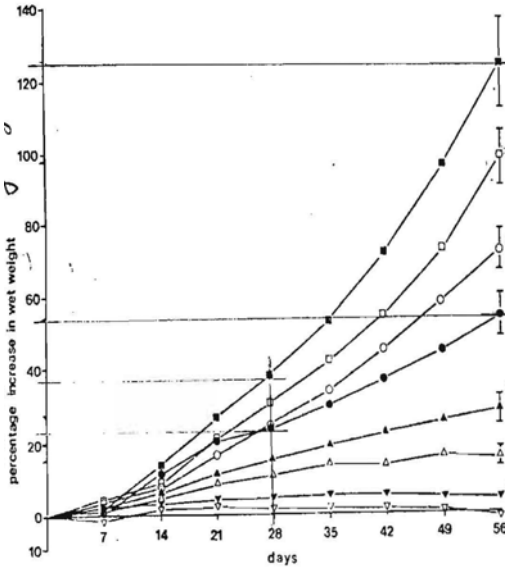
Eulogy for the Reference Site *(Landis 2001)*

Gradient designs are more powerful and more appropriate for field experiments than reference sites and "above-below" comparisons



Comparisons with reference sites provides no toxicological information. It is necessary to compare with tissue residue thresholds.

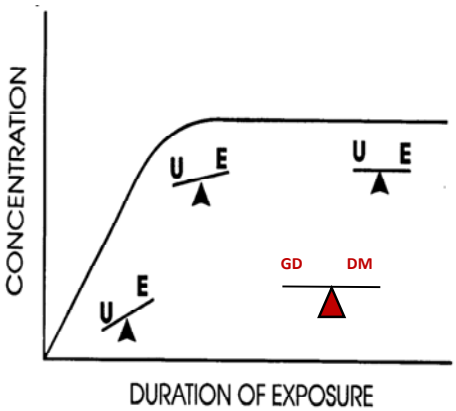
Effects of Growth on Bioaccumulation



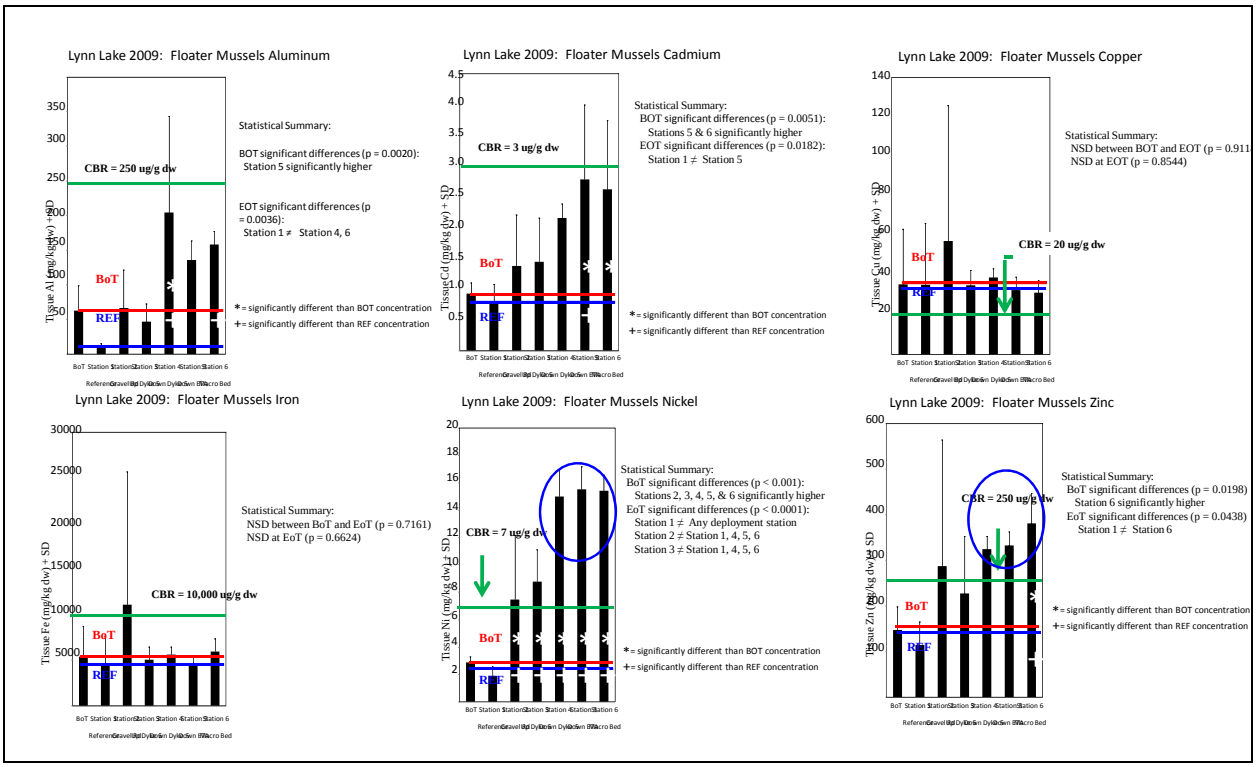
Crassostrea gigas increase in set weight during 56-d growth study.

Uptake Elimination Model

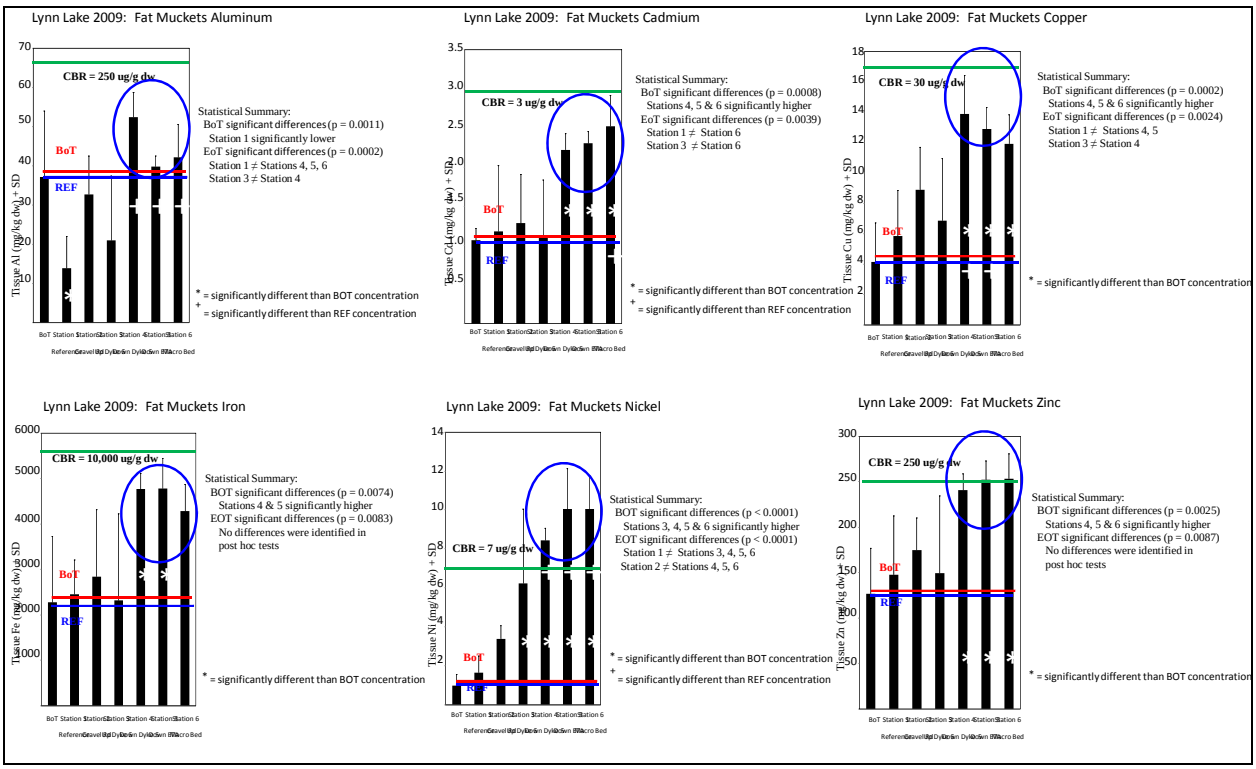
Modified by growth rates



U = uptake
E = elimination
GD = growth dilution
DM = degrowth magnification

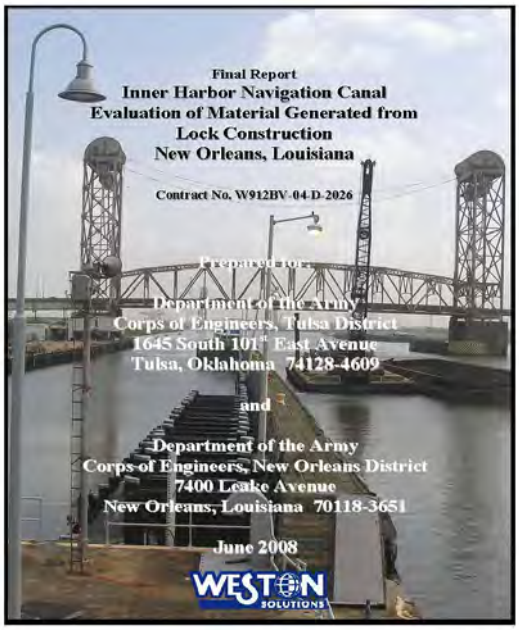

Lynn Lake 2009: Floater Mussels Aluminum
Tissue Al (mg/kg dw) + SD
CBR = 250 ug/g dw
BoT
REF
Statistical Summary:
BOT significant differences (p = 0.0020):
Station 5 significantly higher
EOT significant differences (p = 0.0036):
Station 1 ≠ Station 4, 6
* = significantly different than BOT concentration
+ = significantly different than REF concentration
Lynn Lake 2009: Floater Mussels Cadmium
Tissue Cd (mg/kg dw) + SD
CBR = 3 ug/g dw
BoT
REF
Statistical Summary:
BOT significant differences (p = 0.0051):
Stations 5 & 6 significantly higher
EOT significant differences (p = 0.0182):
Station 1 ≠ Station 5
* = significantly different than BOT concentration
+ = significantly different than REF concentration
Lynn Lake 2009: Floater Mussels Copper
Tissue Cu (mg/kg dw) + SD
CBR = 20 ug/g dw
BoT
REF
Statistical Summary:
NSD between BOT and EOT (p = 0.911)
NSD at EOT (p = 0.8544)
Lynn Lake 2009: Floater Mussels Iron
Tissue Fe (mg/kg dw) + SD
CBR = 10,000 ug/g dw
BoT
REF
Statistical Summary:
NSD between BoT and EoT (p = 0.7161)
NSD at EoT (p = 0.6624)
Lynn Lake 2009: Floater Mussels Nickel
Tissue Ni (mg/kg dw) + SD
CBR = 7 ug/g dw
BoT
REF
Statistical Summary:
BoT significant differences (p < 0.001):
Stations 2, 3, 4, 5, & 6 significantly higher
EoT significant differences (p < 0.0001):
Station 1 ≠ Any deployment station
Station 2 ≠ Station 1, 4, 5, 6
Station 3 ≠ Station 1, 4, 5, 6
* = significantly different than BOT concentration
+ = significantly different than REF concentration
Lynn Lake 2009: Floater Mussels Zinc
Tissue Zn (mg/kg dw) + SD
CBR = 250 ug/g dw
BoT
REF
Statistical Summary:
BoT significant differences (p = 0.0198)
Station 6 significantly higher
EoT significant differences (p = 0.0438)
Station 1 ≠ Station 6
* = significantly different than BOT concentration
+ = significantly different than REF concentration

9.15


Lynn Lake 2009: Fat Muckets Aluminum
Tissue Al (mg/kg dw) + SD
CBR = 250 ug/g dw
BoT
REF
Statistical Summary:
BoT significant differences (p = 0.0011)
Station 1 significantly lower
EoT significant differences (p = 0.0002)
Station 1 ≠ Stations 4, 5, 6
Station 3 ≠ Station 4
* = significantly different than BOT concentration
+ = significantly different than REF concentration
Lynn Lake 2009: Fat Muckets Cadmium
Tissue Cd (mg/kg dw) + SD
CBR = 3 ug/g dw
BoT
REF
Statistical Summary:
BoT significant differences (p = 0.0008)
Stations 4, 5 & 6 significantly higher
EoT significant differences (p = 0.0039)
Station 1 ≠ Station 6
Station 3 ≠ Station 6
* = significantly different than BOT concentration
+ = significantly different than REF concentration
Lynn Lake 2009: Fat Muckets Copper
Tissue Cu (mg/kg dw) + SD
CBR = 30 ug/g dw
BoT
REF
Statistical Summary:
BoT significant differences (p = 0.0002)
Stations 4, 5 & 6 significantly higher
EoT significant differences (p = 0.0024)
Station 1 ≠ Stations 4, 5
Station 3 ≠ Station 4
* = significantly different than BOT concentration
Lynn Lake 2009: Fat Muckets Iron
Tissue Fe (mg/kg dw) + SD
CBR = 10,000 ug/g dw
BoT
REF
Statistical Summary:
BOT significant differences (p = 0.0074)
Stations 4 & 5 significantly higher
EOT significant differences (p = 0.0083)
No differences were identified in post hoc tests
* = significantly different than BOT concentration
Lynn Lake 2009: Fat Muckets Nickel
Tissue Ni (mg/kg dw) + SD
CBR = 7 ug/g dw
BoT
REF
Statistical Summary:
BOT significant differences (p < 0.0001)
Stations 3, 4, 5 & 6 significantly higher
EOT significant differences (p < 0.0001)
Station 1 ≠ Stations 3, 4, 5, 6
Station 2 ≠ Stations 4, 5, 6
* = significantly different than BOT concentration
+ = significantly different than REF concentration
Lynn Lake 2009: Fat Muckets Zinc
Tissue Zn (mg/kg dw) + SD
CBR = 250 ug/g dw
BoT
REF
Statistical Summary:
BOT significant differences (p = 0.0025)
Stations 4, 5 & 6 significantly higher
EOT significant differences (p = 0.0087)
No differences were identified in post hoc tests
* = significantly different than BOT concentration

9.16

Irrefutable Evidence



Benthic Bioaccumulation

- Conduct 28-day whole-sediment exposure
- Accumulation of chemicals of interest in organisms as endpoint
- Compare tissue concentrations: Dredged Material vs. Reference

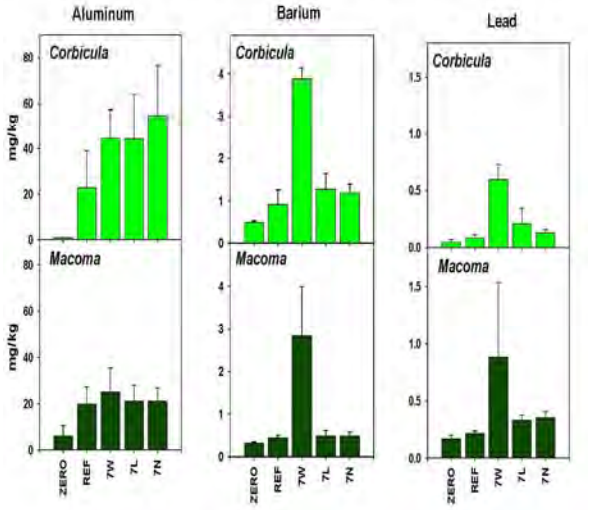
Estuarine Species
Macoma nasuta

Freshwater Species
Corbicula fluminea

9.17

Irrefutable Evidence

Bioaccumulation of Metals



Summary and Conclusions

- Elutriates toxicity – no effects on sheepsheads; mortality of fatheads likely caused by ammonia in a few samples.
- Amphipod mortality: *Hyalella* in 2 samples; *Leptocheirus* in 6 samples – likely caused by heavy metals.
- Exceedingly low bioavailability of PAHs, PCBs and chlorinated pesticides (BSAFs < 0.05). Overall similar bioaccumulation in *Corbicula* and *Macoma*.
- Bioaccumulation above initial body residue only for a few heavy metals. Higher bioaccumulation of aluminum in Corbicula; similar for barium and lead.
- Evaluation of brackish water samples using both estuarine and freshwater tests successful.

9.18

Conclusions & Summary

Corbicula is an effective dose-response indicator for evaluating bioaccumulation potential

- **Tolerant, but not insensitive**
- **Easy to collect, cage, measure**
- **Response time similar to *Macoma – irrefutable evidence***
- **Ecological relevance**
- **Quantitative, predictable relationships**
- **Lynn Lake study provided important information on bioaccumulation potential in 28-day field exposure; even though animals were not at steady state.**

ANCHOR QEA

Sediment Larval Test Interpretation Guidelines

Clay Patmont

May 5, 2010

10.1

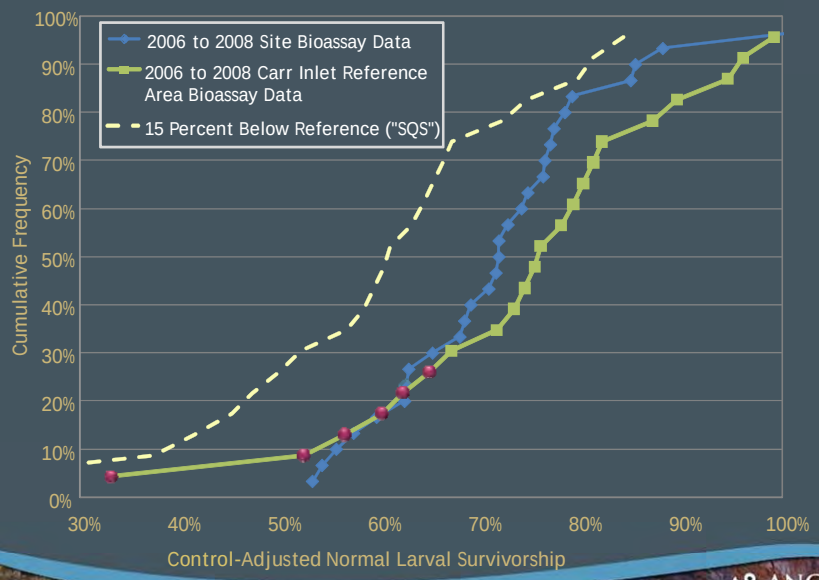
The Situation

- Sediment larval test results typically determine confirmatory marine bioassay test outcomes
  - Frequently no correlation with other bioassay tests
- Reference samples often do not meet larval performance standards
  - Less than 65% control-adjusted normal survivorship
  - Leads to reference or control substitution
- False positive identification of larval "hits"
  - Not scientifically defensible
  - Inefficient resource use ~ 20 to 30% false positives
- Need for a more thoughtful approach

ANCHOR QEA

10.2

Example – 2006 to 2008 Larval Data



ANCHOR QEA

10.3

SMS Regulatory History

- No larval reference performance standard included in promulgated SMS regulation
  - Other bioassays included reference standards
  - Only seawater control sample performance standard (greater than 70% normal survivorship)
  - Laval reference variability widely recognized
- Reference performance standards were later included in Ecology guidance
  - Generally adopted DMMP requirements to provide greater conservatism beyond the rule
- Need for a more careful regulatory analysis

ANCHOR QEA

10.4

Initial Larval Reference Data Analysis

- No species-specific relationship
  - Bivalves and echinoderms both affected
- No grain size relationship
  - Weak but insignificant correlations
- No other sediment characteristic relationships
  - Organic carbon, ammonia and sulfide not correlated
- Possible holding time issues and other PSEP larval test limitations
  - Discussed further in NewFields presentation (next)
- Need for a more careful analysis

ANCHOR QEA

10.5

Possible Solutions

- To address false positive identification of larval "hits" and associated inefficient resource use
  - Issue is particularly problematic for SMS, as screen tubes and other manipulations currently not allowed

Option 1 Review/revise test methods	• Holding times and allowed manipulations
Option 2 No reference performance standard	• Go back to original promulgated regulation
Option 3 Reference envelope analysis	• Explicitly address reference performance variability • Widely used in other sediment cleanup programs

ANCHOR QEA

10.6

Refinements of Biological Test Methods

Jack Q Word
William W. Gardiner
Jay D. Word
Brian W. Hester
Tracy Schuh

Gary Pascoe – Pascoe Environmental Consulting
Keith Kroeger – TetraTech
Cliff Whitmus – AMEC Geomatrix, Inc
Pete Adolfson - WDOE

NEWFIELDS

11.1

- **Neanthes Growth Test**
  - **Role of gut contents in growth calculation**
  - **Dry weight versus ash-free dry weight**
- **Larval Test**
  - **Entrapment in flocculent layer of fine sediments**
  - **Resuspension and screen tube modifications**
- **Microtox Test**
  - **Role of storage time in sediment toxicity**
  - **Effects of aeration on toxicity**

NEWFIELDS

11.2

Neanthes Growth Test

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

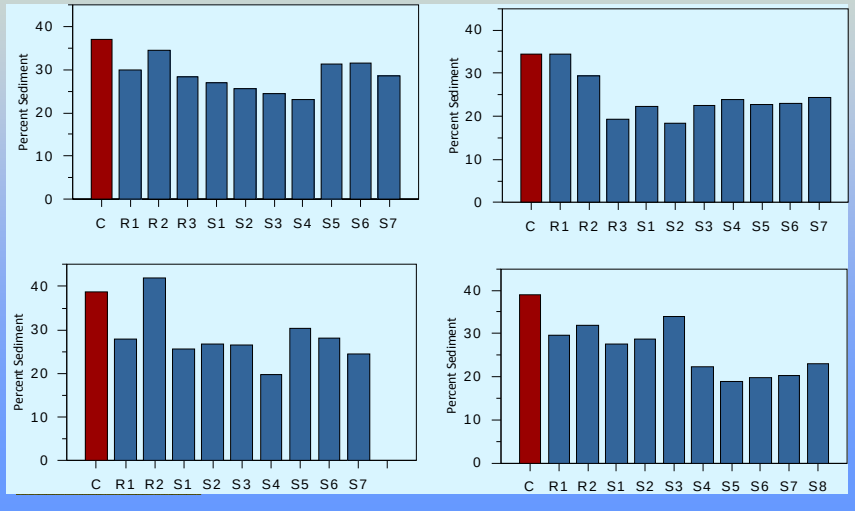
NEWFIELDS

11.3

Neanthes Growth Test

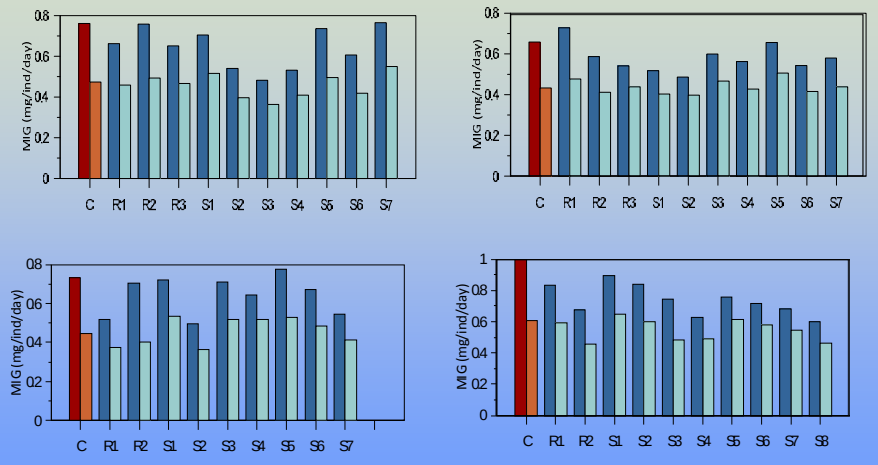
Percentage of weight that is sediment:

Controls: 34% (21% to 46%)
References: 28% (19% - 34%)
Treatments: 26% (17% to 40%)



11.4

Neanthes Growth Test

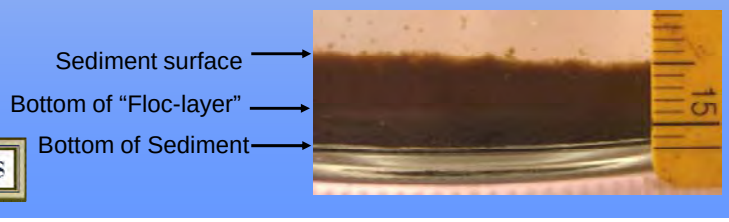


NEWFIELDS

11.5

Larval Test

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

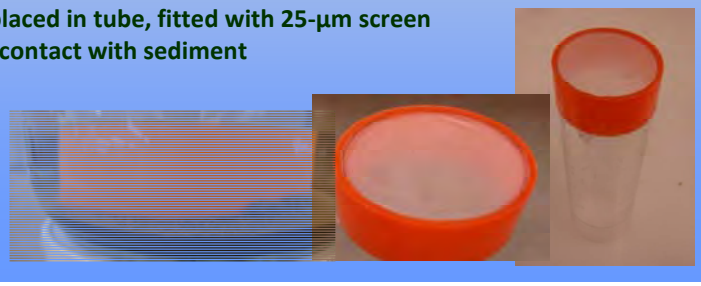


NEWFIELDS

11.6

Larval Test

- Tested three manipulations:
  - Standard PSEP larval test
  - Redisturbance
    - Termination includes homogenizing sediment and water in larval test chamber, allowing overnight settling, resampling following standard protocol
  - Screen-Tube Test
    - Method used in previous programs to separate physical and chemical effects
    - Larvae placed in tube, fitted with 25-µm screen in direct contact with sediment



NEWFIELDS

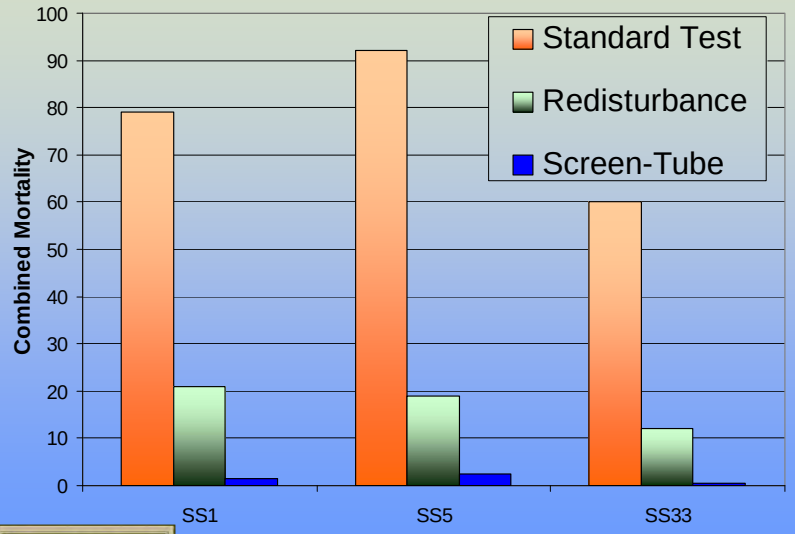
11.7

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

NEWFIELDS

11.8

Larval Test



NEWFIELDS

11.9

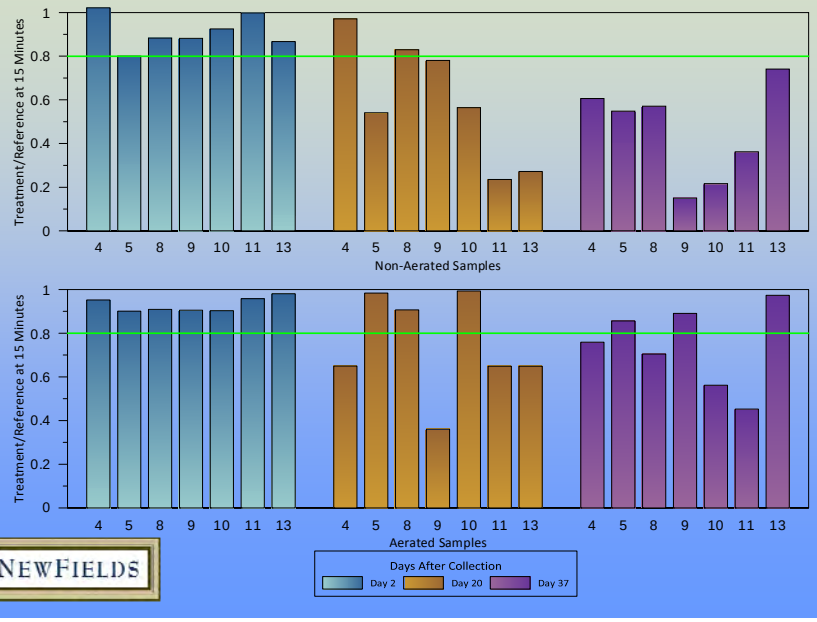
Microtox

- Sediment testing was conducted in 2008 with three standard tests (10-day amphipod, acute larval, and Microtox™)
- All stations passed SQS for the amphipod and larval tests, 7 of 13 failed the Microtox™ test
- Thirteen sediment samples were re- evaluated in 2009 based on the premise the failures may have been due to factors other than COCs

NEWFIELDS

11.10

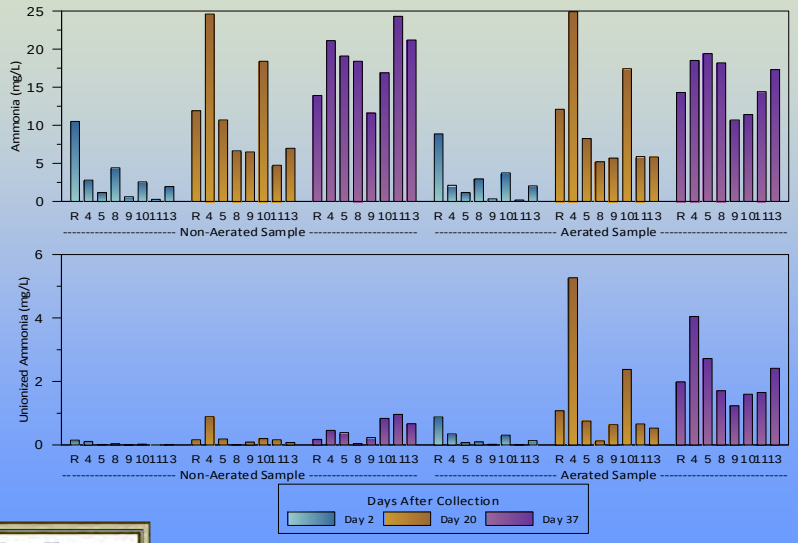
Microtox



NEWFIELDS

11.11

Ammonia Levels in Microtox Samples



NEWFIELDS

11.12

Microtox

- Sediment holding time dramatically affected the Microtox™ test:
  - All passed after 2 days holding
  - 5 stations failed test by Day 20 of holding
  - 7 stations failed by Day 37 of holding.
- Ammonia and sulfide concentrations fluctuated over time
- Sulfides tended to increase with holding time
- Aeration reduced sulfide levels
- Aeration did not decrease ammonia significantly, but did increase unionized ammonia levels
- Recommend measuring ammonia and sulfides during Microtox™ test

NEWFIELDS

11.13

Recommendations

- Neanthes Growth Test
  - Routinely collect AFDW
  - What are appropriate 1-Hit and 2-Hit criteria
  - Consider using AFDW in future
- Larval Test
  - For flocculent sediment use redisturbance or screen tube procedures
- Microtox Test
  - Minimize storage time

NEWFIELDS

11.14

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Ultra Trace Pharmaceuticals and Personal Care Products by LC/MS/MS and GC/MS

The Impact of Sample Salinity on the Analysis of Pharmaceuticals and Personal Care Products (PPCPs)

David J. Herbert

West Sacramento Business Development Manager

May 5, 2010

12.1

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Introduction

- Common emerging PPCP contaminants
- Current EPA Methods
- Experimental Design
- Water bodies in the Puget Sound region Salinity and PPCP Analyses
- Results & Discussion
- Questions

12.2

PPCPs
Often in the News

Potential for ecological and human health impacts is driving public health concern and pre- regulatory assessments

12.3

TestAmerica

Drinking Water for the Future

- Water sources used for drinking water are shrinking and we are looking for new sources
- Desalination by reverse osmosis or electrodialysis reversal are quickly becoming the wave of the future
  - ~ Turning water high in salt into fresh water

12.4

Emerging Contaminants of Concern – What Are They???

- Emerging - implies new or pending evaluation, usually in advance of regulatory controls or updates.
- Contaminants - suggest detectable levels have been observed.
- Concern - indicates potential for adverse impacts on human health or the environment.
- Driven by new data on toxicity or exposure, increases in usage or distribution, better measurement techniques.

12.5

Emerging Contaminants- They Take Many Forms!!

- Pharmaceuticals (antibiotics, steroid hormones/estrogenics, antibacterials, nutraceuticals, etc)
- Cosmetics and other personal care products
- Brominated Flame retardants
- Energetics and Explosives
- Surfactants and detergents (alkylphenols and ethoxylates)
- Organochlorine pesticides, including Toxaphene
- Agricultural chemicals (herbicides, fertilizers)
- Disinfection byproducts
- Plasticizers and other industrial chemicals
- Endocrine disrupting compounds
- Fluorinated compounds

12.6

TestAmerica

Common Emerging PPCP Contaminants

Antibiotics
- Azithromycin
- Lincomycin
- Sulfamethoxazole
- Trimethoprim
- Tyolsin

Anti-inflammatories
- Ibuprofen
- Naproxen

Analgesic and Antipyretic
- Acetaminophen

Antibacterials
- Triclocarban
- Triclosan

Fibrates
- Gemfiborzil

Stimulants
- Caffeine

Aniticonvulsants
- Carbamazepine

Antidepressants
- Cotinine
- Fluoxetine

Benzothiazepines
- Diltiazem

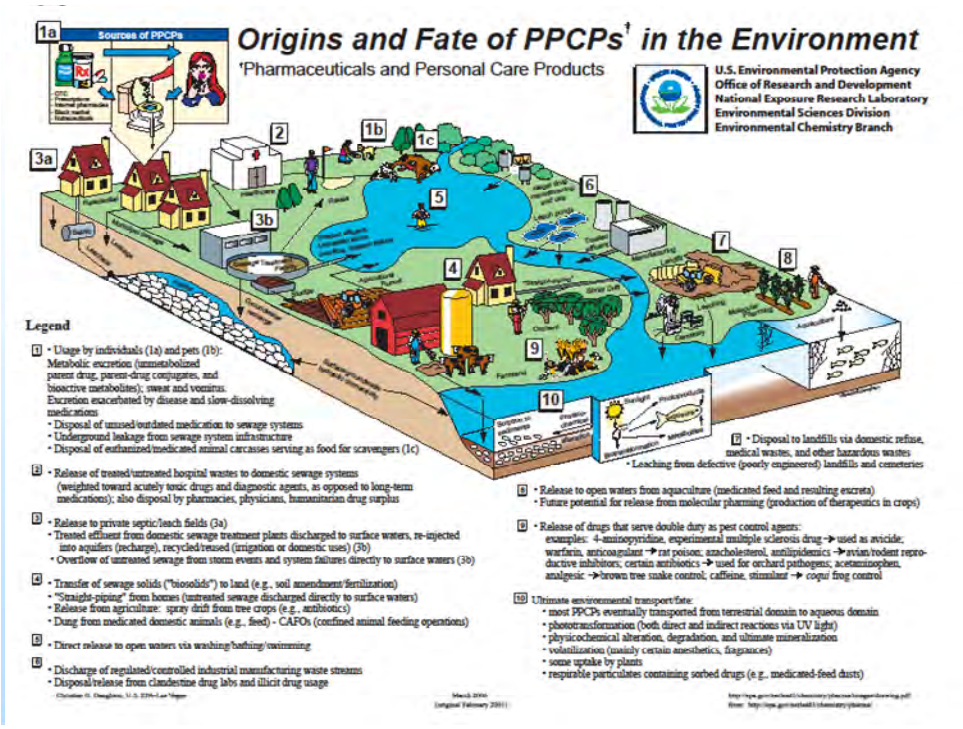
Contrast Media
- Iopromide Isomers

Plastics Manufacturing
- Bisphenol A

Surfactants
- Octylphenol
- Nonylphenol
- Nonylphenol Monoethoxylate
- Nonylphenol Diethoxylate

Steroids and Hormones
- 17a-Estradiol
- 17a-Ethynyl Estradiol
- 17b-Estradiol
- Equilenin
- Estriol
- Estrone
- Progesterone
- Testosterone

12.7



12.8

Ongoing Studies ….

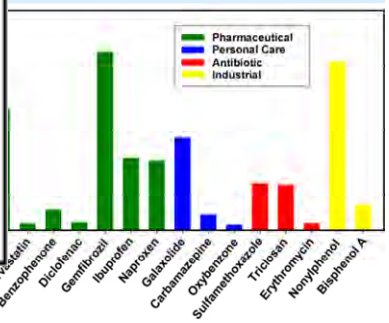
FREQUENCY OF DETECTION OF PPCPS IN STREAMS

Percentage of streams in which contaminant was found	Category of contaminant	Representative substances found (median concentration, in ppb)
80%	Steroids	Cholesterol (0.83), coprostanol (fecal steroid) (0.88)
81%	Nonprescription drugs	Acetaminophen (0.11), caffeine (0.0861), ibuprofen (0.2), cotinine (nicotine metabolite) (0.05)
74%	Insect repellent	DEET (0.06)
68%	Disinfectants	Phenol (0.04), triclosan (0.14)
48%	Antibiotics	Erythromycin metabolite (0.1), ciprofloxin (0.02), sulfamethoxazole (0.15)
37%	Reproductive hormones	17-alpha-ethynyl estradiol (0.073) (birth control), estrone (0.027)
32%	Other prescription drugs	Codeine (0.012), dehydronifedipine (antianginal) (0.012), diltiazem (0.021) (antihypertensive), fluoxetine (0.012) (antidepressant)
27%	Fragrances	Acetophenone (0.15)

SOURCE: Frequency of Detection of PPCPs in Streams. (2002). "Pharmaceuticals, Hormones and Other Organic Wastewater Contaminants in U.S. Streams, 1999-2000: A National Reconnaissance." *Environmental Science and Technology* 36, no. 6:202-1211

Seminal 'streams' study by USGS- 2002

California coastal estuary study



12.9

Regulatory Framework for PPCPs

- **Regulations established under RCRA for handling and disposal of pharmaceuticals by manufacturers and healthcare industry.**
- **Regulations for classical acute affects for some regulated compounds under RCRA**
- **Regulations non-existent or under development for most PPCP compounds from non-point sources**
- **Recharge and Reuse permits increasingly reference PPCPs and other emerging contaminants**
- **EPA coordinating > 100 active studies on presence, fate, treatment and impact of PPCPs**
- **EPA Methods 1694 and 1698 for PPCPs published in early 2008 (1699 for low-level pesticides)**
- **Other Federal, State and local agencies also sponsoring studies**
- **Some PPCPs may be added to CCL and UCMR3 by 2011**

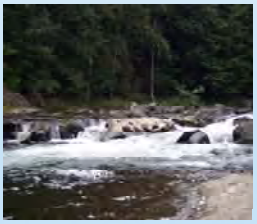
12.10

Analytical Challenges of Water with High Salinity

- Standard analytical methods were developed for soils, sediments, fish, drinking water and fresh water
- Sea water presents a particular problem with standard analytical methods because of the abundance of both organic and inorganic interferences
- Organic interferences include bacteria, organisms as well as other organic material
- Inorganic interferences include salts, metals, silica, etc.

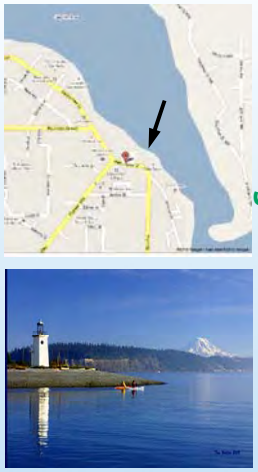
Water Bodies Low in Salinity in the Puget Sound region

Carbon River



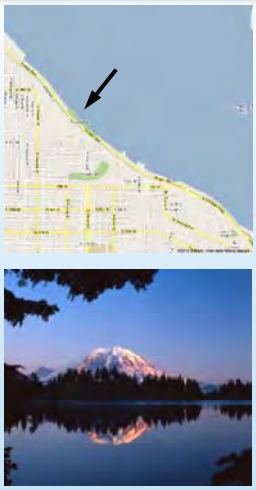
Puyallup River

Water Bodies High in Salinity in the Puget Sound region



Gig Harbor

Commencement Bay



Outer Commencement Bay

13

12.13

Analytical Plan

- Performed the following General Chemistry analyses for pre-treatment processes:
  - pH by EPA Method 150.1
  - Specific Conductance by SM 2510B
  - Salinity by SM 2520B
- Use results from the General Chemistry analyses to determine the extraction process for PPCP analyses:
  - 1694 Pharmaceuticals and Personal Care Products by LC/MS/MS
  - 1694 Antibacterials by LC/MS/MS
  - 1698 Steroids and Hormones by LC/MS/MS
  - ASTM D7065 Alkylphenols and Bisphenol A by GC/MS

14

12.14

TestAmerica

General Chemistry Results

Sample ID	Salinity g/L	pH	EC uS/cm
55 g/L NaCl in DI Water (Control)	58.1	6.4	82800
Carbon River	0.06	7.47	124
Puyallup River	0.05	7.44	96
Gig Harbor	26.5	7.86	41600
Commencement Bay	23.8	7.75	37600
Outer Commencement Bay	30.3	7.69	46800

15

12.15

TestAmerica

PPCP Analytical Results EPA Method 1694

Analyte	RL (ng/L)	Carbon River (ng/L)	Puyallup River (ng/L)	Gig Harbor (ng/L)	Commencement Bay (ng/L)	Outer Commence. Bay (ng/L)
Acetaminophen	50	ND	0.89	5.09	ND	ND
Cotinine	10	7.64	4.05	3.36	ND	ND
Caffeine	50	3.34	2.48	**114.85**	5.83	19.60
Lincomycin	10	0.15	0.13	0.12	0.08	0.11
Trimethoprim	10	**67.21**	3.09	2.99	2.21	0.54
Sulfamethoxazole	25	**328.15**	6.93	11.24	7.92	2.50
Diltiazem	5	**13.08**	3.44	3.80	3.59	3.08
Carbamazepine	10	**61.57**	1.53	1.96	1.26	ND
Naproxen	50	3.52	ND	21.71	ND	ND
Ibuprofen	25	3.39	ND	19.47	ND	ND
Azithromycin	10	**34.50**	ND	**15.48**	ND	**15.06**
Iopromide	50	ND	ND	ND	ND	ND
Tylosin	10	ND	ND	ND	ND	ND
Fluoxetine	25	10.17	ND	ND	ND	ND
Gemfibrozil	25	**232.04**	ND	12.86	ND	ND
Triclocarban	50	28.23	ND	1.41	ND	ND
Triclosan	50	11.09	ND	ND	ND	ND

16

12.16

Steroid and Hormone Results EPA Method 1698

Analyte	RL (ng/L)	Carbon River (ng/L)	Puyallup River (ng/L)	Gig Harbor (ng/L)	Commencement Bay (ng/L)	Outer Commencement Bay (ng/L)
Estriol	50	ND	ND	ND	ND	ND
Equilenin	5	ND	ND	ND	ND	ND
17B-Estradiol	10	ND	ND	ND	ND	ND
17a-Estradiol	10	1.54	1.53	1.75	1.58	1.76
17a-Ethynylestradiol	50	ND	ND	ND	ND	ND
Estrone	10	ND	ND	ND	ND	ND
Testosterone	20	ND	ND	ND	ND	ND
Progesterone	5	ND	ND	ND	ND	ND

Discussion Pharmaceuticals

- The data shows the fresh water rivers (which were low in salinity) have detections for some Pharmaceuticals and Personal Care Products ranging from the low to high ng/L levels
  - ~ Caffeine, Sulfamethoxazole and Gembirozil are among the highest detected analytes
- Low level 17a-Estradiol was detected in all samples just above the method detection limit

Conclusion

- TestAmerica is capable of analyzing historically difficult matrices for PPCP analyses by both LC/MS/MS and GC/MS
- There may be some matrix induced interferences, however using Isotope Dilution all concentrations are corrected to give super accurate quantitation
- There are PPCP compounds that are found in our waterways at detectable amounts
- If we were to use the fresh water from this analysis to make drinking water we would be introducing persistent contaminants to the drinking water process

19

12.19

Technical Contacts

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12.20

Experiments to Evaluate the Release of Hydrophobic Pollutants during Dredging and Resuspension Events

Frank Dunnivant
Whitman College
dunnivfm@whitman.edu

13.1

Resuspension Events

- Dredging of shipping channels

images.theage.com.au/2008/07/31/170827/420bay1-420x0.jpg

- Bioturbation
- Storm events

13.2

Modeling

- How do you model such a system from the release of pollutants on sediment particles to uptake by humans?
  - Equilibrium: measure concentrations in each compartment; relatively easy, but when is a complex multi-compartment system really at equilibrium?
  - Kinetic: break into individual processes and measure rates between compartments…requires huge simplifications

13.3

Simplifications

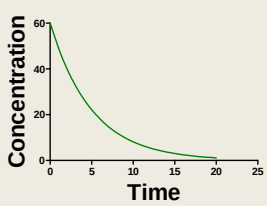
- Scientists love single first-order reactions

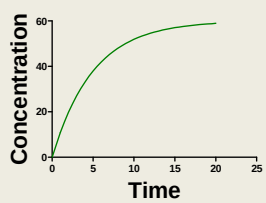
$$\text{Reactant A} \rightarrow \text{Product B}$$

$$\text{Pollutant}_{\text{Sediment}} \rightarrow \text{Pollutant}_{\text{Water}}$$

$$\text{Pollutant}_{\text{Water}} \text{ with time} = C_o\, e^{-\lambda t}$$

- What first-order relations do:
  - Can give a linear concentration relationship with time
  - Easily fit into complex modeling equations for ecosystems





13.4

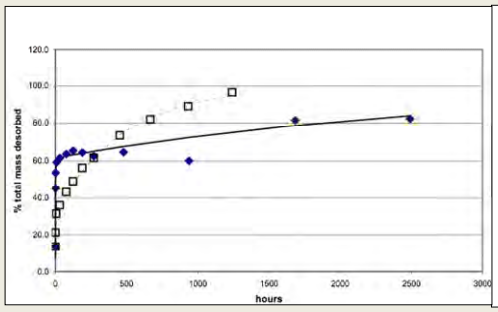
Desorption Profiles

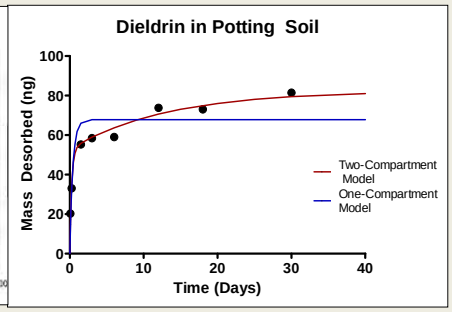
- Two box release (labile and non-labile)

$$\text{Pollutant}_{\text{Sediment}} \rightarrow \text{Pollutant}_{\text{Labile}}$$
$$\rightarrow \text{Pollutant}_{\text{Non-Labile}}$$

$$\text{Pollutant in water at any time} = C_o\, e^{-\lambda_{Labile} t} + C_o\, e^{-\lambda_{Non-Labile} t}$$

Chemosphere, 2006, 66, #2, 384-389



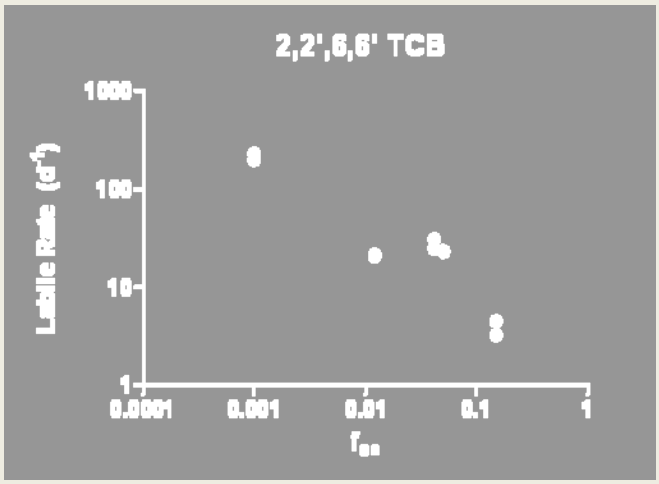


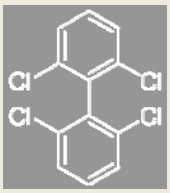
Are Rate Laws First Order? (Independent of TSS)

Chemosphere, 2005, 61, 332-340

TSS (mg/L)	Labile Rate (k_1 in Eqn 3) ($days^{-1}$)	Labile Half-Life (days)
PCB IUPAC # 4		
100	113 (45.9)	0.00613
1000	67.7 (22.9)	0.0102
5000	8.41 (0.74)	0.0824

Trends





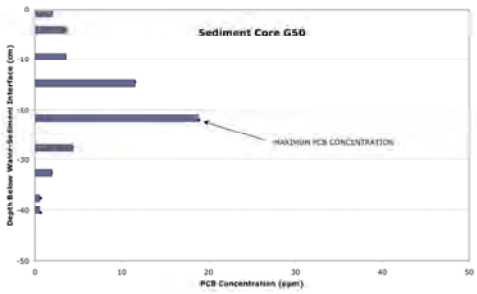
Environ. Tox. Chem., 2010, 29, #5, 1049-1055

But what about reversible reactions?

$$\text{Pollutant}_{\text{Sediment}} \leftrightarrow \text{Pollutant}_{\text{Water}}$$

$$\text{Pollutant}_{\text{Water}} \text{ with time } = B_\infty - B_\infty e^{-(k_1 + k_2)t}$$

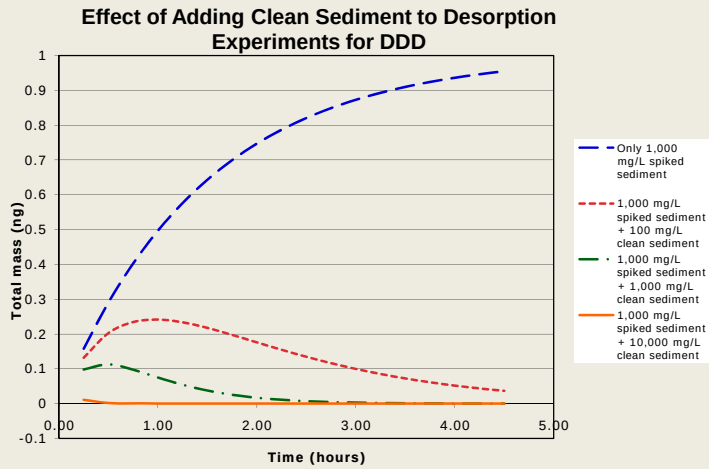
PCBs in Lake Hartwell Sediment (SC)



When adsorption overrides desorption

$$\text{Pollutant}_{\text{Polluted Sediment}} \rightarrow \text{Pollutant}_{\text{Water}} \rightarrow \text{Pollutant}_{\text{Clean Sediment}}$$

$$\text{Pollutant in water at any time} = (C_o - C_o e^{(-\lambda_D t)})e^{(-\lambda_A t)}$$



Moral of Story

- We need more data, but at the moment it depends on the dredging situation.
- When only contaminated sediment is resuspended, a "good portion" of the pollutants can be reintroduced to the water column and ecosystems
- When contaminated and uncontaminated sediments are mixed, little to no pollutant appear to re-enter the ecosystem.

Bioconcentration
A Real-World Numeric Example

MEDIA	Conc. ppm	Conc. Factor
Water	0.000 05	----
Plankton	0.04	800
Silverside Minnows	0.23	4600
Sheephead Minnows	0.94	19200
Pickerel (Predatory)	1.33	26600
Needlefish (Predatory)	2.07	41400
Heron (feeds on small aquatic animals)	3.57	71400
Herring Gull (scavenger)	6.00	120000
Osprey Egg	13.8	276000
Merganser (fish-eating duck)	22.8	456000
Cormorant (feeds on large fish)	26.4	528000

Woodwell et al. (1967)

13.11

Bioconcentration
A Greed-Driven Numeric Example

MEDIA	Conc. ppm	Conc. Factor	Investment return of $1 in Ten Years at different tropic levels (stocks)
Water	0.000 05	----	$1
Plankton	0.04	800	$800
Silverside Minnows	0.23	4600	$4600
Sheephead Minnows	0.94	19200	$19200
Pickerel (Predatory)	1.33	26600	$26600
Needlefish (Predatory)	2.07	41400	$41400
Heron (feeds on small aquatic animals)	3.57	71400	$71400
Herring Gull (scavenger)	6.00	120000	$120000
Osprey Egg	13.8	276000	$276000
Merganser (fish-eating duck)	22.8	456000	$456000
Cormorant (feeds on large fish)	26.4	528000	$528000

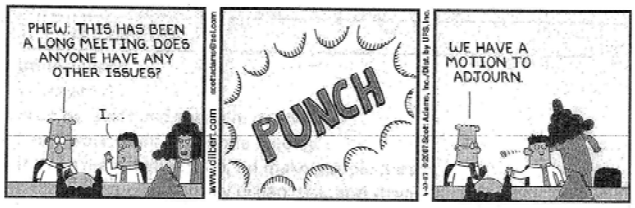
13.12

Let Us Know What You Think

- Papers can be downloaded at:
  - www.nws.usace.army.mil
  - Click on "Dredged Material Management"
- Comment deadline is June 18, 2010
  - Submit dioxin comments to:
    - Dioxinproject@usace.army.mil
  - Submit other comments to:
    - david.r.kendall@usace.army.mil

15.1

15.2


PHEW. THIS HAS BEEN A LONG MEETING. DOES ANYONE HAVE ANY OTHER ISSUES?
I...
www.dilbert.com
PUNCH
WE HAVE A MOTION TO ADJOURN.

APPENDIX 5

SMARM 2010 ISSUE PAPERS

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The Impact of Sample Salinity on the Analysis of Pharmaceuticals and Personal Care Products (PPCPs)

Michael Flournoy – (Michael.Flournoy@TestAmericainc.com), Dennis Gall, Steven Valmores, Jason Baynes (TestAmerica, West Sacramento, CA, 95605)
Kathy Kreps, Kim Presley, Sonya Palmer, Peter Boardway, Anthony Ocana (TestAmerica, Tacoma, WA, 98424)

Recent studies have determined a new class of emerging contaminants called Personal Care Products (PPCPs) poses a potential health risk to human health and the environment. PPCPs include many commonly used medicinal, cosmetic, and personal hygiene products. Unfortunately current water treatment techniques do not eliminate and in many cases do not even minimize these contaminants because they pass through the cleaning process into the finished water. Because water from populated areas make it to local rivers as well as to the ocean it is important to understand how much of these contaminants are in different sources of water for two reasons. 1) The ecosystems that live in these water sources of which nearly the entire population of animals and plants are food sources and 2) at some point in the near future we will need to use these "non-fresh" water sources to make into fresh water. In both cases the water may range from fresh water to some ratio of fresh water to salt water all the way to ocean water as in the case of seawater desalination programs. Saline waters such as ocean water often present unique challenges in determining their quality when applying analytical methodologies developed, which were developed for the testing of freshwater sources.

TestAmerica performed a study to determine the common PPCP compound concentrations and feasibility using advanced analytical methodologies for these non-routine matrices. The study focused on the observed concentrations and potential impact of varying levels of salinity on the determination of many PPCP contaminants. The sampling and analysis plan involved the analysis of water samples from sources throughout the Puget Sound region in the state of Washington. The sample collection program included areas of varying salinity content, ranging from fresh water samples in the Puyallup and Carbon Rivers to seawater samples collected from Commencement Bay and Gig Harbor. Bulk water samples were collected at each of the sampling location and analyzed for PPCP compounds by LC/MS/MS as well as salinity, conductivity and pH.

Both spiked and un-spiked aliquots were analyzed in replicate from each of the locations. The un-spiked aliquots were compared with the measured salinity at the locations to see if a correlation to determine if a correlation could be established between the observed concentration and the measured salinity. The observed spike recoveries of samples from each location were compared with the measured salinity at the location to determine if a correlation could be established between the spike recoveries and the measured salinity.

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EFFECTS OF THE PROPOSED NISQUALLY REACH AQUATIC RESERVE ON THE ANDERSON/KETRON AND PORT TOWNSEND DISPOSAL SITES

Submitted by Eric Johnson, Washington Public Ports Association

INTRODUCTION

Aquatic Reserves are authorized in Washington State, and are managed by the Washington State Department of Natural Resources (WDNR). There are currently four Aquatic Reserves; one each at Cherry Point, Cypress Island, Fidalgo Bay and Maury Island. They are designed to preserve, restore and enhance areas of particular environmental importance or sensitivity, and are established pursuant to the authorities of RCW 79.70 and the regulations of WAC 332-60.

Over the past several years a number of additional areas have been nominated for inclusion into this program. These include the proposed Nisqually Reach Aquatic Preserve, and the Protection Island Aquatic Reserve. Both of these reserve proposals have adjusted their proposed boundaries to encompass all of the Anderson/Ketron Dredged Material Disposal Site, and all or a portion of the Port Townsend Dredged Material Disposal Site.

PROBLEM IDENTIFICATION

Nisqually Reach Aquatic Preserve

The initial nomination of the Nisqually Reach Aquatic Preserve was made by the Nisqually Reach Nature Center. In its initial application for consideration, the Center listed the Anderson/Ketron Island Dredged Material Disposal Site as one of the "risks to the ecosystem" that warranted the designation of Aquatic Preserve. The Center's application goes on to say:

"Within the designated area itself, removal of certain activities from leasing such as expansion of aquaculture, piers and docks, marinas and dredging or dredged material disposal will protect the physical habitat and natural processes of the subtidal photic zone and deepwater habitats within the reserve".

Additional references to dredged material disposal continue within the application document, including prevention of dredged material disposal, a moratorium on dredged material disposal, and additional evaluation of the Anderson/Ketron Island dredged material disposal site.

The Department of Natural Resources recommended managing this site as an Environmental, Scientific and Educational Aquatic Reserve. The Technical Advisory Committee's Management Recommendations for this site include:

- *Monitor dispersal of material at existing dredge disposal site in deepwater trench to gain knowledge about interaction between disposal of dredge material and the unique hard bottom ecosystem found at the site.*

- *Consider restricting activities that might disrupt and/or destroy the oceanographic and estuarine conditions that influence the movement and retention of water, sediment and nutrients that support the diversity of habitats and species found at the site.*

The January 8th 2010 minutes of the Nisqually Reach Planning Advisory Committee meeting state:

"Serious questions were raised about the dredge disposal site within the reserve and its continued function as a disposal site. It was determined that a dredge disposal expert should be invited to the next meeting to further clarify the process and potential issues associated with prohibiting dredge dumping at the site and providing alternative dumping options."

The Advisory Committee also lists "dredge disposal" on a list of issues to consider during the development of the management plan.

Protection Island Aquatic Reserve

The Department of Natural Resources' Technical Advisory Committee also recommended managing the proposed Protection Island Aquatic Reserve as an Environmental, Scientific and Educational Aquatic Reserve. After the initial proposal was made, the northern boundary of the Protection Island Reserve was significantly extended, and an initial assessment of the new boundary appears to show that it partially overlaps the Port Townsend dredged material disposal site.

The Management recommendation of the Committee also state in part: *"Consider restricting activities that <u>might</u> disrupt and/or destroy physical or biological processes that influence the movement of water, sediment, and nutrients within reserve boundaries, as well as oceanographic conditions that support the diversity of habitats and species found at the site."* (emphasis added).

The January 27th 2010 minutes of the Protection Island Aquatic Reserve Planning Advisory Committee list "dredge disposal site" on a list of "*issues and uses to consider during the development of the management plan."*

Discussion

The statutory authority and regulations guiding the DNR's assessment and decision-making regarding natural area preserves is rather vague, and also does not describe very clearly how existing uses within a proposed reserve are supposed to be accounted for.

The general Aquatic Lands statutes that bind and govern the WDNR, however, are not nearly so vague. The general guidelines of RCW 79.105.030 list the four management principles as:

- *Encouraging direct public use and access*
- *Fostering water-dependent uses*
- *Ensuring environmental protection*
- *Utilizing renewable resources*

In addition, RCW 79.105.500 makes the most explicit legislative findings relating to dredged material disposal sites. This section states in part: *"These disposal sites are essential to the commerce and well-being of the citizens of the state of Washington."*

CONCLUSION

Given the general lack of awareness of the intention of the WDNR to include all of one and possibly part of another of the open-water disposal sites in pending aquatic reserves, it seems not only appropriate but highly important for the Department to present its intentions at the 2010 SMARM meeting. The Department should explain to both the public and its DMMP sister agencies how it intends to reconcile its management obligations under the DMMP process, and its statutory authorities to foster water-dependent uses and commerce with its apparent intentions to partially manage dredged material through its Aquatic Reserve Program.

WASHINGTON STATE DEPARTMENT OF
Natural Resources
Peter Goldmark - Commissioner of Public Lands

Aquatic Reserves Program and Dredged Materials Disposal

Aquatic Reserves are established to conserve state-owned aquatic lands that will provide benefit to health of native aquatic habitats and species. When attempting to designate and manage reserves in Puget Sound, DNR often recognizes the need to balance different uses while gaining conservation benefits for important habitats and species. There currently is only one proposed reserve, the Proposed Nisqually Aquatic Reserve that includes a Dredged Material Management Program (DMMP) disposal site—the Anderson/Ketron DMMP site. The claim that the Proposed Protection Island Aquatic Reserve includes some or all of the Port Townsend DMMP site is incorrect (see attached figure). The following outlines the process for establishing aquatic reserves, focusing on the Proposed Nisqually Aquatic Reserve, and includes a discussion of the management of the Anderson/Ketron DMMP site and potential aquatic reserve designation.

Establishing Aquatic Reserves

Aquatic Reserves are considered for designation through a robust public process. The current proposed reserves were nominated during the spring of 2008. Since their initial nomination, DNR and the site proponents have conducted extensive outreach to community groups, interest groups, local, state, federal and tribal governments and citizens. Since spring of 2008, for the current proposed aquatic reserves, DNR has conducted outreach to more than 100 different stakeholder and interest groups.

The designation process includes an independent scientific review conducted by a panel of outside experts. This Technical Advisory Committee provides the Commissioner of Public Lands with a series of recommendations about the proposed reserves, based primarily on the scientific merit of the sites. The Technical Advisory Committee recommended that both the Nisqually site and Protection Island site be further considered for reserve designation—and recommended the current proposed boundaries.

In the final step before a proposed reserve is considered for designation by the Commissioner of Public Lands, DNR leads an effort to develop a draft management plan for the site. The plan is developed through the work of a site-specific Advisory Committee that is made up of stakeholders that have specific interest and familiarity with the location proposed for reserve status. The management plan outlines how DNR will manage the state-owned aquatic lands within the reserve. When developing a draft management plan, DNR takes into consideration all existing uses, environmental conditions and site-specific conservation targets. The Advisory Committee helps DNR develop goals and objectives for the site, and identifies management actions to be implemented if the site is designated as a reserve.

Interim Management Guidelines Allow Existing Uses

Once the planning process begins for a proposed aquatic reserve, interim management guidance goes into effect. While the interim management guidance allows existing uses, it precludes DNR from authorizing any new uses in the proposed reserve until the planning process is complete and a final decision about reserve status is made by the Commissioner. The DMMP site is considered an existing use and management of the DMMP site would not be affected by the interim management guidance.

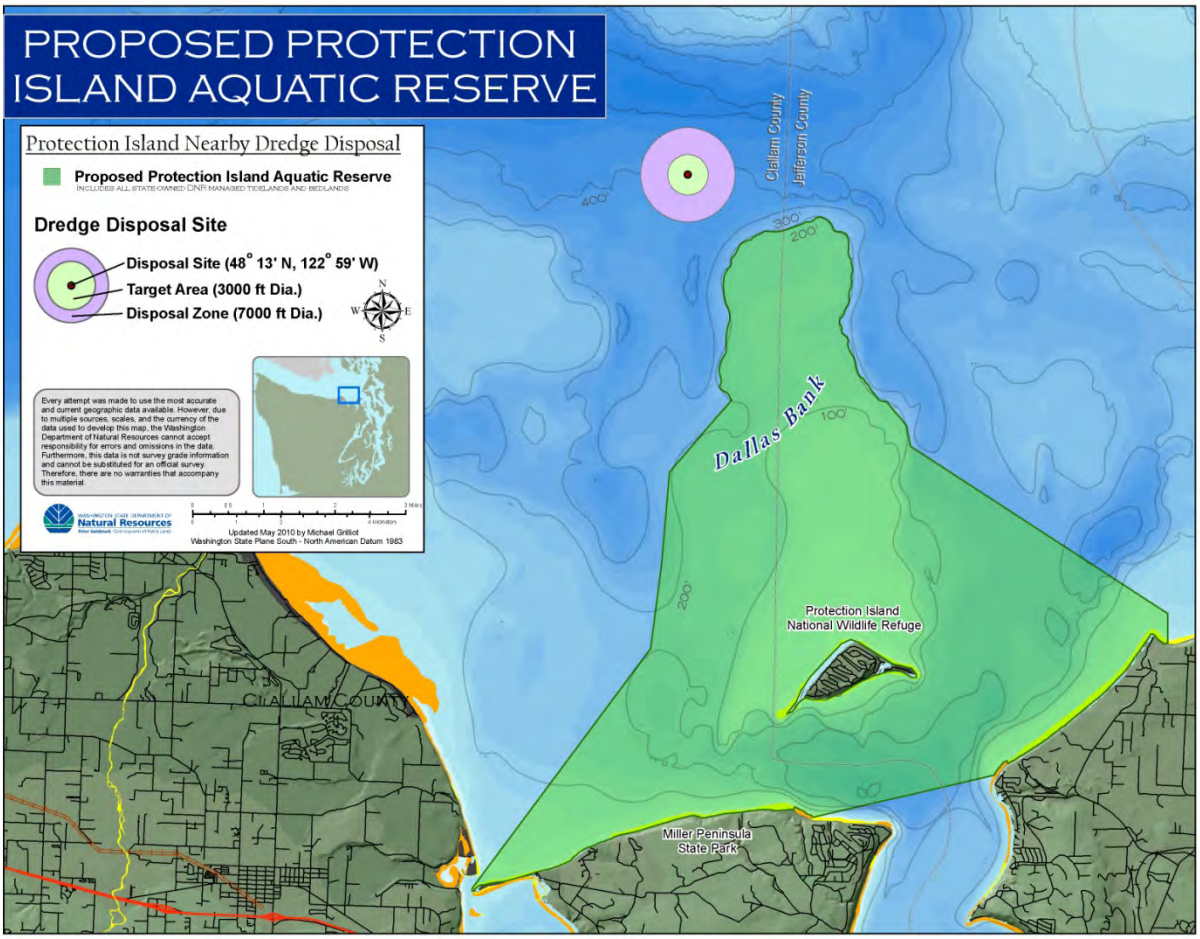
Proposed Nisqually Aquatic Reserve and DMMP

Currently the draft management plan is being developed for the Proposed Nisqually Aquatic Reserve. This is a rigorous process which began in the fall of 2009. The key points regarding the development of a draft management plan and management of the DMMP site are as follows:

- Draft goals and objectives for the Proposed Nisqually Aquatic Reserve focus on clean water standards, protecting and restoring intertidal mudflats, prevention of non-indigenous organisms, protection of nearshore migratory bird habitat, education, salmon as a conservation target, identifying native oyster habitat, reducing armored shorelines to maintain integrity and function of nearshore drift cells.
- DNR fully understands the importance of the Anderson/Ketron DMMP site, and that it is essential to the commerce and navigational needs of the citizens of the state, and of particular important to water-dependent uses in South Puget Sound.
- The aquatic reserves process at the Nisqually site will balance the needs for protection, with the need for uses on state-owned aquatic lands, including the disposal of dredged material.
- In the coming months, DNR and the Advisory Committee for the Proposed Nisqually Aquatic Reserve will begin discussions regarding management actions. DNR has invited representatives from Washington Public Ports Association to participate in this discussion. This discussion with the ports association staff will ensure informed and appropriate management actions are developed that will meet the needs of both the proposed aquatic reserve, and the future management of the Anderson/Ketron DMMP site.

For more information, contact:

Kyle Murphy
Department of Natural Resources
Aquatic Resources Division
360-902-1073


PROPOSED PROTECTION ISLAND AQUATIC RESERVE
Protection Island Nearby Dredge Disposal
Proposed Protection Island Aquatic Reserve
INCLUDES ALL STATE-OWNED DNR MANAGED TIDELANDS AND BEDLANDS
Dredge Disposal Site
Disposal Site (48° 13' N, 122° 59' W)
Target Area (3000 ft Dia.)
Disposal Zone (7000 ft Dia.)
N
W
E
S
Every attempt was made to use the most accurate and current geographic data available. However, due to multiple sources, scales, and the currency of the data used to develop this map, the Washington Department of Natural Resources cannot accept responsibility for errors and omissions in the data. Furthermore, this data is not survey grade information and cannot be substituted for an official survey. Therefore, there are no warranties that accompany this material.
WASHINGTON STATE DEPARTMENT OF
Natural Resources
Peter Goldmark - Commissioner of Public Lands
0 0.5 1 2 3 Miles
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Updated May 2010 by Michael Grilliot
Washington State Plane South - North American Datum 1983
Clallam County
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400'
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Protection Island
National Wildlife Refuge
CLALLAM COUNTY
Miller Peninsula
State Park

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APPENDIX 6
POST-SMARM PUBLIC COMMENT LETTERS ON PROPOSED DIOXIN GUIDELINE REVISIONS WITH EMBEDDED DMMP AGENCY RESPONSES

Appendix 6 (Comment Letters with embedded DMMP Responses)

A. Tribes, People for Puget Sound, and Public:

1. Larry Dunn, Lower Elwha Tribe
2. Brian Cladoosby (Tribal Chair), Swinomish Tribe
3. Denice Taylor, Suquamish Tribe
4. Heather Trimm, People for Puget Sound
5. Harry Branch (Interested Citizen)

B. Washington Public Ports Association (WPPA), Ports, and Anchor QEA:

1. Eric Johnson, WPPA
2. Robert Eisner, Port of Anacortes
3. Sue Mauermann, Port of Tacoma
4. Mark Larsen, Anchor QEA

C. Revised (December 6, 2010) New Interim Guidelines for Dioxin:

D. April 27, 2010 Clarification Paper PCDD/F: Revisions to the Supplemental Quality Assurance Project Plan:

1. Delaney Peterson and Joy Dunay, Anchor QEA

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Appendix 6A-1 (Larry Dunn, Lower Elwha Tribe)

Comments on the DMMP proposed guidelines

5/10/2010

LARRY DUNN; LEKT

Having reviewed the proposed guidelines for the use of the DMMP program sites I have a few concerns and issues.

The first is the use of the BOLD Survey data as the basis of the levels of dioxin which are allowed to be disposed at these sites. I will start with my concerns about the Bold Survey data; there are 5 samples in the south sound and one in Hood Canal which significantly skew the results and should be removed from the data set. They should actually be triggers for an investigation of possible cleanup actions in those areas. These samples are clearly outliers and their removal results in the background level dropping to about 2ppt for dioxin from the proposed 4 ppt. This new number would be a more accurate and appropriate level for the Central and South Sound basins. Again adjusting the data by only using the Hood Canal and Whidbey basins the number would likely be closer the 1 ppt. Admiralty inlet, the straits, and the embayments around the straits areas would likely be less than 1ppt as would other areas outside of these basins.

***DMMP Response**: The study design for the 2008 Ocean Survey Vessel (OSV) Bold survey intentionally excluded areas that were in close proximity to point sources and cleanup sites. When the analytical results were reported to the DMMP agencies, several stations were identified as statistical outliers, including samples in South Sound and Carr Inlet. These stations were then subjected to additional review to verify that they were removed from potential point sources of contamination and were not unusual in any other way. The agencies also took the analytical variability for dioxins into consideration. For example, the "Hood Canal outlier" (HC_2_Dup; TEQ = 3.38 pptr) was a field duplicate of sample HC_2 (TEQ = 1.15 pptr), which indicates that the "outlier" is within the analytical variability observed in the data set. Based on this review, the DMMP agencies determined that all stations met the study criteria and decided that none should be rejected simply because they had statistically elevated dioxin concentrations relative to other samples. From a scientific perspective, it was seen as important to use as much of the data that met our requirements as possible to derive a value that represents non-urban Puget Sound. To not do so would make it appear that the agencies were predetermining the numerical value of the management objective.*

Rather than establishing different site management objectives for various geographical areas, the DMMP agencies decided that a single value should be applied for all disposal sites in the Sound. This decision was based on a desire to maintain consistent guidelines across the program and to avoid creating an incentive for inter-bay transfer of dredged material. It should be noted that the 4 pptr TEQ site management objective is not intended to represent natural background for the purposes of sediment

cleanups. The proposed interim guidelines are specifically for the Dredged Material Management Program; site-specific considerations can and should be carried forward on individual cleanups.

Additionally, rather than using average values – as implied in your comments - the agencies used the 90% upper tolerance limit for the 90th percentile of the values to develop guidance. This is consistent with both existing regulations and with the RSET statistical workshop recommendations. Use of an average value to establish a guideline would mean that 50% of the data points from which the average was derived would exceed the guideline and fail. This would clearly be an unacceptable outcome.

The area of Bellingham Bay is likely a separate issue which should be sampled appropriately and a level figured out for it, thought it appears that the non-dispersive site there may have some bearing on the sample results of the area in the southern Bellingham bay. Though there is a belief that when the dredging spoils are released at the non-dispersive sites they all end up in the site area, without detailed bottom current records and the release being at absolute slack tide, I would question the soundness of this presumption. Further we now know that dioxins and PCBs tend to attach to the fine sediment particles and organics which are easily transported by currents, which would lend to their transport to other areas.

***DMMP Response**: The Bellingham Bay nondispersive disposal site has not been used since 1998 when it was used for dredging of the Squalicum Waterway; additionally, local on-shore sources have been identified in the area, especially the Georgia-Pacific mill, which is the likely source for elevated dioxin in Bellingham Bay. Mill effluents (now curtailed) likely carried these compounds into the area, and are much more likely the source of any elevated dioxin values in the vicinity of the disposal site than dredged material disposal.*

Additionally, over twenty years of post-disposal monitoring at the five nondispersive sites has documented that these sites were properly located in relatively nondispersive environments, and that there is no evidence of dredged material migrating out of these sites. Post-disposal monitoring with Sediment Profile Imagery (SPI) is used to document the dredged material disposal footprint within each nondispersive site. Those observations are further verified with chemical and benthic infaunal abundance measurements, and benthic infaunal tissue assessments for bioaccumulative chemicals of concern to ensure that offsite impacts are not occurring from dredged material disposal. This monitoring has consistently verified that disposal of dredged material has not degraded any of the five Puget Sound nondispersive sites.

My second issue is the transport issue; this pertains to the dispersal release sites. Three of these sites are located in Rosario and Juan de Fuca straits. The Port Townsend and Rosario dispersive sites are located in areas of fast currents, a factor in the decision to use them I'm sure. Those same currents create problems with persistent, bio-accumulative chemicals, such as dioxin, furans and PCBs being released in them. We currently know that dioxin/furan and PCBs attach to fine materials in the sediments which afford their easy transport by currents. Fines tend to settle last and frequently re-suspend and re-transported, with tidal currents and storm events, until they reach an area, such as an embayment where they can adhere to the shallow fine sediments in depositional areas. To this issue I would direct your attention to Discovery Bay which was sampled in the Bold Survey and had a resulting

level of dioxin of 1.75ppt, this is surprising to me, as I know of no source in the area to contribute to a dioxin load of this type, and it is not natural background which is closer to about .4ppt which was measured in Dungeness Bay and Freshwater Bay. The only potential source for dioxin in Discovery Bay would be the dispersive sites, both of which feed Discovery Bay, due to the currents in the area.*(NOAA charts)* I am personally aware of these currents having worked boats in these areas for several years. I have also spoken to tribal fishermen and divers who have worked in these areas for many years and they confirmed the strength of the currents in question and the directions. NOAA current charts, though not representing bottom currents, but near surface currents, indicate that the currents from the area of the Port Townsend dispersive site flow around Protection Island into Discovery Bay and around Point Hudson into Admiralty Inlet. This does present a problem with the Port Townsend site, Protection Island is nature preserve, is currently being assessed for a DNR aquatic reserve status, and has on the west side commercial geoduck beds, used by both tribal and state harvesters. These issues indicate that to be responsibly safe this site should be restricted to tested materials sans any persistent bio-accumulative chemicals such as dioxin/furan and PCB's.

The Rosario Strait dispersive site has its own similar issues in that it also feeds into Discovery Bay and along the shoreline into Admiralty Inlet and into Port Gamble bay, this too is an area of commercial geoduck harvest, in fact it is considered one of the most productive beds. I would therefore also submit that this dispersive site be restricted to tested material which has no dioxin/furan or PCBs in it.

My suggestion is that dispersive sites in total be restricted to tested material without persistent bio-accumulative chemicals in them. The potential risks of such materials ending up in areas of concern, such as harvest areas and less polluted embayments, are significant and unacceptable.

DMMP Response*: In response to the Tribe's concerns about the fate and transport of dredged material disposed at the Port Townsend and Rosario Strait dispersive sites, the DMMP agencies are planning to conduct a fate and transport modeling study to see what, if any, sediment might be transported to Discovery Bay, Protection Island and Port Gamble Bay.*

The agencies' current position is that limiting the dispersive sites to "no detectable" dioxins is unreasonable, since high resolution techniques used to analyze for dioxin can quantify down to the parts-per-trillion level with the result that any sediment sample taken from Puget Sound will have at least one detected dioxin congener. The 4 pptr guideline established by the DMMP agencies for dispersive sites conforms to the narrative standard in the Sediment Management Standards and represents a significant reduction in allowable dioxin concentrations in comparison to the former guideline of 15 pptr.

This said; I do recognize that the non-dispersal sites are different, being in deep water and monitored. Based on these factors and the results of the Bold Survey seeming to indicate that in general, these controls appear to be working reasonably well; lead to my conclusion of my general acceptance of the guideline level. Though I question the concept of sediment falling through 400 feet of water all ending up in an area of less than a mile square, I concede that once there, sufficient safeguards are used to reasonably protect the material. Therefore as these are specific sites for the dumping of contaminated

material I would agree with the guideline level of 4ppt annual for those sites, even though this may be above surrounding areas.

DMMP Response: *It must be pointed out that none of the DMMP disposal sites may be used for the disposal of "contaminated material". Material disposed at these sites must be found suitable for open-water disposal by the DMMP agencies. Only minor adverse effects (Site Condition II) are allowed at nondispersive sites and no adverse effects (Site Condition 1) are allowed at dispersive sites.*

Also, as can be seen in the following table, the nondispersive site management objective of 4 pptr falls within the range of concentrations found in the areas surrounding the disposal sites. In the case of Elliott Bay and Bellingham Bay, the surrounding areas are significantly higher than the site management objective.

Dioxin/Furan Sediment Concentrations* at DMMP Nondispersive Sites

Disposal Site	Year	Onsite: Mean (Range), n = # of stations	Offsite: Mean (Range), n = # of stations
Anderson/Ketron Island	2005	3.1, n = 1	3.6 (1.7 – 6.8), n = 7
Anderson/Ketron Island	2008	1.1, n = 1	2.2 (1.5 – 3.1), n = 7
Commencement Bay	2007	5.2 (1.1 – 14.2), n = 4	2.4 (0.86 – 5.2), n = 10
Elliott Bay	2005	3.0 (0.7 – 6.7), n = 3	no samples collected
Elliott Bay	2007	9.7 (2.5 – 17), n = 3	8.7 (4.0 – 12.2), n = 11
Port Gardner	2006	1.8 (0.71 – 2.6), n = 4	4.1 (3.1 – 5.2), n = 9
Port Gardner **	2010	2.1 (1.4 – 2.6), n = 10	3.6 (3.0 – 4.3), n = 4
Bellingham Bay	2007	5.5 (4.9 – 6.1), n = 2	6.9 (4.3 – 10.5)[1],n = 9

*** Concentrations in ppt-dry weight-TEQ; data extracted from SAIC 2005, 2006, 2008, 2009, and 2010**
****Preliminary data undergoing validation**

Lastly I would recommend that for all dredged spoils from areas not previously dredged testing for dioxin/furans and PCBs prior to acceptance should be required, my basis for this is the outliers of the Bold Survey which found dioxin in areas which had not previously been believed to have such concentrations. This in addition to the Budd Inlet where the cleanup was to be wood waste and testing found high level s of dioxin in the sediments, changing the nature of the cleanup. This indicates that suspicion is not a valid measure of what should be tested. In fact if anything it is an indicator that all dredged material should be tested before acceptance into the DMMP sites.

DMMP Response: *In order to address the Tribe's concern about exposure to dioxin in sediments disposed at the dispersive sites, the DMMP agencies have made a modification to the interim guidelines proposed at the 2010 Sediment Management Annual Review Meeting. This modification provides a more conservative approach to the evaluation of dioxins for projects proposing disposal at a dispersive site. For those projects for which dioxin testing would not normally be required under the reason-to-believe guidelines, the DMMP agencies may require dioxin analysis of a reduced number of sediment*

[1] Mean & range excludes Benchmark station BBB01 located near the Georgia Pacific Outfall with 22 pptr-dry- weight-TEQ

samples to verify that the project does not have elevated dioxin concentrations. The decision to conduct this testing will be based on the size of the project and the grain-size characteristics of the dredged material. This requirement will stay in effect at least until results of the dispersive-site modeling study (see earlier comment) are available. Depending on the outcome of this study, the expanded dioxin testing requirement may be retained or dropped.

PCBs have been on the standard list of chemicals of concern since the beginning of the program and are required to be analyzed for every project.

The issue of natural background based on ubiquitous chemical contamination is frequently brought up therefore if it is necessary to establish such concentrations the only areas which should be considered are areas which are isolated from the currents of Puget Sound and unaffected by the DMMP program activities. This should show such a background with levels of Dioxin /furan and PCBs much lower than described by the Bold Survey.

DMMP Response: *The DMMP agencies determined that the sampling locations used for the OSV Bold survey fit the definition of "natural background" as defined in the MTCA rule language.*

SOURCES:

NOAA Juan de Fuca circulations

Tidal Currents of Puget Sound, Starpath publications, Seattle, Washington

Appendix 6A-2 (Brian Cladoosby (Tribal Chair) Swinomish Tribe)

Phone (360) 466-3163
Fax (360) 466-5309

Swinomish Indian Tribal Community

A Federally Recognized Indian Tribe Organized Pursuant to 25 U.S.C. § 476
11404 Moorage Way
LaConner, Washington 98257-0817

June 28, 2010

To: DMMP agencies
dioxinproject@usace.army.mil

From: Brian Cladoosby, Chair
Swinomish Indian Tribal Community

RE: comments on the proposed DMMP guidelines

I am writing in response to the proposed DMMP dioxin guidelines.
My comments are as follows:

1. Dispersive sites be restricted to tested material with levels of COCs equivalent to or less than the Freshwater Bay site. The potential risks of materials with levels of COCs any higher than Freshwater Bay ending up in areas of concern, such as harvest areas and less polluted embayments, are significant and unacceptable.

DMMP Response: *The DMMP agencies decided that a single site management objective should be applied for all disposal sites in the Sound, both dispersive and non-dispersive. This decision was based on a desire to maintain consistent guidelines across the program and to avoid creating an incentive for interbay transfer of dredged material. The 4 pptr TEQ site management objective was derived using data from the 2008 Ocean Survey Vessel (OSV) Bold survey of non-urban locations in Puget Sound as well as existing dioxin data from reference locations, rather than focusing on only the most pristine embayments.*

By limiting dioxin in dredged material to 4 pptr, the agencies do not believe there will be any impact to harvest areas. The strong currents in the vicinity of the three dispersive sites rapidly disperse dredged material placed there. However, in response to tribal concerns about the fate and transport of dredged material disposed at the Port Townsend and Rosario Strait dispersive sites, the DMMP agencies are planning to conduct a fate and transport modeling study to see what, if any, sediment might be transported to Discovery Bay, Protection Island and Port Gamble Bay.

2. All dredged spoils from areas not previously tested for dioxin/furans and PCBs should be tested prior to acceptance. This comment is based on the outlier findings in the Bold Survey, which found dioxin in areas that had not previously been believed to have such concentrations.

DMMP Response: Over the past two years we have applied new reason-to-believe guidelines for dioxin testing that have resulted in 72% of the projects requiring testing (Dredging Year 2010: 86%; Dredging Year 2009: 61%) for dioxin/furans.

PCBs have been on the standard list of chemicals of concern since the beginning of the program and are required to be analyzed for every project. Due to the high cost of dioxin testing, the agencies are hesitant to require it on every project, especially smaller projects. But, in order to address tribal concerns about exposure to dioxin in sediments disposed at the dispersive sites, the DMMP agencies have made a modification to the interim guidelines proposed at the 2010 Sediment Management Annual Review Meeting. This modification will provide a more conservative approach to the evaluation of dioxins for projects proposing disposal at a dispersive site. For those projects for which dioxin testing would not normally be required under the reason-to-believe guidelines, the DMMP agencies may require dioxin analysis of a reduced number of sediment samples to verify that the project does not have elevated dioxin concentrations. The decision to conduct this testing will be based on the size of the project and the grain-size characteristics of the dredged material. This requirement would stay in effect at least until results of the proposed dispersive-site modeling study (see earlier comment) are available. Depending on the outcome of this study, the expanded dioxin testing requirement may be retained or dropped.

3. Use the term "modern" background instead of "natural" background, particularly when referring background concentrations that are considered to be reflective of the ubiquitous chemical presence in Puget Sound today. Moreover, determining which locations are deemed as demonstrating "modern" levels should be given careful consideration such that "hot spots" are not misconstrued as representing "modern" background levels. Then each cleanup site should take a look at local "modern" background for nearby Bold or PSAMP data that more realistically fits background levels.

DMMP Response: *Use of different terminology to describe the intent of the guidance only invites further confusion, since we are using terminology defined in the state rule (MTCA). As the "natural background" concept underlies the rationale for the selection of an upper bound on background, the agencies will retain it to describe the data used to develop the new interim guidelines. Samples included in the dataset were carefully screened to avoid "hotspots". While industrial hotspots are certainly a feature of modern life, evidence suggests that broad distribution patterns of dioxins/furans appear to be related to air deposition from combustion as opposed to sediment transport from a nearby industrial source. Because the OSV Bold sampling locations and the additional reference site data used to develop the new interim guidance were located outside urban embayments and away from outfalls and cleanup sites, the DMMP agencies believe the OSV Bold data represent this broad background distribution of dioxin.*

4. The proposed dioxin background level of 4 ppt is skewed due to the inclusion of outliers in the determination. By reviewing the majority of the sites, we believe that a background level of 2 ppt is a more appropriate and representative dioxin background level.

DMMP Response*: The study design for the OSV Bold survey intentionally excluded areas that were in close proximity to point sources and cleanup sites. When the analytical results were reported to the DMMP agencies, several stations were identified as potential outliers, including samples in South Sound and Carr Inlet. These stations were subjected to additional review to verify that they were removed from potential point sources of contamination and were not unusual in any other way. The agencies also took the analytical variability for dioxins into consideration. For example, the Hood Canal sample "HC_2_Dup" (TEQ = 3.38 pptr) was a field duplicate of a sample from the same location, "HC_2" (TEQ = 1.15 pptr). In this case, the difference between the two samples (2.23 pptr) reflects the analytical variability observed in the data set. Based on this review, the DMMP agencies determined that all stations met the study criteria and decided that none should be rejected simply because they had statistically elevated dioxin concentrations relative to other samples. From a scientific perspective, it was seen as important to use as much of the data that met our requirements as possible to derive a value that represents non-urban Puget Sound. To not do so would make it appear that the agencies were predetermining the numerical value of the management objective.*

Also, it should be noted that the 4 pptr guideline value was not derived from the OSV Bold dataset alone. Data from established reference areas were also included and the Kaplan-Meier approach (Dennis R. Helsel. 2010 (in press). Summing Nondetects. Integrated Environmental Assessment and Management. SETAC Press.) was used to estimate undetected values. Statistical evaluation of the OSV Bold data alone gives different values than the larger data set used to establish the 4/10 guidance. See the following webpage for details on the derivation of the 4 pptr guideline value:

http://www.nws.usace.army.mil/PublicMenu/Doc_List.cfm?sitename=DMMO&pagename=Dioxin_Statistics

5. Close the loopholes for small dredging jobs by requiring the same screening level of 4ppt. As it currently stands, there is not enough predictive power to know whether subsequent dredge loads deposited on top of the small dredge load will sufficiently cover the small load and be able to keep the total loads dumped within the required yearly average ppt.

The DMMP agencies included the small-business consideration to provide some relief to small businesses with small dredging projects (< 4,000 cy) impacted by the new interim guidelines. The DMMP will carefully scrutinize all available information/data, including the dredging schedule for projects planning to use the same disposal site when evaluating projects meeting the small-business considerations. As such, the proposed small-business consideration will not be a loophole. In the end, the results of disposal site monitoring will be carefully reviewed to ensure the 4 pptr site management objective is achieved at the non-dispersive sites.

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Appendix 6A-3 (Denice Taylor, Suquamish Tribe)

Environmental Program
Fisheries Department
360/394-8450
Fax 360/598-4666

THE SUQUAMISH TRIBE
P.O. Box 498 Suquamish, Washington 98392

June 29, 2010

To: DMMP Agencies
dioxinproject@usace.army.mil

From: Denice Taylor
Environmental Programs
Fisheries Department
Suquamish Tribe

Re: Proposed Changes to Interim Guidelines for Dioxin
April 19, 2010

The Suquamish Tribe ("Tribe") supports the DMMP objective of revising the guidelines for dioxin in dredged sediment to be more protective of human and ecological health. Changes to the existing guidelines are clearly warranted given the toxicity of dioxins, the conclusion of the DMMP agencies' risk assessment that existing environmental dioxin levels pose an unacceptable risk of adverse health effects via consumption of seafood, particularly to tribal populations, as well as the fact that dioxin concentrations in sediment at several open-water disposal sites are now higher than background levels in Puget Sound.

More protective guidelines are necessary to remain consistent with water quality and sediment management standards. The DMMP was established to manage materials dredged to maintain navigational waterways and berth depths. DMMP disposal sites are state owned aquatic lands and are not to be used to dispose of contaminated sediment.

Additional comments regarding the proposed changes follow:

Background Data Set

A concentration of 4 pptr TEQ is identified as a background-based goal consistent with the 2009 Puget Sound Main Basin data set (the BOLD data). As noted in the proposed guidelines, 4 pptr TEQ is the nonparametric estimation of the 90% UCL for the 90th percentile of the distribution of the data set. It is understood that this statistical approach was adopted in an effort to reduce the number of potential false positives during testing (i.e. material erroneously determined to be unsuitable for disposal due to dioxin levels).

The Tribe does not believe that 4 pptr TEQ represents current "background" conditions. In the BOLD data set, dioxin TEQ values ranged from <1 to 11.6 pptr TEQ. Approximately 87% of the samples (65 of 75 samples) had TEQ values under 2 pptr TEQ. The Tribe believes that 2 pptr TEQ is a better representation of overall current conditions in Puget Sound.

Dispersive Site Management Objective (SMO)

Dispersive sites are subject to more stringent standards in order to ensure that disposal of dredged material will result in no adverse effects. As the DMMP is adopting a background-based goal, the SMO for dispersive sites should be set at a level no higher than 2 pptr TEQ.

DMMP Response: *The reason for doing the background survey was to determine the distribution of concentrations that one would find outside urban areas and away from point sources of contamination. The fact that some of these concentrations were elevated compared to others is an indication of both the geographic and analytical variability that can be expected when analyzing sediment for dioxin. Use of the UCL on an upper percentile of the data was recommended by the RSET statistical workshop experts to provide an upper bound for what might be considered background. As pointed out in the comment, use of the 90% UCL for the 90th percentile of the data set reduces the number of potential false positives during testing. The problem with setting the site management objective to 2 pptr is that 13% of the background data points from the 2008 Ocean Survey Vessel Bold survey would fail to meet this objective. This means that even sediment from areas considered by the DMMP as representing background would fail dioxin testing. The DMMP agencies believe this would be an overly restrictive guideline.*

Non-dispersive SMO

The DMMP is proposing a concentration of 4 pptr TEQ as a dredged material screening level that would achieve the SMO of keeping dioxin concentrations at or below current conditions. Again, the Tribe believes that a concentration of 2 pptr TEQ is a better overall estimation of current conditions.

However, as a volume-weighted average for an entire dredging project, 4 pptr TEQ may provide a functional screening level to discriminate contaminated material from non-contaminated material. If only non-contaminated materials are approved for disposal, dioxin concentrations should be at or below current background levels.

The Tribe agrees with the DMMP agencies' plan to increase the number of on-site sediment monitoring samples to determine if site conditions remain at or below current background levels. The inclusion of DMMUs with concentrations of up to 10 pptr TEQ (if the volume-weighted average for the project is less than 4 pptr TEQ) should not be allowed until an effective monitoring program is implemented and/or the site is at or below current background levels.

DMMP Response: *As indicated in our response to the earlier comment regarding the dispersive site management objective, the DMMP agencies believe that 4 pptr TEQ is the upper limit to what can be considered background dioxin concentrations in Puget Sound as a whole. By setting the screening level for the volume-weighted mean for any given project to 4 pptr and carefully sequencing the dredging and disposal of dredged material management units, the DMMP agencies are confident that the site management objective of 4 pptr can be achieved. The enhanced disposal-site monitoring program will provide the feedback necessary to determine whether the management objective is being met. If the management objective is not being met, the DMMP agencies will determine what changes are necessary to the evaluation procedures.*

Bioaccumulation Test Option

Given the lack of target tissue levels and limitations in understanding bioavailability relations, all bioaccumulation endpoints and comparisons should be conservatively protective of human and ecological receptors. The Tribe requests that the DMMP agencies discuss proposed approaches, test results and the development of a tissue database with tribal staff as appropriate.

DMMP Response: The DMMP plans to convene a workgroup to develop the bioaccumulation testing protocol and interpretive guidelines for open-water disposal. We would be happy to include representatives of the Suquamish Tribe on the workgroup.

Dioxin Reason to Believe Factors and Testing Requirements

"No historical information showing that dioxin is below interim guidelines" should be a separate reason to believe factor. It should not be coupled with the factor relating to location within an urban bay.

Deeper sediments identified as native should only be assumed to be below interim guidelines if there is no other reason to believe factor present. If overlying sediments do not meet interim guidelines, native sediment should be tested before disposal.

DMMP Response: *Over the past two years we have applied new reason-to-believe guidelines that have resulted in 72% of the projects requiring testing (Dredging Year 2010: 86%; Dredging Year 2009: 61%) for dioxin/furans. Being located outside an urban area does not necessarily exempt a project from dioxin testing. For example, due to the historical presence of a hog-fuel boiler, the Thatcher Bay restoration project (Blakely Island) was required to test for dioxin. Also, the Corps of Engineers has been testing for dioxin at all of the federal navigation projects in Puget Sound, regardless of location. However, due to the high cost of dioxin testing, the agencies are hesitant to require it on every project, especially smaller projects. But, in order to address tribal concerns about exposure to dioxin in sediments disposed at the dispersive sites, the DMMP agencies have made a modification to the interim guidelines proposed at the 2010 Sediment Management Annual Review Meeting. This modification provides a more conservative approach to the evaluation of dioxins for projects proposing disposal at a dispersive site. For those projects for which dioxin testing would not normally be required under the reason-to-believe guidelines, the DMMP agencies may require dioxin analysis of a reduced number of sediment samples to verify that the project does not have elevated dioxin concentrations. The decision to conduct this testing will be based on the size of the project and the grain-size characteristics of the dredged material.*

Deeper native sediments are also not necessarily exempt from dioxin testing. Samples of the native sediment are typically archived pending the results from overlying sediment. If the dioxin concentration is elevated in the overlying sediment, the native sediment must be analyzed to determine the extent of contamination. In addition, if there is reason to believe that groundwater flow from a dioxin-contaminated upland site might impact native sediment, the native material would need to be tested.

Small Business Consideration for Non-Dispersive Sites

Because it is unclear how the DMMP agencies would be able to anticipate annual use of disposal sites with enough certainty to determine that allowing small project exceptions (disposal of sediment containing up to 10 pptr TEQ for a total dredged volume of <4,000 cy) would be consistent with keeping dioxin levels at or below current levels, these exceptions should not be allowed.

DMMP Response: *The DMMP agencies included the small-business consideration to provide some relief to small businesses with small dredging projects (< 4,000 cy) impacted by the new interim guidelines. The DMMP will carefully scrutinize all available information/data, including the dredging schedule for projects planning to use the same disposal site, when evaluating projects meeting the small-business guidelines. As such, the proposed small-business consideration will not be a loophole. In the end, the*

results of disposal site monitoring will be carefully reviewed to ensure the 4 pptr site management objective is achieved at the non-dispersive sites.

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Appendix 6A-4 (Heather Trimm, People for Puget Sound)

PSS COMMENT LETTER
June 30, 2010
Dredged Material Management Program Team
Via E-mail: dioxinproject@usace.army.mil
RE: Proposed New Dioxin Guidelines for Dredged Sediment Disposal in Puget Sound
Dear DMMP Team,
We are writing to comment on the *Proposed New Dioxin Guidelines for Dredged Sediment Disposal in Puget Sound* developed by the Dredged Material Management Program (DMMP) Agencies. People For Puget Sound is a nonprofit, citizens' organization whose mission is to protect and restore Puget Sound and the Northwest Straits.
We are pleased that these guidelines have been developed and that the DMMP is moving forward on both dioxin (the present proposal) and on PCBs. We also appreciate the comprehensive public participation process that has occurred.
Our specific comments follow:

- **Background-based goal.** We appreciate that DMMP has acquired new data for this project in order to determine background levels for Puget Sound and Straits. The level chosen (4 ppt) for this proposal, however, is not low enough as has been described by Larry Dunn because of the use of outliers in the averaging. The level should be at least as low as 2 ppt for the central and main basins and even lower for northern Sound and areas west. Natural background levels are much lower and that is the target for where we should be trending over time. So we appreciate that these background levels should only be viewed as interim as we move towards a healthy Puget Sound, but even these proposed interim levels are too high.

***DMMP Response**: The study design for the 2008 Ocean Survey Vessel Bold survey intentionally excluded areas that were in close proximity to point sources and cleanup sites. When the analytical results were reported to the DMMP agencies, several stations were identified as potential outliers, including samples in South Sound and Carr Inlet. These stations were subjected to additional review to verify that they were removed from potential point sources of contamination and were not unusual in any other way. The agencies also took the analytical variability for dioxins into consideration. For example, the "Hood Canal outlier" indentified by Larry Dunn of the Lower Elwha Klallam Tribe (HC_2_Dup; TEQ = 3.38 pptr) was a field duplicate of sample HC_2 (TEQ = 1.15 pptr), which indicates that the "outlier" is within the analytical variability observed in the data set. Based on this review, the DMMP agencies determined that all stations met the study criteria and decided that none should be rejected simply because they had statistically elevated dioxin concentrations relative to other samples. From a scientific perspective, it was seen as important to use as much of the data that met our requirements as possible to derive a value that represents non-urban Puget Sound. To not do so would make it appear that the agencies were predetermining the numerical value of the management objective.*

Rather than establishing different site management objectives for various geographical areas, the DMMP agencies decided that a single value should be applied for all disposal sites in the Sound. This decision was based on a desire to maintain consistent guidelines across the program and to avoid creating an incentive for interbay transfer of dredged material.

Additionally, rather than using average values – as implied in Larry Dunn's comments - the agencies used the 90% upper tolerance limit for the 90th percentile of the values to develop guidance. This is

consistent with both existing regulations and with the RSET statistical workshop recommendations. Use of an average value to establish a guideline would mean that 50% of the data points from which the average was derived would exceed the guideline and fail. This would clearly be an unacceptable outcome.

- **Increased dioxin testing**. We support increased testing of dredge material. We have been concerned about the lack of testing for many previous disposal actions. We support that *all* materials proposed for inwater disposal be tested for dioxin. There are too many examples of cases where dioxin (both upland and in sediment) was not *believed* to be present but was found after all. An example are areas (such as Fisherman's Terminal) that would not necessarily fit into an "urban bay" definition.

DMMP Response: *The Fishermen's Terminal project (tested in 2004) preceded the revision of the reason-to-believe guidelines (ca. 2007). All projects along the Lake Washington Ship Canal are considered to be urban projects and would be required to test for dioxins under the revised guidelines. Due to the high cost of dioxin testing, the agencies are hesitant to require it on every project. However, in order to address tribal concerns about exposure to dioxin in sediments disposed at the dispersive sites, the DMMP agencies have modified the interim guidelines proposed at the 2010 SMARM. This modification provides a more conservative approach to the evaluation of dioxins for projects proposing disposal at a dispersive site. For those projects for which dioxin testing would not normally be required under the reason-to-believe guidelines, the DMMP agencies may require dioxin analysis of a reduced number of sediment samples to verify that the project does not have elevated dioxin concentrations. The decision to conduct this testing will be based on the size of the project and the grain-size characteristics of the dredged material.*

- **Dispersive Sites.** Dispersive sites should be carefully managed, with no bioaccumulative toxic chemicals dispersed, given the movement of currents and the natural resources to be protected.

DMMP Response: *Comment noted. We take the management of all our disposal sites seriously, especially disposal of material at the dispersive sites. However, limiting the dispersive sites to "no detectable" dioxins is unreasonable, since high resolution techniques used to analyze for dioxin can quantify down to the parts-per-trillion level with the result that any sediment sample taken from Puget Sound will have at least one detected dioxin congener. The 4 pptr guideline proposed by the DMMP agencies for dispersive sites conforms to the narrative standard in the Sediment Management Standards and represents a significant reduction in allowable dioxin concentrations in comparison to the former guideline of 15 pptr.*

- **Testing in tissue in areas around disposal sites.** We are concerned that testing be conducted in fish tissue and/or other means in order to determine bioaccumulation in the vicinity of disposal sites.

DMMP Response: *Benthic tissue assessment has been a requirement for DMMP monitoring at nondispersive sites over the past 22 years. Since the process for revising dioxin guidelines began in 2007, the DMMP agencies have included analysis of fish tissue (English sole and Starry Flounder) and crab*

tissue (Dungeness) as a special component of site monitoring. The DMMP agencies are also considering inclusion of laboratory bioaccumulation testing of sediments collected for site monitoring in cases where it is difficult to obtain sufficient in situ tissues for analysis.

- **Piecemealing.** We also recommend that the proposal include tightened language to prevent piecemealing. The provision for small projects is not strong enough to prevent an entity from stringing along a project over many years by breaking it into smaller projects (and thus avoid the triggers).

DMMP Response: *In developing the small-business/small-project component of the revised guidelines, the DMMP agencies paid particular attention to the language defining projects that may qualify for this consideration. For example, we used the definition of a small business given in WA State regulations (Chapter 19.85 RCW) as a requirement. We also explicitly disallowed the intentional partitioning of a larger project to meet the 4,000 cubic yard project size limit and required that project volumes be defined in as large a context as possible to minimize the cumulative effects of multiple small discharges (e.g., for multi-year maintenance permits or single contracts dredging multiple locations). The DMMP agencies believe that the current wording of the small-business/small-project consideration is sufficient to prevent "piecemealing".*

We look forward to working with the DMMP team as the new proposals get developed.
Thank you for your consideration. You can reach me at (206) 382-7007 X172 if you have any questions or concerns.
Sincerely,
Heather Trim
Urban Bays and Toxics Program Manager

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Attachment 6A-5 (Harry Branch, Interested Citizen)

From: hwbranch@aol.com
To: DLL-NWS-DioxinProject
Subject: dioxin standards
Date: Friday, June 11, 2010 10:45:05 AM

Dear United States Army Corps of Engineers,

Re: Dioxin

Thank you for continuing to shine a light on this problem and work toward a solution.

I have been working locally on contamination issues in Budd Inlet and have been studying the effects of dioxin on humans and the marine environment for about the past four years.

I have found a lot of the science on dioxin's potential for biological damage to be clouded by industry influence. Some health consultations contain no clearly stated level of exposure that would be considered excessive. Ingestion, inhalation and dermal exposure are not added together to determine cumulative risk. Studies based entirely on marine benthic sediment samples are sometimes applied to land where concentrations can run as much as ten times higher. And so on.

Contrary to repeated claims, dioxin is not naturally occurring in anything other than non-detectable concentrations and it is not going away. If we see a decline in samples taken world-wide, this is because all samples world-wide have been taken in areas that are thought to be contaminated, otherwise why bother sampling. Dioxin is dispersing not disappearing. This dispersal is only going to increase dioxin's bioavailability. The only solution is to remove dioxin from the environment through diligent cleanup efforts.

Dioxin in Puget Sound that has been "cleaned up" has actually been moved to or capped in place in nearshore containments. There is a growing awareness of Puget Sound's history of earthquakes. A subduction fault off the coast could generate a magnitude 9 earthquake and ten surface faults in the Puget Sound basin could generate very damaging quakes. In big earthquakes estuaries sink so many of the containments will end up underwater. There is evidence of tsunamis leaving sand far inland meaning that dioxin released in these numerous containment failures could be spread far and wide.

The Corps of Engineers is correct to keep levels of accepted disposal dioxin concentrations as low as practicably possible. We will be well served by any efforts to remove these things from our environment any place we can.

Harry Branch
239 Cushing St NW
Olympia WA 98502
hwbranch@aol.com

Response. The DMMP agencies acknowledge the comment letter and appreciate your interest in the dioxin guideline development process. We will keep you informed on all future revisions.

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Appendix 6B-1 (Eric Johnson, Washington Public Ports Association)

June 30, 2010
Dredged Material Management Program Dioxin Project
By email to: dioxinproject@usace.army.mil.
Re: Proposed Dioxin Standards for Open Water Sediment Disposal
Dear DMMP Agency officials:
The Washington Public Port Association ("WPPA") thanks you for the opportunity to comment on the Proposed Changes to Interim Guidelines for Dioxins (the "Proposal"), released on April 19, 2010. As public entities, we share the DMMP agencies' goal of ensuring that dredged materials are disposed of in an environmentally sound manner. We also recognize the scientific and legal complexities of establishing guidance for dioxin in sediments. Nonetheless, we are extremely disappointed in how the DMMP agencies (the "Agencies") have arrived at their decision to put forward a proposal that is essentially unchanged from early in 2009. Despite significant new information that has been brought forward over the past two years from ports and others, the Agencies have chosen to move ahead with an unchanged approach without providing any new analyses or evaluations in response to earlier input showing the flaws in the Proposal and its justifications. As entities that understand maritime commerce and dredging issues as well as anyone, and as partners with the Agencies in the DMMP process since its inception, the information and perspectives provided by ports deserves a full and fair evaluation. Because the Proposal is so similar to the earlier Agency proposals, the technical, policy and legal concerns we have expressed multiple times before in this process remain unchanged. Earlier comment letters and information submittals from WPPA and member ports are attached to this letter, and we ask for you to review them with fresh eyes. The remainder of this letter summarizes and updates those concerns.

DMMP Response #1: *The DMMP proposal was developed over a three year period. During that time, the DMMP agencies provided numerous opportunities for discussion and input from interested parties. The DMMP agencies have documented the full chronology of meetings with stakeholders (Table 1) over the past 3 years to show our good-faith effort in reaching out to all stakeholders. We have also documented the director-level meetings focused on the dioxin guideline revisions, to demonstrate DMMP and Puget Sound Partnership interest in this issue (Table 2).*

The DMMP agencies received extensive comments over the 3 year period. The DMMP carefully considered all comments in developing the 2009 and 2010 proposals and the revised guidelines issued in November 2010. The DMMP's response to the earlier input has been summarized in various documents and presentations that were posted on-line. Additional responses were made verbally during meetings and workshops. The evaluation and responses to comments on the 2010 proposal will also be posted on-line.

The DMMP agencies recognize that the 2010 proposal is similar to the 2009 proposal. However, there are some important differences that reflect the agencies consideration of comments from the dredging community. For example, the DMMP agencies modified the case-by-case considerations and added the small-business consideration. The latter, in particular, was intended to create greater flexibility in response to the ports' concerns for the effects of the revised guidelines on smaller maintenance projects. Detailed discussion of these and the other comments raised in the remainder of this letter are included below.

It is also important to understand that the agencies needed to work within the existing Sediment Management Standards (SMS) framework, which currently only has narrative standards for bioaccumulative compounds such as dioxins. The SMS rule includes a two-tiered decision-making

framework, with the Sediment Quality Standards (SQS) representing the lower, more protective, tier. The SMS rule also authorizes Ecology to designate open-water disposal sites as Sediment Impact Zones (SIZ), which would allow elevated concentrations (the second, upper tier, SIZmax) at the disposal sites. Although the SMS authorizes Ecology to designate the disposal sites as SIZs, the Department never designated them as such because disposal site monitoring results showed that on-site samples rarely/never exceeded SQS for benthic toxicity. Thus, unless the sites are established as Sediment Impact Zones, the upper tier cannot be considered in the development of guidance. In the early phases of the DMMP dioxin process, the agency directors made a policy decision not to pursue any action requiring that the sites be designated as SIZs out of concern that the benefits of designating SIZs would not outweigh the issues with implementing them. The rationale behind this decision is documented in the SMARM 2009 issue paper presented by the agencies (page 13 of attachment 2 of the SMARM 2009 issue paper).

Table 1. Public Stakeholder Meetings on Dioxin Regulatory Revisions

Date	Forum	Topic
August 10, 2006	DMMP Monthly Meeting	Eric Johnson & Integral provide comments on A/K Dioxin Tech Memo.
May 2, 2007	Sediment Management Annual Review Meeting (SMARM)	Anderson/Ketron Disposal Site Interim Dioxin Guideline, Conceptual paradigm for Interim Approach
September 5, 2007	Stakeholder Outreach: Dioxin Project	Meeting with Doug Hotchkiss, Heather Trim, Lynn Barre and Dan Averill to plan public workshops
September 26, 2007	Dioxin Public Workshop, Seattle (COE)	Stakeholder Outreach – discuss options
October 2, 2007	Dioxin Public Workshop, Lacey (Ecology)	Stakeholder Outreach – discuss options
October 11, 2007	Dioxin Public Workshop, Bellingham (POB)	Stakeholder Outreach – discuss options
October 16, 2007	Dioxin Public Workshop, Port Angeles	Stakeholder Outreach – discuss options
October 19, 2007	Technical Workshop, Seattle (COE)	Stakeholder Outreach – technical discussion of problem and alternatives
November 6, 2007	Dioxin Technical Workshop, Seattle (COE)	Discuss Types of Risk Assessment, Risk Parameters, Multi-Criterion Decision Analysis
March 27, 2008	Northwest Indian Fisheries Commission Monthly Meeting, Lacey	Briefing on Dioxin Framework by DMMP staff
May 14, 2008	SMARM	Dioxin Framework Presentation
June 24, 2008	Special meeting with WPPA and Ports, Seattle (COE)	Discuss SMARM presentation on Dioxin Framework
October 7, 2008	RSET/DMMP Statistical Experts Workshop, Seattle Public Library	Discuss statistical issues involving dioxin data.
February 23, 2009	Meeting between EPA & Port of Bellingham/Anchor, Seattle (COE)	Port-requested meeting to provide preliminary feedback on DMMP Dioxin proposal
March 11, 2009	Stakeholder Technical Workshop, Seattle (COE)	Provide pre-SMARM overview of Agencies' proposal
April 16, 2009	Meeting with Port Representatives, Seattle (COE)	Discuss project-impact and economic analysis
April 22, 2009	Meeting with Tribal Representatives, Seattle (COE)	Provide pre-SMARM overview of Agencies' proposal and discuss issues
April 23, 2009	Meeting with People for Puget Sound and Fred Felleman, Seattle (COE)	Provide pre-SMARM overview of Agencies' proposal
May 6, 2009	SMARM	Dioxin Issue Paper, Public Issue Papers
May 18, 2009	Stakeholder Outreach, Lacey (St. Martin's Priory)	Post-SMARM Public Workshops – Regulatory Context, Project Objectives and Risk Assessment
May 28, 2009	Stakeholder Outreach, Seattle (COE)	Post-SMARM Public Workshops – Material Pass/Fail Analyses, Impacts to Dredging, Relative Risk

June 24, 2009	Stakeholder Outreach, Seattle (COE)	Post-SMARM Public Workshops – Port of Bellingham Pilot Proposal, Input re: Moving Forward, PCBs and other Bioaccumulatives
May 5, 2010	SMARM	Revised Dioxin Issue Paper, Public Issue Papers
June 11, 2010	Meeting between WPPA and EPA RA, Seattle (EPA)	WPPA requested meeting to discuss proposed framework

Table 2. Dredged Material Management Program, Puget Sound Partnership Director Meetings Focused on Dioxin Guideline Revisions

Date	Forum	Topic
February 6, 2007	**DMMP and PSWQAT Director's Meeting**	Dioxin Issues, etc. surfaced for DMMP action
January 24, 2008	**DMMP & PSP Director's Meeting**	Dioxin Framework Briefing
April 18, 2008	**DMMP & PSP Director's Meeting**	Dioxin Framework Status Briefing
January 28, 2009	**DMMP & PSP Director's Meeting**	Dioxin Framework Status Briefing
December 18, 2009	**DMMP & PSP Director's Meeting**	Dioxin Issue Paper Revisions
September 15, 2010	**DMMP & PSP Director's Conference Call**	Decision for new Interim Dioxin Framework

I. Process Problems

In at least two sets of past comments, and through numerous meetings with Agency officials over the last several years, our members jointly and individually provided the Agencies with information about:

- Anticipated impacts on port district operations and specific projects (both port and private entity projects) that will not go forward as planned in the event the Agencies implement their proposed changes to the dioxin suitability criteria.

***DMMP Response #2**: Agency responses on individual projects can be found in Appendix A.*

- Fundamental flaws in the Agencies' analysis of the Proposal's potential economic impacts.

***DMMP Response #3:** The DMMP staff worked with the project-specific data available to them. The ports indicated they would provide information that would be critical to a more complete economic evaluation but little detailed information was submitted. The information that was provided, such as upland disposal costs, was incorporated into revisions of the economic analysis.*

- Suggestions for appropriate analyses of incremental human health risks from open water disposal of sediments containing dioxin and other bioaccumulative chemicals of concern.

***DMMP Response #4:** The DMMP agencies received several comments following the 2007 workshops with recommendations and examples for incremental risk calculations. Several individuals and organizations provided updated recommendations during meetings held in 2009. After reviewing the examples and recommendations provided by the ports , the DMMP agencies performed their own incremental risk calculations and a worksheet with the resulting values was distributed to stakeholders attending the (May 18, 2009) DMMP dioxin technical workshop. A copy of the worksheet is available at*

the following web site:
http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/Summary_of_Incremental_Risk_Calcs_051209&intro.pdf.

The DMMP calculations were generated in response to earlier stakeholder suggestions that sediment values associated with specific risk increments (10E-5 or 10E-6) would be a possible approach to generating new dioxin guidelines. The exposure assumptions and approach used to generate hypothetical risk-based sediment guidelines were determined by the DMMP agencies based on best professional judgment and/or consultation with experts from other resource agencies and do not reflect consensus with the stakeholder community.
The DMMP agencies decided not to proceed further with this approach. The rationale for this decision includes the following:

- *An incremental risk approach is one option for making case-by-case decisions within the context of a sediment impact zone. However, the agencies had previously decided not to designate the DMMP sites as sediment impact zones.*
- *The agencies concluded that use of an incremental risk approach provided limited flexibility for establishing revised guidelines. Only the use of the 10E-5 risk increment and very large foraging areas of sole and crab would provide more latitude for higher acceptable dioxin concentration based on incremental risk.*
- *It is likely that EPA will update the Integrated Risk Information System (IRIS) database to include a significantly higher cancer slope factor (CSF) for dioxin and furan mixtures. The EPA has proposed a revised cancer slope factor (CSF) for dioxin to reflect a six to ten-fold greater toxicity. Application of this CSF in the agencies' incremental risk calculations would result in a reduction of the allowable dioxin concentrations by an order of magnitude, thus making even the highest possible risk-based values roughly equivalent to the proposed 4/10 guidelines.*

- Constructive suggestions for alternative approaches to the management of dredged material disposal that would result in both environmental improvements and the continued economic viability of Puget Sound's working waterfronts.

DMMP Response #5: *The DMMP agencies considered the pilot project proposed by the Port of Bellingham but determined it was impracticable because it represented a huge resource outlay and time commitment on the part of the agencies (as well as other entities) to conduct analyses which have, in part, already been performed in the last 3 years of the project. The agencies also concluded that the pilot, as proposed, was unworkable due to the lack of agreement on the basics of such a study, such as what data are needed, where and how it should be collected, and how it should be used to derive dioxin guidelines. Achieving consensus with the ports (and other stakeholders) on these issues would be particularly difficult in light of the significant and fundamental disagreements between these groups on topics such as the applicability of WA Sediment Management Standards (SMS) to the DMMP's disposal sites and acceptable approaches for determining risk.*

Following facilitated work group meetings and multiple comment submissions, we were assured by Agency staff that our comments and concerns had been heard and that an alternative to the original agency proposal was being worked out. However, after a hiatus of more than eight months, the Agencies came forward with a proposed approach that appears essentially unchanged. Worse, the analyses and justifications provided in support of the Proposal appear unchanged as well. It's as if months of comments, proposals and work group meetings never occurred.

DMMP Response #6: *While the DMMP agencies didn't completely revise the basis for the guidelines as was suggested by the ports, we did include elements from the ports' comments into the revised guidelines. Examples of these changes include the development of a bioaccumulation test-out option and the addition of language that enhances guideline flexibility for small businesses. The DMMP agencies have also provided additional flexibility in the new interim guidelines by eliminating the automatic triggering of bioaccumulation testing for exceedances of the 10 pptr screening level. Case-by-case decisions to allow disposal of material not meeting the 4 pptr or 10 pptr screening levels may be made by the DMMP agencies based on the overall goal of meeting the non-dispersive disposal site management objective.*

From a process perspective, we are extremely concerned that the Agencies have chosen to ignore a wealth of pertinent information that has been provided by WPPA, its member ports, and others.

DMMP Response #7: *The DMMP agencies fully considered all information provided by the ports and other stakeholders over the past three years of this project. The agencies utilized that information in developing the revised guidelines as evidenced by the case-by-case considerations, small-business consideration and changes in the cost analysis. For example, following the initial presentation of the project impact analysis at the March 2009 technical workshop, the ports provided information regarding upland disposal costs. This information was incorporated in the Project Impact Analysis Technical Memorandum prepared for the 2009 SMARM. While the agencies did not adopt certain stakeholder proposals such as incremental risk, considerable analysis of those proposals was conducted and discussed at stakeholder meetings and technical workshops.*

If the Agencies are going to engage stakeholders on policy and technical issues of this type before coming forward with a proposal for formal public comment, they must also be willing to respond to comments received, do new analyses if the original work is shown to be flawed, and adapt their proposal accordingly. We appeared to be on track for that to happen, but now the Agencies have returned to a fundamentally flawed Proposal with information that has already been shown to be incomplete, skewed, and generally inadequate for changes of the magnitude being proposed.

DMMP Response #8: *The agencies did conduct additional analyses and made revisions to our original proposal in response to stakeholders' concerns (e.g., small-business impacts, incremental risk calculations, case-by-case considerations). The agencies concluded that neither the regulatory nor the scientific bases of the proposal were flawed.*

Instead of allowing ports and others to move through the open water disposal process with proposed projects that would generate new information and allow for adaptive management and future adjustments to ensure protectiveness, the Agencies have defaulted to the easy-to-implement Proposal that was already on the table. In doing so, the Agencies have paid little heed to the public entities with the best information regarding how the Proposal will affect the management of urban area sediments.

DMMP Response #9: *The agencies received a broad spectrum of comments from public entities with information regarding how best to manage urban areas sediments, in addition to those received from the ports. While this comment from WPPA essentially questions the agencies' decision to apply a more conservative background-based approach in the development of the revised interim guidelines for dioxin, other public entities question whether the agencies have gone far enough to protect human health. The proposal the DMMP agencies have made is an attempt to balance the broad spectrum of comments received, while complying with current State rules.*

The adaptive management approach referred to in WPPA's comment would be equally applicable to the "more conservative" guidelines proposed by the agencies as it would be to ones that are "less conservative." The agencies' decision to propose the revised guidelines as "interim" reflect the DMMP's willingness to reconsider them in light of ongoing State efforts to reconcile the SMS and MTCA rules and the outcome of future deliberations on PCBs.

As discussed below, the Agencies' Proposal threatens to not only halt projects essential to the Washington economy in the middle of an economic downturn, but also threatens to *increase* risk to the environment in comparison to the current sediment management approach. As is often the case, the easy way out is a lose/lose proposition for all concerned.

DMMP Response #10: *Our retrospective analyses (the project-impact and small-business analyses), as well as our experience implementing the former interim dioxin framework, indicate that the costs and impacts to maritime industry and economy are overstated by the ports. Many of the projects cited in the ports' analysis as failing under the revised interim guidelines would have also failed under the old guideline of 15 pptr TEQ. We note that DMMP implementation of the former interim dioxin framework has not shut down dredging in Puget Sound. Most of the material tested for dioxin has been found to be suitable for open-water disposal. During the 2008-2010 dredge years, 21 out of 30 Puget Sound projects with suitability determinations included at least some testing for dioxin. Approximately 10% (212,000 cy out of 2.2 million cy) of the dioxin-tested material was found to be unsuitable for open-water disposal at a non-dispersive site. Only 165,000 cy of this material was found unsuitable because of dioxin alone, and this largely due to the restrictive nature of the former interim guidelines for the Commencement Bay site. Under the new guidelines the volume of material failing in 2008-2010 due to dioxin alone would have dropped from 165,000 cy to 38,000 cy.*

The DMMP does not agree that the revised guidelines would increase the risk associated with dioxin in comparison to the "current sediment management approach". The basis of this statement appears to be the presumption that more sediment would fail for open-water disposal and, as a consequence, be left in place (undredged) in the shallow-water environment. This argument further presumes that the dioxin in the tested material represents surface concentrations in the biologically active zone, which is not necessarily the case since DMMUs typically represent a dredge prism ranging from 2 – 5 ft in depth. The agencies have encountered a number of projects (e.g., at the Port of Olympia, Percival Landing and Port of Seattle T-115) in which dioxin concentrations increase with depth. Thus, even if unsuitable sediments are left in place, the dioxin concentration in the biologically active zone may not pose an increased risk in the nearshore relative to that which may result from dredging and open-water disposal of deeper sediments with higher dioxin concentrations. Furthermore, a relative risk approach as discussed here is inconsistent with meeting the SQS.

In arriving at the new interim guidelines, the agencies – within the constraints of state regulations – attempted to balance environmental and economic impacts. The agencies carefully evaluated impacts with respect to both historic and planned projects, and took input from stakeholders who are potentially affected by these decisions. The new guidelines reflect years of hard deliberations through which we have sought to provide protectiveness while minimizing economic disturbance.

II. No demonstration of environmental benefits or comparison to other alternatives

In evaluating alternatives for the management of sediments containing dioxin and other bioaccumulative chemicals, the Agencies should be asking the fundamental question: "What are the human health and environmental benefits of this alternative, and how do these benefits compare to those provided by other approaches?" In order to answer that question, the Agencies must evaluate the extent to which the alternative, if implemented, would actually reduce risks to human health and the environment. The Agencies have conducted no such analysis with respect to the Proposal or other alternatives.

DMMP Response #11: *Overall, the Agencies estimate that the guidelines will result in net benefits to human health and the environment relative to the former guidelines. The Agencies' conclusions are largely based on a qualitative evaluation due to the uncertainties in quantifying risk associated with dioxin in dredged material.*

DMMP Open Water Sites: The Agencies expect that the revised guidelines will result in several health and environmental benefits relative to the former guideline of 15 pptr. These benefits will result from reduced dioxin concentrations at many of the DMMP sites. All sites are part of tribal Usual and Accustomed fishing grounds, and some (Anderson-Ketron and Port Gardner) have significant crab populations.

The Agencies' conclusions are largely based on a qualitative analysis of benefits. This is consistent with current state and federal approaches for evaluating health benefits (particularly benefits associated with non-cancer risk reduction). While it would be technically possible to calculate and compare quantitative estimates of cancer risks specifically associated with the disposal sites, there are large uncertainties in quantifying the disposal site-only contribution to exposure for both human and wildlife receptors. The Agencies do recognize, however, that the incremental benefits relative to current guidelines are likely to be small given the limited acreage represented by the disposal sites relative to Puget Sound as a whole,

The benefits of the revised guidelines include the following:

- *Reduced Cancer Risks: Numerous scientific and regulatory organizations have concluded that dioxins and furans are known or probable human carcinogens (ATSDR, 1999; IARC, 1997; US EPA 2008, 2009, 2010). These compounds can be transferred from sediments to fish/shellfish foraging in the vicinity of the DMMP sites. People can then be exposed to dioxins from the DMMP sites when they eat those fish/shellfish. The Agencies believe the revised guidelines will reduce the cancer risk associated with the disposal sites because of the lower dioxin levels allowed at the sites. For example, the 2007 monitoring study of the Elliott Bay site found a mean on-site concentration of 9.7 pptr TEQ. Under the revised guidelines the highest allowable mean concentration would be 4.0 pptr TEQ. Lowering the on-site concentration from 9.7 to 4.0 pptr would reduce the risk associated with the Elliott Bay disposal site by more than a factor of two. Because the dioxin concentrations at the disposal sites change with each disposal event, it would be extremely difficult to quantify precisely the risk reduction over time for each of the disposal sites, but the Elliott Bay example does provide evidence that the risk reduction would be real, at least at that site.*
- *Reduced Non-Cancer Risks: Exposure to dioxins/furans have also been shown to increase the risks of developing a wide range of non-cancer health problems including hepatic, immunological, dermal, endocrine effects, neurological effects and reproductive and development effects (ATSDR, 1999; IARC, 1997; US EPA 2008, 2009, 2010). The Agencies believe the revised guidelines will result in a reduction in non-cancer risk because of lower dioxin levels at disposal sites.*

- *Reduced Ecological Risks to Fish and Wildlife. Potential effects of dioxin through bioaccumulation to demersal fish were evaluated by the agencies using the tissue-residue effects methodology during the Olympia Harbor Federal/Port Navigation Project suitability determination (DMMP, 2006) for disposal at the Anderson/Ketron site. According to this evaluation, at sediment values near the 4 ng/kg TEQ management goal, greater than 97.5% of this population would be protected. Higher sediment values would be associated with a greater tissue burdens, and thus could have greater potential effects to more of these demersal populations. Biomagnification or increasing concentrations as hydrophobic organics such as dioxins pass through the food web to higher predators may also be of concern. Specifically regarding the threatened and endangered Southern Resident Killer Whale population, dioxin TEQ in 100% of males and in 87% of females exceeded tissue burdens believed to represent harm in Harbor Seals (Ross et al, 2000). Although the Southern Resident Killer Whale population ranges widely and the dredge-site contribution of dioxin is likely to be small, even a small reduction in bioavailable dioxin inventory in Puget Sound waters and sediment could be beneficial.*

Dredging Project Locations: The WPPA and other interested parties have expressed concerns that the revised guidelines will result in the cancellation or delay of dredging projects. In those situations, they pointed out that the cancellations or delays may mean the loss of health and environmental benefits because dioxin-contaminated sediments would remain in the nearshore areas where most dredging projects occur. The Agencies recognize that the revised guidelines will impact decisions on whether to proceed with some dredging projects. However, given that less than 2 percent of the 2.2 million cubic yards of material tested for dioxin in Puget Sound in the last three years (2008 – 2010) would be found unsuitable for open water disposal under the revised guidelines solely on the basis of dioxin concentrations, it would appear that the revised guidelines are unlikely to significantly alter the total volume of material found to be suitable for open water disposal and are therefore unlikely to lead to widespread cancellation of nearshore dredging projects.

Furthermore, guidelines that allow for more sediment removal do not necessarily translate into improved nearshore environmental quality. The actual environmental benefits at the project location are case-specific, and will depend on the changes to concentration (and hence bioavailability) of dioxins or other hazardous substances in the sediments exposed by the dredging project relative to the surface concentrations prior to dredging. Should biologically-productive habitats be present near the dredging project, there could be nearshore benefits when the post-dredging surface sediments are cleaner that the pre-dredging surface sediments. However, the reverse situation (post-dredge surface concentrations are higher than pre-dredging surface concentrations) may also occur. In the latter circumstance, the project would have a negative effect on environmental quality at the dredging location.

Upland Disposal Activities: The WPPA and other interested parties have expressed concerns that greater reliance on upland disposal options will have adverse environmental consequences. These include impacts associated with transport (e.g., spills, CO2 emissions) and disposal (e.g., ground water impacts, loss of habitat). The Agencies recognize that the revised guidelines may increase the amount of material that needs to be taken to upland disposal sites. However, as discussed above, it does not appear that the revised guidelines will significantly alter the total volume of material found to be suitable for open water disposal. Therefore, the agencies believe that negative environmental consequences associated with any increase in upland disposal activities are likely minor.

Rather than fairly evaluating the Proposal and other alternative approaches, the Agencies relied on an assessment of risks from background levels of dioxin in Puget Sound. That risk evaluation explicitly does not account for risks from dredged material disposal. Thus, the Agencies have done no analysis of what

risks, if any, are created by the disposal of dredged material, much less what the reduction in risk (i.e., the human health and environmental benefit) would be from the proposed changes. In other words, the Agencies have not shown that the Proposal will yield any environmental benefit. The Agencies must be transparent in their decision-making by communicating – in a precise and scientific manner in risk terms – the actual benefit of the Proposal. Instead, the Agencies simply used a risk analysis that defines all of Puget Sound as "dirty," and then: (1) borrowed a broken component from the MTCA program by defaulting to "natural background" as a management target for disposal sites; and (2) leapt to the conclusion that using a project-specific volume-weighted average of natural background is the best way to balance all of the goals of the open water disposal program in meeting this new management target. This conclusory approach tells you nothing about whether the new sediment management requirements will actually yield environmental benefits or whether alternative approaches, including approaches that allow a much greater level of open water disposal, might actually provide more overall risk reduction and greater environmental benefits.

In fact, serious questions arise regarding whether the Proposal will actually lead to any risk reduction at all…

DMMP response #12: *This comment presupposes that the basis of all regulation and guideline development must be in response to a quantitative demonstration of risk. If this were indeed the case, it would be relatively easy for any small project to successfully argue that the risks associated with their activities within the aquatic environment would result in no quantifiable increase in risk to the system. As discussed previously, this perspective does not conform to the Washington State Sediment Quality Standards. The DMMP's determination of unacceptable human health risk associated with background levels of dioxin contamination in Puget Sound restricts the agencies' ability to set dioxin guidelines at any concentration above that background level. Given that restriction, determining the site's risk contribution to an overall unacceptable risk throughout Puget Sound is unnecessary.*

The Agencies apparently assume that no dredging projects would be cancelled or indefinitely postponed due to the Proposal's more stringent approach to open water disposal.

DMMP Response #13: *The DMMP agencies have always acknowledged that some dredging projects would be cancelled or postponed. For example, the Project Impact Analysis Technical Memorandum (April 2009) stated, "Some projects will have DMMUs that fail for dioxin alone. This will have cost implications for dredging and disposal and could result in project delay or cancellation. The "tipping point" at which additional costs for managing dioxin-contaminated dredged material result in project cancellation depends on a number of factors including the financial wherewithal of the dredging proponent, costs vs. benefits, and the ratio of incremental to total project cost."*

The benefits provided by dredging projects involving the removal of higher concentration sediments from shallow water areas where contaminants are more bioavailable and where more aquatic resources are present, are therefore assumed to remain in place. Sediments that would otherwise have gone to an open water disposal site will simply be conveyed by truck and train to upland landfills. So, the Agencies assume that the environmental benefits of projects will remain in place, with risks from shallower areas being reduced, and the open water disposal sites will also get cleaner due to the more stringent disposal criteria.

The flaw in this approach is the assumption that projects are not sensitive to cost and will go forward even if transportation and disposal costs for dredged sediments increase by 5- to 10-fold for any

sediments that will no longer qualify for open water disposal. The Agencies apparently believe that dredged materials that exceed the dioxin limits in the Proposal will be removed from shallow water areas and disposed of at upland landfills or otherwise be sequestered in some fashion other than being buried under successive projects at a non-dispersive open water disposal site.

DMMP Response #14: *The DMMP agencies have not assumed that the environmental benefits of projects due to removal of contaminated sediment will accrue regardless of cost. The agencies realize that some projects will move beyond the "tipping point" and will be cancelled or delayed. However, as discussed earlier, our review of the projects provided in the WPPA's letter indicates that most of these would have failed the old guidelines as well as the new ones. Furthermore, the new guidance does acknowledge the fact that at some sites material will be buried under successive projects. This is a key consideration of the case-by-case evaluation. However, the assumption that sediments would rapidly be covered by other disposal events is not applicable for several of the sites that receive relatively infrequent disposal (e.g., Anderson-Ketron, Port Gardner).*

In addition, we would again point out the questionable assumption that contamination is at the surface when DMMP testing is typically of 2 – 5 ft intervals. The agencies have encountered a number of projects in which dioxin concentrations increase with depth. Therefore a project that is not dredged will not necessarily result in an increased exposure (and risk) versus if it were dredged and disposed of at an open-water site.

Also, the WPPA's position relies on the supposition that all the non-dispersive disposal sites are in deep waters that are barren of life, but this is not accurate. While it is true that sites were selected for low biota abundance compared to other areas within Puget Sound, three of the sites have biota within their bounds that are consumed by humans, and all sites are in Usual and Accustomed Tribal fishing areas.

Not only do the Agencies apparently assume that the benefits of shallow-water dredging projects will continue to be provided, they also assume that there will be no environmental harm associated with the increased transportation of dredged materials to landfills. *If* projects continue to go forward at close to the same pace as before the transportation of thousands of tons of dredged sediments for offsite disposal will lead to increased emissions of greenhouse gases and other air pollutants and will impose risks associated with transportation accidents. The Agencies cannot assume projects (with their attendant benefits) will go forward as before, and also ignore the increased environmental impact of the substantial change in transportation and disposal practices that would occur. An analysis of the true environmental costs and benefits of the Proposal and other approaches is needed before the Agencies can validly conclude that the Proposal is the best alternative to pursue.

DMMP Response #15: *Most of the projects identified by WPPA as impacted under the revised guidelines would also have been impacted under the old guideline of 15 pptr and the former interim guidelines. The additional volume of material requiring upland disposal under the revised guidelines is not enormous and, in the case of two large projects in Commencement Bay, is substantially less when compared to the former interim guidelines.*

The ports have not provided any documentation to support the suggestion that the proposal will result in increased greenhouse gas emissions. The agencies' analysis indicates that most of the dredged material tested for dioxin in 2008, 2009 and 2010 was found to be suitable for open-water disposal and much of that found unsuitable was unsuitable under the old guidance of 15 pptr as well. In 2008-2010, only 2% of the material tested for dioxin would have failed under the new guidelines due to dioxin alone. Of the 21

projects tested for dioxin during this time, only 3 more would be impacted by the new guidelines than by the old guideline and only 2 of these 3 projects would be impacted by dioxin alone. Of the 107 DMMUs tested for dioxin, only 4 more would be impacted by the new guidelines compared to the old guideline, and only 2 of these 4 DMMUs would be impacted by dioxin alone. Even if all of these impacted projects were taken upland, the increase in greenhouse gas emissions would be minor.

The agencies considered quantifying the greenhouse gas emissions associated with the various alternatives. However, once the range of alternatives had been narrowed down to those which were consistent with State regulations, it was apparent that there was an insufficient difference between them relative to greenhouse gas emissions to warrant the expense that such an analysis would entail.

III. Economic effects

This Proposal will also impose significant economic costs. As many organizations have already expressed, numerous economically vital projects will be halted or indefinitely delayed by the Proposal's approach to defining acceptable dioxin and other bioaccumulative chemical limits for the open water disposal of dredged material. Attachment A to this letter enumerates several projects that are in jeopardy if the Proposed Changes are adopted, based on a WPPA survey of member ports. (Footnote: The results of this survey have been provided to the Agencies in past comments.)

DMMP Response #16: *Project-specific responses are provided in Appendix A. Many of the listed projects would have failed the original DMMP 15 pptr TEQ guidance in place prior to this effort, and therefore, any associated cost impacts for these projects are not resultant from the revised guidelines. Several other projects have data that indicate dioxins are low enough to pass open-water disposal criteria regardless of which guidance one uses. In addition, two large projects in Commencement Bay – the Blair-Hylebos Redevelopment project and the Puyallup Tribal Terminal – fare much better under the revised interim guidelines than under the former interim guidelines, but were not mentioned in Appendix A.*

The Agencies' analysis of economic effects is limited to a snapshot view of the percentage of DMMUs during a specified time period that would fail under the Proposal, but would have passed under a less stringent approach. Because the percentage of additional failures appears to be relatively small, the Agencies have concluded that there will not be significant economic impacts.

This approach has major flaws that result in the Agencies grossly underestimating the extent of the Proposal's economic impacts. These flaws have been pointed out in prior comments to the Agencies and in the various work group meetings, but the Agencies remain committed to the same flawed justification without providing any new analysis or rebuttal.

DMMP Response #17: *The DMMP agencies have endeavored to include any and all pertinent information provided by stakeholders. For example, following the initial presentation of the project impact analysis at the March 2009 technical workshop, the DMMP staff met with representatives of the ports to better understand their concerns. Information provided by stakeholders on upland disposal costs was incorporated in the Dioxin Project Impact Analysis Technical Memorandum prepared for the 2009 SMARM.*

A basic problem with the Agencies' approach to determining the economic impact of the Proposal is that many of the projects with the greatest economic benefit have relatively small dredge volumes compared to projects such as Snohomish River dredging that involve extremely large volumes of essentially clean

sand that has moved downstream from headwaters areas. Large volume projects of that type, combined with the occasional urban project that is dredging a large volume of native material, can result in a small number of projects dominating a snapshot analysis of dredged volumes.

DMMP Response #18: *The DMMP agencies recognized the skewing effect that large projects could have on dredged material volumes. To address this problem, the agencies have always presented data both in terms of volume and in terms of number of projects affected. The Dioxin Project Impact Analysis Technical Memorandum provided separate assessments of larger vs. smaller projects. The Memorandum also discussed the differential impact on smaller projects.*

In contrast to the handful of extremely large volume projects that intercept pristine sediments before they reach urban areas, and the small number of high-volume native material projects, there are a large number of urban area maintenance dredging projects needed to keep berth areas and channels open for maritime commerce. Until recently, the dredged material from these projects routinely qualified for open water disposal. This is not surprising, as these projects are often dredging urban area background sediments of the type the PSDDA program was designed to address through the acceptance of sediments at disposal sites with a "moderate" level of impact.

DMMP Response #19: *DMMP sites were "designed" to receive dredged sediments from any area (urban or non-urban) which meets the sediment quality guidelines set out in the PSDDA Evaluation Procedures Technical Appendix (EPTA). Specifically, the DMMP site management objective for non-dispersive sites (EPTA: page II-111, Table II.8-1) is "Site Condition II" (minor adverse effects), which <u>would not</u> accommodate a "moderate" level of impact (Site Condition III) as implied by the WPPA comment. The site management objective for the three dispersive sites is even more stringent: "Site Condition I" (no adverse effects on biological resources due to sediment chemicals).*

Although qualifying sediments from urban area maintenance dredging projects for open water disposal has become gradually more difficult since the inception of the PSDDA protocols, the Proposal's approach to dioxin represents a quantum leap in that difficulty. (Footnote: Although the current Proposal is closely related to an interim policy that has been in place for some time, the change from rarely finding a "reason to believe" that dioxins are an issue (and therefore rarely testing for them) to testing for them in nearly all urban areas, has resulted in much greater difficulty in qualifying urban area sediments for open water disposal. The Proposal would institutionalize an approach that has been successfully used to qualify very few, if any, urban area maintenance dredging projects. Meanwhile, as has been documented to the Agencies before, multiple significant projects have been put on hold indefinitely as a result of the combined effect of the interim policy and the expanded reason to believe requirement.)

DMMP Response #20: *The agencies' expanded reason-to-believe guidelines are a result of the adaptive management in the Program, arising due to: 1) the high dioxin concentrations found in Olympia Harbor; 2) disposal site monitoring, which has shown unexpectedly high dioxin levels within onsite disposal zones at two sites (Commencement Bay, Elliott Bay) that appear to be linked to past failures in adequately characterizing dredged material; and 3) increased awareness of the various other sources of dioxin in addition to pulp and paper mills.*

The original reason-to-believe guidance under the PSDDA program led to dioxin testing for several projects in Everett early in the life of the program, due to the historical presence of pulp and paper mills. The relatively low dioxin concentrations found in what was considered one of the "worst-case" areas at the time resulted in relaxed testing requirements in the years that followed. The 2006 Olympia Harbor

project alerted the agencies that dioxin was a more widespread chemical of concern than first believed. The DMMP agencies now have several examples of projects in Blair Waterway and Fisherman's Terminal that were not tested for dioxins (predated the revised reason-to-believe guidelines), resulting in elevated concentrations at the Commencement Bay and Elliott Bay disposal sites from the disposal of material that would now trigger testing under the revised guidance. Accordingly, the revised reason-to-believe guidelines will result in more projects being tested for dioxins. However, the statement that, "The Proposal would institutionalize an approach that has been successfully used to qualify very few, if any, urban area maintenance dredging projects" is belied by the following list of recent projects that would pass under the revised guidelines:

1) *Delta Marine Industries (Seattle)*
2) *Dakota Creek Industries (Anacortes)*
3) *Washington United Terminal (Tacoma)*
4) *Boyer Towing (Seattle)*
5) *10th Street Boat Launch (Everett)*
6) *Pacific Terminal (Everett)*
7) *USACE Duwamish (Seattle)*

While this has clearly increased sediment testing costs, it has not resulted in a quantum leap in failures. During the 2008-2010 dredge years, 21 out of 30 Puget Sound projects with suitability determinations included at least some testing for dioxin. Approximately 10% (212,000 cy out of 2.2 million cy) of the dioxin-tested material was found to be unsuitable for open-water disposal at a non-dispersive site. Only 165,000 cy of this material was found unsuitable because of dioxin alone, and this largely due to the restrictive nature of the former interim guidelines for the Commencement Bay site. Under the new guidelines the volume of material failing in 2008-2010 due to dioxin alone would have dropped from 165,000 cy to 38,000 cy.

An analysis by Anchor QEA of data from recent maintenance dredging projects shows that about 70% of the DMMUs from these projects would fail the new dioxin criteria.

DMMP Response #21: *The basis for the Anchor QEA analysis was not submitted as part of their formal comments, but based on discussions at the May 28, 2009 public workshop, the DMMP agencies believe the analysis likely included the following urban projects:*

1) Port of Seattle T115
2) Delta Marine Industries
3) Port of Seattle T18
4) Port of Bellingham I & J Waterway
5) Port of Olympia East Bay Marina
6) Port of Anacortes Cap Sante Marina
7) Port of Bellingham Squalicum Harbor Gate 3
8) USACE Duwamish O&M
9) Port of Anacortes Dakota Creek
10) Port of Seattle T5
11) MJB Properties (Anacortes)

It is true that eight of these ***projects*** *(73%) would be impacted under the revised non-dispersive guidelines, but it is important to note that six of these projects would have been impacted under the old*

guideline of 15 pptr TEQ. Only two of these eleven projects (the Port of Seattle T5 and MJB Properties) would not have been impacted under the old guideline but impacted under the revised non-dispersive guideline. But dioxin was not the only issue at T5. Elevated TBT concentrations and bioassay failures also precluded some of the dredged material from this project from open-water disposal. Thus only a single project (MJB) would have been impacted by the new guidelines versus the old and, for that project, only one out of seven DMMUs would fail under the revised guidelines.

While the 70% "failure" rate cited by WPPA may be true with regard to the fraction of impacted projects, it is not accurate ***with respect to DMMUs.*** *For the 11 projects listed above, 26 out of 57 (46%) DMMUs would fail under the revised guidelines, while 20 of 57 (35%) would have failed under the old guideline. The DMMP agencies acknowledge that this is a significant increase for the type of project included in the analysis, but several of these projects had other issues beyond dioxin. For example, the Port of Seattle T115 dredged material contained very high concentrations of PAHs. The Port of Seattle T18 project included elevated concentrations of TBT and PCBs. The Port of Anacortes Dakota Creek project had elevated concentrations of PAHs. Non-dioxin data for two of the projects (Port of Bellingham I&J Waterway and Port of Olympia East Bay Marina) have not been submitted to the DMMP agencies for review, so no judgment can be made in the case of these projects.*

It also must be pointed out that the projects included in the Anchor QEA analysis represent a worst-case analysis. A more recent review of all projects tested for dioxin to-date (see Table 4 at the end of this document), reveals that 12 of 29 projects (41%) would be impacted under the revised guidelines, while 8 of 29 projects (28%) would have been impacted under the old guideline of 15 pptr. From a DMMU perspective, 47 of 169 DMMUs (28%) would be impacted under the revised guidelines, while 38 of 169 DMMUs (22%) would have been impacted under the old guideline. This does not take into account projects and DMMUs that would be impacted due to other considerations such as failed bioassays. It also does not include native material and non-urban projects that would not be subjected to dioxin testing.

And when a "natural background" approach is applied to other bioaccumulative chemicals, as the Proposal expressly contemplates, material from nearly all urban area maintenance dredging projects will no longer qualify for open water disposal.

DMMP Response #22: *The DMMP agencies have acknowledged that other bioaccumulatives represent a challenge, and plan on evaluating compounds such as PCBs in the future. The comment misstates the intention of the agencies – only bioaccumulatives that have unacceptable risk associated with background values are being considered for a background approach.*

The economic impact of DMMU failures is magnified by the extremely large cost differential between open water disposal and all other options. (A recent Port of Anacortes project showed a cost differential of $92/ton. Other ports have experienced incremental costs for upland disposal far in excess of $100/ton.) Even if some DMMUs from a project still pass, even a modest increase in a project's DMMU failure rate can flip a project from viability to one that the project sponsor cannot justify financially. Further, since dredging is needed to maintain the basic infrastructure of maritime commerce that is essential to Washington's economy, the inability of port districts and private entities to fund such projects due to cost increases can have major economic repercussions well beyond those felt by an individual port district or facility operator. The Agencies have provided no analysis of these impacts.

DMMP Response #23: *As stated previously, the DMMP agencies have endeavored to include all pertinent information provided by stakeholders. For example, following the initial presentation of the project impact analysis at the March 2009 technical workshop, the ports provided information regarding upland disposal costs. This information was incorporated in the Project Impact Analysis Technical Memorandum prepared for the 2009 SMARM. At several meetings, the ports indicated they would provide additional information that would be critical to a more complete economic evaluation but little detailed information was submitted. Furthermore, the ports offered to provide their own analysis in the early stages of this activity, but did not follow through on this offer. WPPA provides no specific information or data to substantiate the view that the new guidelines will have major economic repercussions for the Pacific Northwest.*

By forcing most urban area maintenance dredging projects to rely on upland disposal, the Agencies are dramatically affecting our state's maritime commerce. To do so when the actual environmental benefits are unclear at best, and with an analysis of potential economic impacts that simply assumes them away, is irresponsible.

DMMP Response #24: *The DMMP agencies are well aware of the potential economic impacts that may result from implementation of the proposed guidelines. The agencies concluded that the revised approach provides the most flexibility (within the constraints of the SQS) and balances environmental protection with minimizing and mitigating these impacts. We have actively worked with ports on projects to find workable solutions and minimize impacts wherever possible. The benefits of restoring the Sound and reducing the toxic burden of fish and wildlife, not to mention humans, will be realized by generations in perpetuity.*

IV. Legal deficiencies in the process

Although styled as "guidance," the Proposal is written in the prescriptive fashion of an administrative rule. There is a "possibility" that the Agencies will consider allowing a DMMU slightly above the 10 ppt TEQ limit for dioxin to go to open water disposal under highly unusual circumstances, but Agency representatives made it clear at this year's SMARM and elsewhere that the new limits will be treated as generally-applicable requirements. If the Agencies go forward as planned with implementation of the Proposal, they will be violating both the federal and Washington Administrative Procedure Acts by promulgating a rule without following the rulemaking procedures required by those statutes.
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DMMP Response #25: *The updated guidance represents a continuation of the DMMP's systematic approach to periodically updating sediment evaluation guidance. The proposed Interim Guidelines respond to updated science on risk posed by dioxin, new information on fish consumption, and incorporate recently-updated information on Puget Sound sediment dioxin background. As explained below, the updated Guidelines are consistent with the existing regulation governing dredge disposal activity, and do not adopt new standards that are not in rule.*

The State of Washington's Sediment Management Standards (SMS), Chapter 173-204 WAC, provide the sediment quality standards applicable to disposal sites. Under the SMS, the Department of Ecology (Ecology) establishes requirements for dredging activities and disposal sites using best available scientific information, dredged material management guidelines and applicable federal and state rules. WAC 173-204-410(7). On the issue of protecting human health, the SMS provide a narrative standard to protect against "significant health risks to humans," and reserve the right to determine applicable criteria on a case-by-case basis. WAC 173-320(4)(1)(a) & (4).

The SMS provide for background concentrations (non-anthropogenically affected sediments) as a default standard whenever concentrations of a substance pose an unacceptable risk at or below background levels. WAC 173-204-320(6). In addition, the SMS provide that no cleanup sites be created by permitting the discharge of dredged material. WAC 173-204-410(1)(c). The existing MTCA Cleanup Regulation applies a one-in-a-million excess cancer risk limit to sediment cleanups to protect human health, with a default to Puget Sound background levels.

Based on updated information about the risks posed by dioxin and fish consumption levels, the agencies considered at length how to assess the risk posed by dioxin at dredge disposal sites. The ports, for example, suggested that various risk limits (e.g., 10^{-5}) and risk assessment approaches be applied to assessing the risk posed. As noted in Responses 4 and 11, the DMMP agencies explored these options and found that background levels would be greater regardless of which were applied. For example, background levels would exceed the cancer risk limits specified in the DMMP guidelines (10^{-5}), MTCA Cleanup Regulation (10^{-6} or 10^{-5} (in limited situations)) and the state water quality standards (10^{-6}). As Ecology now construes SMS requirements, this then necessitates the agencies' application of background levels to define the Sediment Quality Standard (SQS) for dioxin/furan mixtures.

The assessment of background levels can change with updated information. The agencies recently revised their estimate of background levels based on updated sampling in non-urban areas of Puget Sound. Four (4) pptr is currently considered to fall within the range of dioxin background concentrations in Puget Sound, and forms the basis for applying a management goal of 4 pptr to disposal sites. For dioxins, the agencies believe that the range of sediment concentrations measured in non-urban areas provides a reasonable estimate of the range of non-anthropogenic sediment concentrations. The DMMP agencies intend to review this determination periodically as new sampling data becomes available.

The hallmarks of the Interim Guidelines are:

- *Dioxins testing associated with non-dispersive sites is triggered only where the DMMP agencies find reason to believe those substances are present above background concentrations; Projects proposing disposal at dispersive sites may be required to conduct some level of dioxin testing regardless of whether reason to believe triggers testing.*
- *Where testing is triggered, a case-by-case decision making process is conducted to ensure the Sediment Quality Standard will be met for each site;*
- *The agencies have a high level of confidence that projects with sediments falling below a conservative concentration level (project average less than 4 pptr and no single DMMU greater than 10 pptr) will ensure that dioxin levels at disposal sites remain below 4 pptr. This is a processing tool used to facilitate the streamlined evaluation of the least contaminated material for disposal, not a bright-line standard: projects with sediments below this concentration level are subject to a streamlined suitability assessment on a case-by-case basis; projects with sediments above that concentration level threshold will simply be subject to more intense*

project-specific analysis, which will hinge on consideration of the project's individual circumstances;

- *The proponent has the option of requesting that sediments not meeting approval under any other analytical framework be further evaluated. This can include bioaccumulation testing of concentration levels in tissue exposed to project sediments as compared with tissue exposed to reference sediments.*

Consequently, under the Guidelines, the DMMP agencies exercise discretion, flexibility, and best professional judgment on a case-by-case basis. For example, it is the project proponent that elects the bioavailability testing process. Therefore, the Guidelines do not establish a rigid, prescriptive process and set of standards that are binding on private parties and the agencies alike. Rather, the Guidelines establish a procedural structure representing a preferential path that the DMMP agencies use to assess compliance of proposed disposal projects with the State SMS. Moreover, the DMMP agencies may take action at variance with this guidance and its implementing procedures.

Because the revised Interim Guidelines simply reflect application of the default background standard contained in the SMS, there is no obligation by the State under the State APA to conduct rule making to update the SMS. In addition, adoption of the Guidelines does not constitute promulgation of a federal rule subject to obligatory notice and comment rulemaking procedures under the federal APA. By its terms, the notice and comment rulemaking processes of the APA do not apply to interpretive rules, general statements of policy, or rules of agency procedure or practice. 5 USC § 553(b), (c), and (d). The Interim Guidelines constitute no more than a general statement of collective DMMP agency policy, and reflect nothing more than intended DMMP practice and procedure in conducting suitability determinations. The Interim Guidelines – infused with the application of best professional judgment, discretion, flexibility, and elective alternate approaches – create no "binding effects on private parties or on the agency not already included in existing law and regulation."[1] The Interim Guidelines simply represent the DMMP agencies' "position with respect to how [they] will treat . . . the governing legal norm."[2] As a general statement of DMMP agencies' policy, the Interim Guidelines "advise the public prospectively of the manner in which the agenc[ies] propose[] to exercise a discretionary power."[3] Just because the Interim Guidelines "may have some substantive impact," they do not constitute an agency rule subject to notice and comment rulemaking procedures because they leave the DMMP agencies "free to exercise [their] informed discretion"[4] when applying the existing regulatory requirements.

The agencies expect this approach will provide new information that can help inform how best to protect human health from the risks posed by dioxin. The agencies will use this process to continue to review and revise the overall approach in the Guidance. In addition, information gained from application of these Interim Guidelines could support future rule amendments.

Further, the Proposal would be a major action that significantly affects the quality of the human environment. As such, it is subject to review under both the National Environmental Policy Act ("NEPA") and the Washington State Environmental Policy Act ("SEPA"). Both of these statutes require the Agencies to study the environmental effects of the Proposal and compare the Proposal to alternative approaches. Appropriately performed NEPA and SEPA analyses would likely show that the Proposal

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[1] Molycorp, Inc. v. EPA, 197 F.3d 543, 545 (D.C. Cir. 1999)
[2] Syncor Int'l Corp. v. Shalala, 127 F.3d 90, 94 (D.C. Cir. 1997)
[3] Brock v. Cathedral Bluffs Shale Oil Co., 796 F.2d 533, 537 (D.C. Cir. 1986), *quoting* U.S. Dept. of Justice, *Attorney General's Manual on the Administrative Procedure Act* 30 n. 3 (1947).
[4] Brock v. Cathedral Bluffs Shale Oil Co., 796 F.2d 533, 537 (D.C. Cir. 1986).

provides no net environmental benefits and is not the most environmentally beneficial alternative. The Agencies' failure to perform an appropriate comparative risk analysis violates both the substance and principles of both statutes, as does the Agencies' failure to properly analyze alternative approaches.

DMMP Response #26: *As described above, the Interim Guidelines are consistent with the existing regulation governing dredge disposal activity. Because they do not adopt new state standards that are not in the SMS, SEPA review is not triggered. Further, it is the issuance of a Section 404 permit under the Clean Water Act that would be the final federal agency action that affects or changes the use of a disposal site, not the revised Interim Guidelines. Consequently, the Guidelines themselves do not have the potential to affect significantly the quality of the environment. As described more fully above, the Interim Guidelines reflect a preferential, flexible, and discretionary approach to conducting dredged material disposal suitability determinations, and as such revision of the Guidelines does not constitute NEPA Federal action at all. Therefore, the DMMP Agencies have also determined that revision of the Interim Guidelines does not trigger NEPA review.*

Finally, it is important to note that the NEPA/SEPA documents prepared for PSDDA in 1988 and 1989 already included adaptive management provisions for addressing emerging issues such as bioaccumulative contaminants.

V. Ecology is revising how urban area sediments are addressed under MTCA.
Meanwhile, in another forum, the Washington Department of Ecology is working to resolve some inconsistencies between MTCA and the Sediment Management Standards ("SMS"), especially in regard to their application to urban sediments. Through this process, Ecology is confronting many of the same issues confronted by the Agencies, such as determining how best to address the issue of the vast areas of sediment in urban waterways and bays that are not "clean" when using a one-in-a-million risk threshold and tribal consumption rates in a risk assessment. MTCA currently requires final cleanups for those sediments to meet "natural background" levels that cannot be maintained in urban areas. This results in a problem for the MTCA program because urban area sediment cleanups can never be completed as long as the new sediment being deposited is above the natural background level (which it always will be unless *all* urban area inputs can somehow be eliminated).

The "natural background" requirement in MTCA, and its relationship to sediment cleanups performed primarily under the SMS, is both a key issue for Ecology's MTCA/SMS integration effort and a fundamental concept underpinning the Proposal. Ecology is currently discussing with stakeholders an approach that would change the cleanup level in urban area sediments to "Regional Background" in order to address the unworkability of applying the current MTCA regulations to urban area sediment cleanups. Whether or not that is ultimately the solution implemented through rulemaking by Ecology, it is clear that the current MTCA-based approach is going to be changed in favor of one that accounts for the fact that cleaning up and maintaining urban area sediments to natural background levels is impossible.

Despite Ecology's current efforts to move away from an approach to urban area sediments based on natural background concentrations, the Proposal embraces natural background as the management objective for non-dispersive disposal sites located in the middle of large urban bays. (Footnote: It is curious that Ecology (itself one of the DMMP agencies) is working hard to craft a new approach to urban area sediments at exactly the same time as the Agencies are collectively expanding the reach of an approach that Ecology recognizes as unworkable. Why not wait on issuing final DMMP guidelines for

dioxin and other bioaccumulative chemicals until Ecology has completed its review of the issues involved and settled on a new approach?)

DMMP Response #27: *As noted previously, the existing MTCA Cleanup Regulation (Chapter 173-340 WAC) applies a one-in-one-million excess cancer risk limit to sediment cleanup actions with a default to natural background levels. Ecology is currently working on revisions to the MTCA and SMS rule to clarify the relationships between the two sets of rule requirements. These changes may also provide greater flexibility to respond to practical constraints posed by ongoing discharges and the potential for recontamination. However, the changes that may result from that rulemaking effort are not yet clear. Until actual rule revisions are implemented, the DMMP agencies must comply with existing regulations. When rule changes are enacted, we can re-evaluate to determine if we are able to incorporate more flexibility.*

Further, the Proposal strictly limits the concentrations in individual DMMUs in the interest of ensuring that natural background levels can only be exceeded at the surface of the disposal site for the briefest of time periods, and even then by only a relatively small amount. (Footnote: In risk terms, this extraordinarily conservative approach is unwarranted because the exposures involved that drive the calculated risk levels are lifetime exposures over much larger geographic areas than individual disposal sites.

DMMP Response #28: *As previously discussed, the DMMP is not establishing strict limits on allowable DMMU concentrations. Instead the guidelines act as screening levels to facilitate review and approval of the projects with the least contaminated material. More project-specific analysis is required for projects with higher concentrations. The revised guidelines provide some flexibility to consider the size and sequencing of projects when performing project-specific analyses.*

Furthermore, the Agencies have provided no analyses demonstrating that short-term changes in dioxin concentrations at the surface of a disposal site (such as occurs between barge loads in a properly-sequenced disposal project) have any effect at all on dioxin concentrations in seafood species.)

DMMP Response #29*: As previously discussed, the agencies have decided not to pursue SIZ designations for the DMMP sites. The State rule defaults to background given the range of risks calculated using several methods and assumptions. This point has been discussed in more detail in previous comments.*

This approach is illogical for a number of reasons:

- When disposal sites are not actively used, their surface sediments (i.e., the biologically active zone) will tend to equilibrate to the same concentrations of hazardous substances as the bay they are sitting in as new sediments are deposited bay-wide. Maintaining the disposal sites at "natural background" levels during the time period when active disposal is ongoing has the effect of temporarily (and artificially) creating unsustainable extra-clean spots at the bottom of deep bays in exactly the locations the PSDDA EIS concluded were the least biologically important.

DMMP Response #30: *The 4 pptr management goal is quite similar to concentrations surrounding most of the disposal sites; the exceptions are Elliott Bay and Bellingham Bay. Even these sites had surrounding area maxima that are close to the 10 pptr screening level in the revised guidelines, so the contention that the guidance will result in "extra clean" areas is not supported for most cases.*

- While active disposal is ongoing, the sediments being disposed of every year have the effect of suppressing the benthic community due to frequent burial, making their contribution to the aquatic food chain even less prominent than when disposal is not occurring. Once disposal ceases, whatever benefits are provided by the extra-clean spot will disappear as the site equilibrates to bay-wide "regional background" concentrations.

DMMP Response #31: *Rapid recolonization of the benthos has been documented during DMMP's regular site monitoring. The assumption that disposal suppresses the benthic community making their contribution to the aquatic food chain insignificant is not supported by our data. Furthermore, under the revised guidelines, the disposal sites would not represent "extra-clean spots" in an elevated "regional background" area. Table 3 summarizes the observed on-site and off-site dioxin data from the disposal sites to support this and the previous response.*

Table 3. Dioxin/Furan Sediment Concentrations* at DMMP Nondispersive Sites

Disposal Site	Year	Onsite: Mean (Range), n = # of stations	Offsite: Mean (Range), n = # of stations
Anderson/Ketron Island	2005	3.1, n = 1	3.6 (1.7 – 6.8), n = 7
Anderson/Ketron Island	2008	1.1, n = 1	2.2 (1.5 – 3.1), n = 7
Commencement Bay	2007	5.2 (1.1 – 14.2), n = 4	2.4 (0.86 – 5.2), n = 10
Elliott Bay	2005	3.0 (0.7 – 6.7), n = 3	no samples collected
Elliott Bay	2007	9.7 (2.5 – 17), n = 3	8.7 (4.0 – 12.2), n = 11
Port Gardner	2006	1.8 (0.71 – 2.6), n = 4	4.1 (3.1 – 5.2), n = 9
Port Gardner **	2010	2.1 (1.4 – 2.6), n = 10	3.6 (3.0 – 4.3), n = 4
Bellingham Bay	2007	5.5 (4.9 – 6.1), n = 2	6.9 (4.3 – 10.5)[5],n = 9

*** Concentrations in ppt-dry weight-TEQ; data extracted from SAIC 2005, 2006, 2008, 2009, and 2010**
****Preliminary data undergoing validation**

- The exposures that drive calculated risks are lifetime exposures. Any temporary up-tick in concentrations at a disposal site, or any temporary reduction, will not affect risk levels measured across lifetime exposures from the consumption of aquatic life that ranges over areas far larger than just the disposal site itself. This is especially true during periods of active disposal, when benthic community productivity at the disposal sites is suppressed due to smothering.

DMMP Response #32: *As previously discussed, the revised guidelines were developed to be consistent with the SQS. The revised guidelines provide some flexibility to consider the size and sequencing of projects when performing project-specific analyses.*

In summary, the Agencies have opted for a Proposal that: is based on MTCA regulations that will likely change in the near future; provides no demonstrated or discernable human health or ecological benefit; is extraordinarily prescriptive and conservative about even very short term potential exposures above natural background levels at disposal sites (despite the risks involved being calculated based on lifetime exposures); and makes no real effort to accommodate creative approaches that would likely allow much

[5] Mean & range excludes Benchmark station BBB01 located near the Georgia Pacific Outfall with 22 pptr-dry- weight-TEQ

higher concentrations to be disposed of at open water sites with adaptive management protocols in place to ensure that any problems were quickly addressed.

DMMP Response #33: *The agencies developed the new interim guidelines for open-water disposal of dioxin in sediments consistent with the SQS, supported (though not driven) by incremental human-health risk analysis, and including flexibility for evaluating projects on a case-by-case basis. The ports' proposal for allowing disposal of much higher concentrations with adaptive management protocols does not conform to the intent of the SQS for human health protection (as discussed earlier), potentially increases exposures/risk to subsistence and tribal fishers, and raises concerns regarding transport of contaminant-laden fine grained material to shallow water habitat. Furthermore, the ports' proposal disregards the cumulative impacts of contamination in the Sound, which is already manifested by the most contaminated high trophic levels in the world.*

Footnote: Note that dioxin concentrations at disposal sites have generally been about the same as the bays they are located in, even when dioxins were not generally tested for and a great deal of sediments were being disposed of that we now know likely had dioxin concentrations that were far higher than even urban background concentrations. Project sequencing and disposal protocols were keeping dioxin from being a disposal site problem even though dioxin concentrations were not determined for most projects. The Agencies have now concluded that there is a problem after all, even though the disposal sites are not creating any greater risks from dioxin than are present from background concentrations across those same urban bays, whether or not disposal of dredged sediments occurs in one small part of the bay.) We can surely do far better for both the environment and ourselves than this Proposal.

DMMP Response #34: *The WPPA appears to be arguing that past practices have resulted in acceptable on-site dioxin concentrations at the DMMP's disposal sites. The agencies do not agree with this perspective. Site monitoring has shown on-site dioxin concentrations at two of our sites (Commencement Bay and Elliott Bay) that are in excess of the old 15 pptr TEQ guideline. Furthermore, our revised guidelines (in accordance with the SQS) indicate that a management object of 4 pptr TEQ needs to be met at the disposal sites.*

VI. A better idea.

Rather than addressing uncertainty by being highly prescriptive, and rather than pushing beyond the Agencies' legal authority to simply get something definitive and final in place and move on, the Agencies should allow a great deal of project-specific and disposal-site-specific flexibility. Project proponents will be willing to do the additional monitoring and implement contingency measures as needed to ensure management objectives for disposal sites are met. There is no need, for example, to limit single DMMU concentrations of dioxin to 10 ppt TEQ and require a volume-weighted average of 4 ppt TEQ across all project DMMUs. Instead, Washington's ports suggest the following approach:

- Set management targets for disposal sites at Regional Background concentrations for the bays in which they are located. We would expect Regional Background concentrations to be significantly higher than Natural Background, but lower than near-shore "Area Background" levels that are more highly influenced by individual sources. Given the deep-water location of the disposal sites in their bays, Regional Background should not be too different than the concentrations in each bay just outside its disposal site.

- Set default levels at which no follow-up testing or contingent measures would be required, such as a volume weighted average concentration equivalent to Regional Background.

- Allow higher concentration dredged materials to be placed at the disposal site provided appropriate disposal sequencing and other management tools are used to verify that the surface concentration at the end of a project or series of projects meets the management objective. Do not pre-judge what may or may not be workable for human health protection from bioaccumulative chemicals in individual DMMUs; allow project proponents to come forward with proposals and judge each proposal on its merits.

- Have contingent measures in place, including funding commitments, to ensure that season-ending surface concentrations meet the management target levels.

This approach would facilitate an adaptive management process that would develop a great deal of new information about what works and what doesn't work for open water disposal of urban sediments. With appropriate protections and contingent measures in place, any exceedences of management target levels for surface sediments would be measured in weeks or months, at most. Meanwhile, environmentally and economically beneficial projects could move forward and our store of knowledge concerning how we can live and work productively in harmony with Puget Sound will grow larger. In contrast, the Proposal will significantly curtail most urban area maintenance dredging projects. We will lose the tremendous economic and environmental benefits those projects provide, and we will gain nothing in terms of improved health or environmental protection.

DMMP Response #35: *Significant parts of the "better approach" put forward by the WPPA are contained either within our former or new interim approaches. For one, the former interim approach used comparison to dioxin concentrations in sediment surrounding the disposal sites, similar to the "regional background" described by the WPPA. In fact, the 4-10 pptr TEQ range of natural background dioxin represented in the revised guidelines roughly encompasses the range of sediment dioxin concentrations measured in the areas surrounding all of the non-dispersive sites. Only at the Elliott Bay site, where the maximum dioxin concentration in surrounding sediments has been measured as 12.2 pptr TEQ, does the "regional background" concentration exceed the 4/10 guidelines. Additionally, the DMMP's revised guidelines provide for case-by-case flexibility that would allow higher concentrations of dioxin to be disposed based on case-by-case considerations such as sequencing.*

The agencies' revised approach differs from the suggestions made by the WPPA in that it recognizes other permitting challenges and constraints to the levels of contamination that we can allow at the sites. Allowing open-water disposal of "higher concentrations" of dioxin (presumably >15 pptr) could prove problematic not only for section 404 permitting of individual projects, but in the renewal of shoreline permits for the disposal sites. The ports' proposal does not conform with the intent of the SQS (as discussed earlier), it potentially increases exposures/risk to subsistence and tribal fishers, and raises concerns regarding transport of contaminant-laden fine grained material to shallow water habitat.

VII. Summary

WPPA is extremely disappointed in the Proposal and in the process through which the Agencies decided to bring the Proposal forward. Following years of effort in a process that appeared to be moving towards workable solutions, the Agencies disappeared and then reappeared many months later with a prior proposal that is legally suspect and whose justifications have already been shown to be fundamentally flawed. WPPA requests that the Agencies instead take the more legally-defensible approach of setting workable target concentrations for each non-dispersive disposal site (based on Regional Background determinations) and allowing project proponents to come forward with proposals Dredged Material that

should permit those target concentrations to be maintained. That approach would allow the economic and environmental benefits of dredging projects to be realized, while also maintaining disposal sites at concentrations that are protective and consistent with MTCA requirements.

Very truly yours,

Eric D. Johnson
Executive Director

ATTACHMENT A
SELECTED PROJECTS PLACED IN JEOPARDY BY PROPOSED CHANGES

1. Port of Anacortes Cap Sante Marina Dredging

A major marina redevelopment requires dredging to maintain and increase depths. The first two phases are complete. The third phase, which is "shovel ready" other than an updated open water suitability determination, requires dredging of 40,000 cubic yards of sediments. Anticipated subsequent phases total about 200,000 cubic yards. The third phase material was approved for open water disposal, but the Port was required to update its suitability determination following implementation of the interim dioxin policy.

DMMP Response #A1: *The description of the process leading up to the retesting of the phase 3 sediments is not entirely accurate. The original suitability determination for this material was dated April 12, 2001. The recency period expired in February 2006 and the Port of Anacortes requested an extension of the recency period. The DMMP agencies are required to determine whether there have been any changed conditions, including changes to evaluation procedures. Dioxin testing was required for the recency extension because this location meet the reason-to-believe criteria (e.g., dioxin in excess of the interim guidelines has been measured in nearby sediments and presence of historical sources). The dioxin concentrations measured in Cap Sante sediments would have exceeded the old DMMP guideline of 15 pptr TEQ. Thus, while it is true that this project would have gone forward without a hitch if the agencies had not requested dioxin testing, it would have required the agencies to ignore our own reason-to-believe guidelines.*

Testing of the phase three marina project sediments showed a volume weighted average dioxin concentration of over 25 ppt TEQ. There is no reason to suspect that the remainder of the marina sediments that require dredging will be significantly different in concentration. Upland disposal costs make further dredging in the marina under the DMMP's interim dioxin policy financially unworkable for the Port of Anacortes. The Port's recent experience with both open water and upland disposal of dredged sediments from the DCI Shipyard project shows that the cost differential for Anacortes projects is about $92/cubic yard. Based on this differential, the 40,000 cubic yard phase three dredging project would cost an additional $3,680,000.

DMMP Response #A2: *It should be noted that the entire 40,000 cubic yards of phase-three dredging was not found unsuitable for open-water disposal. DMMU C1, comprising 15,200 cy was found suitable for disposal at the Bellingham, Port Gardner, Elliott Bay and Anderson-Ketron non-dispersive sites. More importantly, all 25,700 cy of material that would fail under the revised guidelines would also have failed under the old DMMP guideline of 15 pptr TEQ. Therefore, in this case, the additional cost due to the proposed guideline is zero.*

The incremental cost for the planned subsequent phases totaling an additional 200,000 cubic yards would be would be $18,400,000, making the total incremental additional costs for all planned marina dredging in excess of $22 million.

DMMP Response #A3: *It is possible that all of the additional 200,000 cy would fail the updated dioxin guidelines, but given that part of the phase-3 material was found suitable for open-water disposal, this "all-would-fail" scenario is speculative. Also, without data it is impossible to say what fraction of the additional material would fail under the revised guidelines but not under the old guidelines.*

The high incremental cost of changing to upland disposal makes further marina dredging financially unworkable for the Port. Not being able to dredge limits the Port's ability to upgrade the marina and will cost jobs and limit the facility's profitability for the Port. Deeper depths are needed to accommodate larger vessels, which is a change in approach that most Puget Sound marinas are pursuing because smaller vessels now have lower cost dry boat storage options. Larger vessels do not have that option, and they also pay higher moorage rates. So not being able to upgrade the remainder of the Anacortes marina will result in the local community losing business, revenues and jobs.

DMMP Response #A4: *We understand that the higher costs of upland disposal may be prohibitive to the Port but note that it isn't the change in the proposals that is causing this expense. These sediments would have failed under the old 15 pptr guidelines as well.*

2. Port of Anacortes Curtis Wharf Redevelopment Project
The Port of Anacortes plans to redevelop Curtis Wharf, which will involve dredging about 45,000 cubic yards of what would appear to be relatively clean sediments. Past testing of Curtis Wharf sediments showed that they were suitable for open water disposal. That testing did not include dioxin, as there was no "reason to believe" that dioxin would be an issue at this location. However, a dioxin sample collected near Curtis Wharf from Ecology's dioxin survey sampling showed a level of 5 to 10 ppt TEQ, which is above the deep Puget Sound Basin background level of 4 ppt TEQ used for the dispersive disposal site near Anacortes. Upland disposal of even a portion of the 45,000 cubic yards required to create a berth at Curtis Wharf would preclude redevelopment of that site, as every 10,000 cubic yards that must go upland represents nearly $1 million in increased costs for the redevelopment project.

DMMP Response #A5: *While this project was not tested under DMMP, a review of Ecology's Fidalgo Bay Sediment Investigation Data Report indicates that the stations in closest proximity to Curtis Wharf (A4-12 and A4-13) had numerous exceedances of chemical SQS and CSL values. The bioassay data indicated that A4-13 would have failed the guidelines for disposal at the Rosario Strait dispersive site. Both stations would have passed the bioassay guidelines for nondispersive sites. However, it is impossible to say how the dredged material would fare under the DMMP guidelines as the Ecology investigation evaluated samples from the biologically active zone (0-10 cm) only. If the deeper sediment is less contaminated, it could possibly be acceptable for open-water disposal. If it is more contaminated, it could fail DMMP bioassays. Therefore, impact of the change in dioxin guidelines to the Curtis Wharf project is difficult to gauge without data pursuant to the DMMP program.*

3. Port of Bellingham Squalicum Harbor Marina Dredging Deepening of a portion of the Port of Bellingham's Squalicum Marina requires dredging of 50,000 cubic yards of sediments. The marina was originally dredged in the 1950s and is due for maintenance dredging. The Port has planned and permitted a maintenance dredging project and the sediments involved passed open water disposal criteria prior to being required to test for dioxin. Port staff report that the marina sediments will not pass the dioxin interim criteria or any criteria based on non-urban background concentrations. The Port's consultants report that the incremental cost for the upland disposal of Bellingham sediments should be in the range of $104 per cubic yard. That would increase the project's costs by over $5 million, which makes the project unworkable for the Port.

DMMP Response #A6: *Squalicum Harbor Marina had not been characterized under DMMP prior to the current proposal for maintenance dredging. Therefore it is incorrect to say that "the sediments involved passed open water disposal criteria prior to being required to test for dioxin." While it is true that the majority of the sediment (3 out of 4 DMMUs) in the current proposal would not pass under the revised*

interim guidelines, these same DMMUs (ranging from 22.4 to 47.1 pptr) would have failed under the former guideline of 15 pptr. There is only one DMMU that would have passed under the old guideline but fails under the revised guidelines.

It is our understanding that the Port of Bellingham is currently exploring alternative upland disposal options that would allow this project to move forward.

4. Port of Bellingham Whatcom Waterway Navigation Dredging
The planned Whatcom Waterway navigation dredging is to be performed in conjunction with the Waterway remediation work. It involves 130,000 cubic yards of material that should pass open water disposal criteria other than the interim dioxin policy. Upland disposal costs would increase the project costs by over $13 million. The project makes it possible to bring deeper draft vessels into the Port's marine terminal, which will have a deeper berth following the Whatcom Waterway cleanup. Not doing the navigation dredging will limit the potential tenants to those with shallower draft vessels, and would fail to take advantage of the cleanup dredging that will create greater berth depths. The project will not be viable if upland disposal at a landfill is necessary.

DMMP Response #A7: *Data for this project have not been provided to the DMMP agencies, so it is not possible to comment on the suitability of the dredged material for open-water disposal.*

5. Bellingham Shipyard Area Dredging
This dredging is necessary to maintain access to the Harris Avenue shipyard. The Port will not be able to pursue the project if open water disposal cannot be used. The facility employs about 750 people. Those jobs would not be immediately lost, but long-term degradation of the shipyard's viability would occur if reasonable-cost dredging cannot be provided.

DMMP Response #A8: *Data for this project have not been provided to the DMMP agencies, so it is not possible to comment on the suitability of the dredged material for open-water disposal.*

6. Port of Everett Marina and Boat Launch Maintenance
The Port of Everett's marina requires maintenance dredging, much like the Ports of Bellingham and Anacortes marinas. Open water disposal has been used in the past, but Port staff report that background-based dioxin criteria would preclude it in the future. Additionally, the Port's boat launch would have to shut down before long, which would be minor revenue loss to the Port and a major public relations debacle.

DMMP Response #A9: *The Port of Everett 10th Street Boat Launch was recently characterized for open-water, including dioxin testing. The dioxin concentration was 1.9 pptr and all 32,000 cubic yards were found suitable for open-water disposal.*

DMMP characterization of Everett Marina sediment is underway. While the marina has not been tested previously for dioxin, recent dioxin testing in the vicinity of the project has not resulted in concentrations that would fail under the revised guidelines.

7. Port of Everett Marine Terminals Maintenance Dredging
This is a 25,000 cubic yard project that maintains the long-term viability of the Port of Everett's marine terminals. The Port reports that upland disposal costs would make the project non-viable. Cost-effective

maintenance dredging is necessary to avoid degrading the utility of the facility over time and putting hundreds of jobs at risk.

DMMP Response #A10: *It's not clear which project is being referred to. The Port of Everett Pacific Terminal project (10,000 cy) was recently tested under DMMP and all material was found suitable for open-water disposal. Dioxin concentrations ranged from 0.4 to 1.7 pptr. There are currently no other marine terminal projects being characterized under DMMP.*

8. Port of Everett Settling Basin Expansion
The Port of Everett is planning on expanding the settling basin that is upstream of numerous Port facilities via a 50,000 cubic yard project that should pass open water criteria. However, dioxin concentrations are unknown. Upland disposal would kill the project and result in a lost opportunity to reduce the sedimentation rates at the Port's downstream facilities.

DMMP Response #A11: *A partial characterization, including dioxin testing, was completed in DY10 for the Downstream Settling Basin relocation project. Dioxin was analyzed in these sediments and the measured concentrations were low, ranging from 0.02 to 0.47 pptr, well below the revised guidelines for open-water disposal.*

9. Port of Grays Harbor Berth Maintenance
The Port currently plans dredging of 50,000 – 80,000 cubic yards for berth maintenance and expansion. Upland disposal costs would preclude maintenance dredging, and the material involved has in the past qualified for open water disposal. According to Port staff, an open water disposal criterion for dioxin that is based on non-urban background concentrations would probably preclude open water disposal of the dredged material. The facilities involved are a major economic engine for SW Washington coastal communities and are linked to about 5,000 jobs. However, lease revenues received from tenants cannot justify the incremental expenditure of millions of additional dollars for upland disposal of dredged sediments.

DMMP Response #A12: *The revised guidelines would not apply to Grays Harbor.*

10. Port of Olympia Navigation and Berth Dredging
In 2000, the Port of Olympia was granted a suitability determination for open water disposal of 635,000 cubic yards of material to be dredged from the federal channel, turning basin and port berthing areas. A recency determination was approved in 2005 for 478,000 cubic yards of that material; however, in 2006 the determination was withdrawn based on the need for additional dioxin testing of the material. That year 29 DMMU were tested to include 458,734 cubic yards of material. Based on those results, 53 percent of the material was found to be unsuitable for open water disposal, based on the interim disposal criteria. In 2007, 101,000 cubic yards of suitable material was dredged and disposed of at the Anderson-Ketron disposal site. The port sponsored the Corps of Engineers to perform this work.

The Port of Olympia also completed a pilot project for removal of approximately 9,000 cubic yards of unsuitable material within the berthing area. This project was critical to maintain current safe navigational moorage. All of this material was loaded to a barge and subsequently trans-loaded directly into rail cars for upland disposal at a subtitle D landfill in Oregon. The project was completed in March 2009 and the actual off loading, transport and disposal fee was $134 per cubic yard. The disposal fee does not include any mobilization or dredging costs. The estimated increased cost for disposal of the remaining unsuitable material is $14,847,875 or 7.3 times greater than the cost of open water disposal.

Additionally, these costs do not include the extensive supplemental planning, regulatory oversight, permitting and engineering that will be required to carry out the project. These additional costs are due to the fact that all of this material is co-located with the remaining 110,500 cubic yards of material that is suitable for open water disposal. The port does not have specific estimated figures for these activities, however they are confident it will add several million dollars in additional costs and will likely take up to a decade for regulatory approvals to be completed. The cost and time associated with future maintenance needs severely impacts the Port of Olympia's ability to compete and support job opportunities within the region. The mean concentration of dioxin in the unsuitable materials is 30.2 ppt, with a range of 16.9 to 52.6 ppt.

DMMP Response #A13: *This is the project that alerted the DMMP agencies to the more widespread nature of dioxin contamination in Puget Sound. Our analysis of the dioxin data generated by the Port indicates that only one additional DMMU (out of 26) would fail under the revised interim guidelines when compared to the old guideline of 15 pptr. Under the old guideline 12 out of 26 DMMUs would have failed, while under the revised guidelines 13 DMMUs would fail.*

11. Port of Olympia Swantown Marina Dredging

The Port of Olympia must complete dredging in the Federal Navigation Channel that leads to and includes parts of the Swantown Marina and the Boatworks facilities. The port has completed dioxin characterization of the 33,000 cubic yards of material required for maintenance of the channel and moorage areas to be dredged. Of this amount only 5,300 cubic yards are suitable for open water disposal. Disposal cost of the unsuitable material would now be 8.7 times greater than open water disposal costs and increases the costs over $3,000,000 for disposal, making this project prohibitively expensive even though it is necessary for maintenance and expansion needs. The mean concentration of dioxin in the 5 DMMU exceeding interim disposal standards is 45 ppt, with a range of 18.8-61 ppt.

DMMP Response #A14: *As indicated in your description, the dioxin concentrations are elevated for this project. Our analysis of the dioxin data indicates that only one additional DMMU (out of 8) would fail under the revised interim guidelines when compared to the former guideline of 15 pptr. Under the former guideline 7 out of 8 DMMUs would have failed, while under the revised guidelines all 8 DMMUs would fail.*

12. Port of Vancouver Berth Deepening and Maintenance

The Port of Vancouver's current dredging permit allows for 200,000 cubic yards of berth maintenance dredging. The material involved has always qualified for open water disposal in the past, but dioxin testing has not been required before now. Dioxin concentrations are unknown, but the urban setting and the terminals' proximity to industrial discharges leads to Port concerns that the material will not pass a background based criterion. The Port reports that any significant cost escalation would put the project on hold and probably cause a revision to its scope. Thousands of jobs are linked to these facilities.

DMMP Response #A15: *The revised guidelines would not apply to Columbia River.*

Table 4 - Cummulative Project Impact Analysis as of June 23, 2010

management objective:			NA				4 pptr				former interim guidelines (non-dispersive)			
upper limit/screening level:			15 pptr				10 pptr							
project	dredge year	project volume	DMMUs pass	DMMUs fail	Volume pass	Volume fail	DMMUs pass	DMMUs fail	Volume pass	Volume fail	DMMUs pass	DMMUs fail	Volume pass	Volume fail
Port of Everett 10th St. Boat Ramp	**1992**	12340	1	0	12340	0	*0*	*1*	*0*	*12340*	*0*	*1*	*0*	*12340*
Port of Everett 12th St. Barge Channel	**1992**	80500	8	0	80500	0	8	0	80500	0	*6*	*2*	*62500*	*18000*
US Navy Everett Homeport Element II	**1993**	39200	6	0	39200	0	6	0	39200	0	*5*	*1*	*35200*	*4000*
Port of Bellingham I&J Waterway	**2006**	15770	0	5	0	15770	0	5	0	15770	0	5	0	15770
Port of Olympia East Bay Marina	**2006**	27664	1	7	3750	23914	*0*	*8*	*0*	*27664*	*0*	*8*	*0*	*27664*
Port of Bellingham Gate 3	**2007**	49884	2	2	24942	24942	*0*	*4*	*0*	*49884*	*1*	*3*	*12471*	*37413*
Dakota Creek Industries	**2007**	64000	4	0	64000	0	4	0	64000	0	4	0	64000	0
USACE/Port of Olympia	**2007**	448317	14	12	235360	212957	*13*	*13*	*210083*	*238234*	*5*	*21*	*191724*	*256593*
Port of Anacortes Cap Sante Marina	**2008**	40900	1	3	15200	25700	1	3	15200	25700	1	3	15200	25700
Port Townsend O&M	**2009**	1250	2	0	1250	0	2	0	1250	0	2	0	1250	0
Port of Seattle T115	**2009**	3750	0	2	0	3750	0	2	0	3750	0	2	0	3750
Delta Marine Industries	**2009**	6534	2	0	6534	0	2	0	6534	0	2	0	6534	0
Port of Seattle T18	**2009**	6800	0	1	0	6800	0	1	0	6800	0	1	0	6800
MJB Properties	**2009**	67825	7	0	67825	0	*6*	*1*	*59034*	*8791*	*6*	*1*	*59034*	*8791*
Port of Tacoma Washington United Terminal	**2009**	95700	5	0	95700	0	5	0	95700	0	5	0	95700	0
Port of Tacoma Blair-Hylebos Development	**2009**	317017	4	0	317017	0	4	0	317017	0	*3*	*1*	*278189*	*38828*
Puyallup Tribal Terminal	**2009**	376523	8	0	376523	0	8	0	376523	0	*6*	*2*	*278625*	*97898*
Boyer Towing	**2010**	3900	1	0	3900	0	1	0	3900	0	1	0	3900	0
Skyline Marina	**2010**	105,700	12	0	105700	0	12	0	105700	0	12	0	105700	0
Former Scott Paper Mill	**2010**	25,640	7	0	25640	0	*6*	*1*	*21660*	*3980*	*6*	*1*	*21660*	*3980*
10th Street Boat Launch	**2010**	32,000	1	0	32000	0	1	0	32000	0	1	0	32000	0
Pacific Terminal	**2010**	10,192	3	0	10192	0	3	0	10192	0	3	0	10192	0
Terminal 5	**2010**	10,410	5	0	10410	0	*3*	*2*	*6940*	*3470*	*4*	*1*	*8150*	*2260*
Thatcher Bay	**2010**	12,900	1	0	12900	0	1	0	12900	0	1	0	12900	0
USACE Duwamish	**2010**	109,535	15	0	109535	0	15	0	109535	0	15	0	109535	0
USACE Snohomish	**2010**	801,849	16	0	801849	0	16	0	801849	0	16	0	801849	0
USACE Swinomish	**2010**	152,000	3	0	152000	0	3	0	152000	0	3	0	152000	0
LaFarge Cement	**2010**	24,000	0	6	0	24000	0	6	0	24000	0	6	0	24000
Nippon Paper Industries	**2010**	1,000	2	0	1000	0	2	0	1000	0	2	0	1000	0
total:		2943100	131	38	2605267	337833	122	47	2522717	420383	110	59	2359313	583787
percent passing:					88.5				85.7				80.2	

indicates an impacted project

indicates a change in project impact when compared to the old 15 pptr guideline.

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Attachment 6B-2 (Robert Eisner, Port of Anacortes)

PORT OF ANACORTES COMMENT LETTER
June 30, 2010
Dredged Material Management Program Dioxin Project
By email to: dioxinproject@usace.army.mil.

Re: DMMP Agencies' Proposed Dioxin Standards

Dear DMMP agencies:
I am writing on behalf of the Port of Anacortes (the "Port") to express the Port's concern with the proposed dioxin standards for open water disposal. The Port supports the comments submitted today by the Washington Public Port Association ("WPPA"), and the comments submitted in the past by WPPA and various ports. This letter is meant to supplement WPPA's comments on the current proposal and provide some additional information about the situation faced specifically by Port of Anacortes.

As has been documented in prior submissions to the DMMP agencies (the "Agencies"), the Port has multiple projects that are currently on hold due to the combined effect of the Agencies' interim dioxin policy and the enhanced "reason to believe" requirement. The Agencies' current proposal would make those changes permanent. The potential economic impacts, both short and long-term, would be extremely significant to the Port, to Anacortes and to Skagit County. Although the Port fully supports regulations that protect the environment and human health, we are at a loss to understand how the Agencies' proposal will do anything other than stop projects that would both enhance the environment and provide a sorely-needed economic boost to our community. As an example, I would like to discuss a Port project that was been indefinitely suspended by the Agencies' new approach.

DMMP Response: *The revised guidelines that will soon be implemented remain "interim" (rather than final or "permanent"), as dioxin policies will continue to be refined in concert with the development of guidelines for other bioaccumulatives, especially PCBs.*

Cap Sante Boat Haven
The Cap Sante Boat Haven is a major Puget Sound marina. It encompasses 107 acres of upland and in-water property, has 950 slips, and provides moorage for 100 commercial fishing vessels in addition to recreational craft. The Boat Haven is the second busiest guest moorage marina in the state, providing temporary and guest moorage to more than 10,000 vessels in 2008. The Boat Haven provides an essential economic boost to the Port and the City of Anacortes through direct jobs and through the considerable commerce that comes to the area from Boat Haven users and the various services they require.

To maintain needed berth depths, and to upgrade the Boat Haven to keep it competitive with other top-flight marinas, the Boat Haven must be redeveloped and dredged. A portion of that work has been completed, but much remains to be done. The Port has had a project for one phase of that work ready to go for over a year. The work was halted when the Port was required to supplement its earlier suitability determination with dioxin sampling.

The Boat Haven dredging project is a good example of the economic and environmental benefits that are provided by shoreline redevelopment projects that include a dredging component.

The DMMP's proposed dioxin standards would eliminate those benefits for the Boat Haven due to the extraordinarily high incremental costs of disposing of dredged sediments at upland landfills. Based on the costs incurred by the Port for the recent Dakota Creek Industries cleanup and redevelopment project, every ton of sediments taken to an upland landfill costs $92 more than the open water disposal option. For the Boat Haven, upland disposal would add about $3.68 million for the next phase of work, and over $22 million of total additional cost for all of the needed dredging. The Port simply cannot possibly bear additional costs of that magnitude (or even a significant fraction of those costs) for either the next phase or the project as a whole.
The result of the Boat Haven project being put on hold is that the sediments with relatively high dioxin levels will remain in place in shallow, resource-rich water. By contrast, if the Port were permitted to craft a program of dredged material disposal that would allow the Boat Haven sediments to be placed at a non-dispersive site in sequence with cleaner sediments (such as deeper material from the Boat Haven or sediments from other projects), the disposal site could be maintained at a target concentration for dioxin, such as a "regional background" concentration for the area of the disposal site (as suggested by WPPA). Surface sediments in the Boat Haven would be significantly cleaner, and new risks would not be created at the disposal site. Instead, the project is on hold, economic benefits are being lost at a time when they are sorely needed, and the environment is no cleaner.

DMMP Response: *The original suitability determination for the Cap Sante Boat Haven dredging project was dated April 12, 2001. The recency period expired in February 2006 and the Port requested an extension of the recency period. Before an extension of the recency period can be granted, the DMMP agencies are required to determine whether there have been any changed conditions, including changes to evaluation procedures. Dioxin testing was required for the recency extension because this location meets the reason-to-believe criteria (e.g., dioxin in excess of the interim guidelines had been measured in nearby sediments and there was the presence of historical sources). The dioxin concentrations in three of the four DMMUs far exceeded the old DMMP guideline of 15 pptr TEQ. Thus, while it is true that this project would have gone forward without a hitch if the agencies had not requested dioxin testing, it would have required the agencies to ignore our own reason-to-believe guidelines. Thus, it was not the revised guidance per se that resulted in problems with sediment from the Cap Sante Boat Haven, but a heightened concern (borne out by the testing results) that led to testing of the material.*

It also needs to be pointed out that the entire 40,000 cubic yards of phase-three dredging was not found unsuitable for open-water disposal (as implied by the estimated $3.68 million disposal cost). DMMU C1, comprising 15,200 cy, was found suitable for disposal at the Bellingham, Port Gardner, Elliott Bay or Anderson-Ketron non-dispersive sites. That reduces the volume of material that would need to be disposed upland to 25,700 cy. But all of the 25,700 cy of material that would fail under the proposed guidelines would also have failed under the old DMMP guideline of 15 pptr TEQ. Therefore, the additional cost due to the proposed guideline is zero.

It is possible that all of the additional 200,000 cy planned for dredging in a future phase of redevelopment will fail the updated dioxin guidelines, but given that part of the phase-3 material was found suitable for open-water disposal, this "all-would-fail" scenario (as implied by the $22 million estimate) is speculative. Also, without data it is impossible to say what fraction of the material would fail under the new guidelines but not under the old guidelines. The differential disposal cost for this fraction is the only additional cost that could be attributable to the new guidelines.

Attachment 1

Monitoring and Project Review Support

The WPPA comment letter outlines an alternative approach for DMMP's regulation of dioxin in dredged sediments. WPPA's suggested approach allows much more site-specific flexibility, and relies to a greater degree on disposal site monitoring and adaptive management. It would provide a pathway for projects like the Boat Haven dredging to move forward in a cost-effective fashion that fully protects human health and the environment.

Of course, project-specific and disposal-site-specific monitoring, reviews and determinations require staff time and resources. In contrast, a blanket rule of the type proposed by the Agencies is relatively simple to implement. In order to assist the Agencies with additional monitoring and project-specific reviews, the Port of Anacortes would support additional fees on dredging projects to supply the program support needed for a more flexible approach. This is clearly a more desirable outcome for ports than either bearing the much greater costs of upland disposal or just cancelling beneficial projects.

DMMP Response: *Significant parts of the alternative approach put forward by the WPPA are contained either within our former or new interim approaches. For one, the former interim approach used comparison to dioxin concentrations in sediment surrounding the disposal sites, similar to the "regional background" described by the WPPA. Notably, the 4-10 pptr TEQ range of natural background dioxin represented in the new guidelines roughly encompasses the range of sediment dioxin concentrations measured in the areas surrounding all of the non-dispersive sites. Only at the Elliott Bay site, where the maximum dioxin concentration in surrounding sediments has been measured as 12.2 pptr TEQ, does the "regional background" concentration exceed the 4/10 guidelines. Additionally, the DMMP's new guidelines provide for case-by-case flexibility that could allow higher concentrations of dioxin in individual DMMUs to be disposed based on considerations such as sequencing. The new interim guidelines have eliminated the automatic triggering of bioaccumulation testing for exceedances of the 10 pptr screening level. Case-by-case decisions to allow disposal of material not meeting the 4 pptr and 10 pptr screening levels may be made by the DMMP agencies based on the overall goal of meeting the non-dispersive disposal site management objective.*

The agencies' revised approach differs from the suggestions made by the WPPA in that it recognizes other permitting challenges and constraints to the levels of contamination that we can allow at the sites. Allowing open-water disposal of "higher concentrations" of dioxin does not conform to the intent of the SQS, it potentially increases exposures/risk to subsistence and tribal fishers, and raises concerns regarding transport of contaminant-laden fine grained material to shallow water habitat.

It is also important to understand that the agencies needed to work within the existing Sediment Management Standards (SMS) framework, which currently only has narrative standards for bioaccumulative compounds such as dioxins. The SMS rule includes a two-tiered decision-making framework, with the Sediment Quality Standards (SQS) representing the lower, more protective, tier. The SMS rule also authorizes Ecology to designate open-water disposal sites as Sediment Impact Zones (SIZ), which would allow elevated concentrations (the second, upper tier, SIZmax) at the disposal sites. Although the SMS authorizes Ecology to designate the disposal sites as SIZs, the Department never designated them as such because disposal site monitoring results showed that on-site samples rarely/never exceeded SQS for benthic toxicity. Thus, unless the sites are established as Sediment Impact Zones, the upper tier cannot be considered in the development of guidance. In the early phases of the DMMP dioxin process, the agency directors made a policy decision not to pursue any action requiring that the sites be designated as SIZs out of concern that the benefits of designating SIZs would not outweigh the issues with implementing them. The rationale behind this decision is documented in the

SMARM 2009 issue paper presented by the agencies (page 13 of attachment 2 of the SMARM 2009 issue paper).

While the DMMP agencies appreciate the Port's offer to increase dredging fees to help pay for additional monitoring, we cannot allow dredged material to be placed at the sites that would result in a failure to meet the site management objective. However, given that stricture, the agencies have provided as much flexibility as possible to allow individual projects to meet the objective.

Ecology's MTCA/SMS Rulemaking Process

The WPPA comments discuss the Advisory Committee and rulemaking process that Ecology is currently undertaking to address inconsistencies between MTCA and the Sediment Management Standards. Chief among those issues is MTCA's requirement that a final cleanup must meet natural background concentrations for those hazardous substances that are calculated to pose a human health risk at background levels. The MTCA regulations were not written with sediment cleanups in mind, and the Sediment Management Standards (which were) provide greater DMMP Agencies flexibility. Ecology is working through a process that will culminate in rulemaking to resolve these inconsistencies.

WPPA, the Port of Anacortes, and other port districts have been actively involved in Ecology's MTCA/SMS process. In that role, it has become clear to us that Ecology seeks to provide more flexibility in MTCA and is moving away from a natural background cleanup level for final urban area sediment cleanups. (footnote: Natural background would remain as a long-term goal to be strived for through source control efforts. An alternative standard, such as "regional background" would be used as a basis for defining final sediment site cleanup levels.) At the same time, the DMMP dioxin proposal puts forward that same MTCA requirement as a basic reason why disposal sites in urban areas should be managed to attain and maintain natural background concentrations of dioxin and other bioaccumulative chemicals. If the proposed new guidelines are put in place, the Agencies will be attempting to maintain concentrations at disposal sites that one of the DMMP agencies may well have opted to abandon as a requirement for cleanups in those same areas.

Using MTCA cleanup standards for disposal site decisions is not legally required and there are good policy reasons to make suitability determinations on other grounds. Even if the Agencies believe that a MTCA-based approach is necessary for disposal site suitability determinations, a more prudent approach than the current proposal would be to wait until Ecology's rulemaking process is much further along before imposing a MTCA-based dioxin management standard for disposal sites.

DMMP Response: *The changes that may result from that rulemaking effort are not yet clear. Until rule revisions are promulgated, the DMMP agencies must comply with existing regulations. When rule changes are enacted, we can re-evaluate to determine if we are able to incorporate more flexibility.*

Conclusion

The Port of Anacortes will be hamstrung if the Agencies institutionalize the approach to suitability determinations represented by the dioxin proposal. The projects that will not happen represent a tremendous economic loss. Failure to go forward with those projects will also be a loss for the environment. The Agencies should withdraw the current proposal and instead come forward with an approach that allows a great deal more flexibility in determining what can work at each disposal site. The WPPA proposal represents just such an approach and should be

adopted by the Agencies. We are confident that funding for the necessary additional monitoring and staff reviews can be worked out with ports and other site users.

Very truly yours,
Robert Elsner

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Attachment 6B-3 (Sue Mauermann, Port of Tacoma)

June 30, 2010

Dredged Material Management Program Agency
C/o Floyd Snider
601 Union Street, Suite 600
Seattle, WA 98101

Re: **Proposed Dioxin Guidelines for Dredged Sediment Disposal in the Puget Sound, announced April 19, 2010**

Dear DMMP Agency:

As a public entity that is an integral part of the Puget Sound community, the Port of Tacoma strongly urges you to reverse the DMMP Agency's recent decision to significantly restrict future dredge material disposal in the Puget Sound via the Proposed Dioxin Guidelines for Dredged Sediment Disposal in Puget Sound announced April 19, 2010. We make this request because we are convinced that there are other adaptive management options that sufficiently protect the quality of the Puget Sound without creating unacceptable impacts to the local and regional economies.

In support of our position, we offer the following specific observations regarding the proposed dioxin policy change for your consideration:

- **No Reduction in Contaminant Input to Puget Sound.** Numerous studies[1] consistently conclude that the greatest source, by far, of toxic chemicals into the Puget Sound is surface water runoff. Under the revised DMMP policy, there will be no change in the contaminant input to the Puget Sound. We would prefer that the limited agency resources available to improve the Puget Sound be directed to where they will achieve the greatest good.

DMMP Response: *While upland source control is likely the best way to reduce exposure over the long run, we cannot ignore the issue until it is resolved for upland sources. The DMMP agencies are responsible for managing the disposal of dredged material at the state's open-water disposal sites and are bound by current regulations to limit the disposal of dioxin to background concentrations. Additionally, while sediment is not a major source of dioxins to the Puget Sound system, the movement of material containing dioxins may contribute to re-distribution, which is one of the tribal concerns.*

- **No Improvement to Environmental Quality and/or Human Health.** Agency monitoring reports and environmental impact assessments consistently conclude that the use of DMMP open-water disposal sites in the Puget Sound to date have not adversely impacted the environment nor do they represent a threat to the ecological food chain[2]. This is by design, in that the disposal sites were chosen "*in areas of relatively low habitat value or low use by biota (distance offshore, depth, areas of low known resource value)*" and the timing of disposal events is controlled "*to avoid*

[1] WA Department of Ecology, 2008, *Focus on Toxic Chemicals in Puget Sound* Publication 08-10-097.
[2] U.S. Army Corps of Engineers, 2006, White Paper RE: *Supplement to Corps of Engineers March 2005 Biological Evaluation for Puget Sound Dredged Disposal Analysis Program (PSDDA) Dredged Material Disposal Sites: Consideration of Puget Sound Dredged Material Management Program (DMMP) Activities (Specifically Dredging, Transport, and Unconfined Disposal of Dredged Material) As They Affect Bioaccumulation of Contaminants of Concern in Southern Resident Killer Whales* and U.S. Army Corps of Engineers, 2005. *Continued Use of Puget Sound Dredged Disposal Analysis Program (PSDDA) Dredged Material Disposal Sites*, March.

overlap with sensitive migration or life history periods of salmon"[3]. The agencies, therefore, are altering a program that empirical data show is currently achieving its objectives. However, the proposed changes will have substantial negative economic impacts, while providing no measurable environmental improvement.

***DMMP Response**: The non-dispersive disposal sites are not all deep-water sites with no marine life; sites were selected for low biota abundance compared to other areas within Puget Sound area, but three sites have biota within their bounds that are consumed by humans, and all sites are in Usual and Accustomed Tribal fishing areas. Thus, while the DMMP agencies support the conclusions in the cited report for Orca (as well as for other wildlife), revisions to the dioxin guidelines are being driven by human-health considerations instead.*

Overall, the Agencies estimate that the guidelines will result in net benefits to human health and the environment relative to the former guidelines. The Agencies' conclusions are largely based on a qualitative evaluation due to the uncertainties in quantifying risk associated with dioxin in dredged material.

DMMP Open Water Sites: The Agencies expect that the revised guidelines will result in several health and environmental benefits relative to the former guideline of 15 pptr. These benefits will result from reduced dioxin concentrations at many of the DMMP sites. All sites are part of tribal Usual and Accustomed fishing grounds, and some (Anderson-Ketron and Port Gardner) have significant crab populations.

The Agencies' conclusions are largely based on a qualitative analysis of benefits. This is consistent with current state and federal approaches for evaluating health benefits (particularly benefits associated with non-cancer risk reduction). While it would be technically possible to calculate and compare quantitative estimates of cancer risks specifically associated with the disposal sites, there are large uncertainties in quantifying the disposal site-only contribution to exposure for both human and wildlife receptors. The Agencies do recognize, however, that the incremental benefits relative to current guidelines are likely to be small given the limited acreage represented by the disposal sites relative to Puget Sound as a whole,

The benefits of the revised guidelines include the following:

- *Reduced Cancer Risks: Numerous scientific and regulatory organizations have concluded that dioxins and furans are known or probable human carcinogens (ATSDR, 1999; IARC, 1997; US EPA 2008, 2009, 2010). These compounds can be transferred from sediments to fish/shellfish foraging in the vicinity of the DMMP sites. People can then be exposed to dioxins from the DMMP sites when they eat those fish/shellfish. The Agencies believe the revised guidelines will reduce the cancer risk associated with the disposal sites because of the lower dioxin levels allowed at the sites. For example, the 2007 monitoring study of the Elliott Bay site found a mean on-site concentration of 9.7 pptr TEQ. Under the revised guidelines the highest allowable mean concentration would be 4.0 pptr TEQ. Lowering the on-site concentration from 9.7 to 4.0 pptr would reduce the risk associated with the Elliott Bay disposal site by more than a factor of two. Because the dioxin concentrations at the disposal sites change with each disposal event, it would be extremely difficult to quantify precisely the risk reduction over time for each of the disposal sites, but the Elliott Bay example does provide evidence that the risk reduction would be real, at least at that site.*
- *Reduced Non-Cancer Risks: Exposure to dioxins/furans have also been shown to increase the risks of developing a wide range of non-cancer health problems including hepatic, immunological, dermal, endocrine effects, neurological effects and reproductive and development effects (ATSDR, 1999; IARC, 1997; US EPA 2008, 2009, 2010). The Agencies believe the revised guidelines will result in a reduction in non-cancer risk because of lower dioxin levels at disposal sites.*
- *Reduced Ecological Risks to Fish and Wildlife. Potential effects of dioxin through bioaccumulation to demersal fish were evaluated by the agencies using the tissue-residue effects methodology during the Olympia Harbor Federal/Port Navigation Project suitability determination (DMMP, 2006) for disposal at the Anderson/Ketron site. According to this evaluation, at sediment values near the 4 ng/kg TEQ management goal, greater than 97.5% of this population would be protected. Higher sediment values would be associated with a greater tissue burdens, and thus could have greater potential effects to more of these demersal populations. Biomagnification or increasing concentrations as hydrophobic organics such as dioxins pass through the food web to higher predators may also be of concern. Specifically regarding the threatened and endangered Southern Resident Killer Whale population, dioxin TEQ in 100% of males and in 87% of females exceeded tissue burdens believed to represent harm in Harbor Seals (Ross et al, 2000). Although the Southern Resident Killer Whale population ranges widely and the dredge-site contribution of dioxin is likely to be small, even a small reduction in bioavailable dioxin inventory in Puget Sound waters and sediment could be beneficial.*

Dredging Project Locations: The WPPA and other interested parties have expressed concerns that the revised guidelines will result in the cancellation or delay of dredging projects. In those situations, they pointed out that the cancellations or delays may mean the loss of health and environmental benefits because dioxin-contaminated sediments would remain in the nearshore areas where most dredging projects occur. The Agencies recognize that the revised guidelines will impact decisions on whether to proceed with some dredging projects. However, given that less than 2 percent of the 2.2 million cubic yards of material tested for dioxin in Puget Sound in the last three years (2008 – 2010) would be found unsuitable for open water disposal under the revised guidelines solely on the basis of dioxin concentrations, it would appear that the revised guidelines are unlikely to significantly alter the total volume of material found to be suitable for open water disposal and are therefore unlikely to lead to widespread cancellation of nearshore dredging projects.

Furthermore, guidelines that allow for more sediment removal do not necessarily translate into improved nearshore environmental quality. The actual environmental benefits at the project location are case-specific, and will depend on the changes to concentration (and hence bioavailability) of dioxins or other hazardous substances in the sediments exposed by the dredging project relative to the surface concentrations prior to dredging. Should biologically-productive habitats be present near the dredging project, there could be nearshore benefits when the post-dredging surface sediments are cleaner that the pre-dredging surface sediments. However, the reverse situation (post-dredge surface concentrations are higher than pre-dredging surface concentrations) may also occur. In the latter circumstance, the project would have a negative effect on environmental quality at the dredging location.

Upland Disposal Activities: The WPPA and other interested parties have expressed concerns that greater reliance on upland disposal options will have adverse environmental consequences. These include impacts associated with transport (e.g., spills, CO2 emissions) and disposal (e.g., ground water impacts, loss of habitat). The Agencies recognize that the revised guidelines may increase the amount of material that needs to be taken to upland disposal sites. However, as discussed above, it does not appear that the revised guidelines will significantly alter the total volume of material found to be suitable for open water disposal. Therefore, the agencies believe that negative environmental consequences associated with any increase in upland disposal activities are likely minor.

- **Flawed underlying analysis of risk.** The fundamental basis on which the need for a policy change is founded (unacceptable risk to human health at current background levels) is compromised in approach and by significant uncertainties. Many of these have been transmitted in prior comments; the following are just a few:
    - The risk assessment did not evaluate the incremental risk that the open water disposal sites represent;

DMMP Response: *The ports have suggested alternative risk approaches, such as an analysis of the comparison of the relative risk of placement of contaminated material at the open-water sites versus leaving it in place or the additional risk of disposal at a given site in relation to the overall risk posed by concentrations prevalent in Puget Sound (incremental risks). The agencies believe that incremental risk approaches are inconsistent with the goal of meeting the SQS (see the above discussion regarding the decision of the agencies to meet the SQS), and that the SQS represents the goal of sediment quality throughout the state, not a site-specific value. However, in an effort to address all stakeholder comments, the DMMP agencies explored these alternative risk approaches and found that they did not support alternative conclusions. A worksheet with the resulting values was distributed to stakeholders attending the May 18, 2009 DMMP dioxin technical workshop. A copy of the worksheet is available at the following web site:*
http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/Summary_of_Incremental_Risk_Calcs_051209&intro.pdf.

The DMMP calculations were generated in response to earlier stakeholder suggestions that sediment values associated with specific risk increments (10E-5 or 10E-6) would be a possible approach to generating new dioxin guidelines. The exposure assumptions and approach used to generate hypothetical risk-based sediment guidelines were determined by the DMMP agencies based on best professional judgment and/or consultation with experts from other resource agencies and do not reflect consensus with the stakeholder community. The DMMP agencies decided not to proceed further with this approach. The rationale for this decision includes the following:

- *An incremental risk approach is one option for making case-by-case decisions within the context of a sediment impact zone. However, the agencies had previously decided not to designate the DMMP sites as sediment impact zones.*

- *The agencies concluded that use of an incremental risk approach provided limited flexibility for establishing revised guidelines. Only the use of the 10E-5 risk increment and very large foraging areas of sole and crab would provide more latitude for higher acceptable dioxin concentration based on incremental risk.*

It is likely that EPA will update the Integrated Risk Information System (IRIS) database to include a significantly higher cancer slope factor (CSF) for dioxin and furan mixtures. The EPA has proposed a revised cancer slope factor (CSF) for dioxin to reflect a six to ten-fold greater toxicity. Application of this CSF in the agencies' incremental risk calculations would result in a reduction of the allowable dioxin concentrations by an order of magnitude, thus making even the highest possible risk-based values roughly equivalent to the proposed 4/10 guidelines.

- Numerous conservative assumptions that cumulatively introduce a high level of uncertainty in the estimate of risk were used, these include:
  - A direct link was assumed between the dioxin measured in Puget Sound fish and the sediment data used to estimate Puget Sound "background" dioxin concentrations. Yet none of the sediment data was collected contemporaneously with the tissue samples, and roughly 40% of the sediment samples were from depths at which agency studies have concluded insignificant feeding takes place by commercially- and tribally-harvested seafood (greater than 300 ft).

DMMP Response: *The DMMP conducted its background risk assessment using tissue data from various surveys conducted within non-urban areas of Puget Sound (retrieved from Ecology's EIM database). The tissue data from these different surveys were divided into categories (clam, fish, and crab) and sample-weighted means for each category were derived by multiplying the species-specific tissue data by the associated number of samples, summing them by category (clam, fish or crab) and dividing by the total sum of the samples in that category. Nearly all of the embayments represented by the background tissue data were also sampled during the 2008 Ocean Survey Vessel (OSV) Bold sediment survey. Aside from 4 tissue samples (2 crab and 2 clam) that were collected in 1991, all of the background tissue data had been collected within 3 years of the 2008 OSV Bold survey. Although 30 out of the 70 samples from the OSV Bold survey were from locations in greater than 300 ft of water, there were 27 additional samples from non-urban areas (reference sites and the area surrounding the Anderson/Ketron disposal site) which were included in the derivation of the 4 pptr TEQ UTL representing dioxin in non-urban sediments. Approximately half (14) of these additional sediment data were from shallow locations within Carr Inlet, West Beach, Freshwater Bay, Sequim Bay, and Samish Bay.*

The sample-weighted mean values for clam, crab and fish were intended to represent the central tendency of tissue dioxin from non-urban areas of Puget Sound. Likewise, 4 pptr derived from the OSV Bold/reference sediment data is intended to represent the upper end of the distribution of sediments in non-urban areas of Puget Sound. No attempt was made to elucidate the association between particular tissue concentrations and sediment dioxin measured from the same area. However, the DMMP did assume that there is some (not necessarily direct) association between dioxin in fish and shellfish tissue caught in non-urban areas of Puget Sound and dioxin found in the sediments from the same areas. The extremely low solubility of dioxin in water, and its high affinity for lipids/carbon lend support for this assumption.

While the OSV Bold survey did not investigate tissue concentrations, contemporaneous sampling for sediment and biota dioxin content has occurred at several of the nondispersive sites. The 2005 and 2007 Anderson Ketron data (for example) were discussed in the early technical workshops and published on

*the DMMP website. At the Anderson-Ketron site, benthic tissue concentrations of Compsomyax, Macoma, and Yoldia were measured and expressed as BSAFs using below-detection-limit (BDL) substitution. When BDL = 0, the median BSAF was 0.044 and the mean BSAF was 0.071 for all species combined. When BDL = 0.5*DL, the median BSAF was 0.249 and the mean BSAF was 0.222. These species are potential food for foraging fish such as English sole, and in that species at that site in 2007, concentrations of 0.258 ng/kg TEQ (BDL=0) and 0.286 ng/kg TEQ (BDL = 0.5*DL) were found . Based on this data, we conclude that there is sufficient evidence to link sediment concentrations with concentrations in fish.*

- The risk claims are based on extremely limited data sets: only 102 samples of seafood and only 70 sediment samples (from a body of water that covers more than 1,000 square miles) and *no salmon samples*, which leaves a data gap for 50% of the Tulalip Tribes' seafood consumption, 24% of the Suquamish Tribe's seafood consumption, and a significant portion of the modeled "general public"[1] seafood consumption.
- The estimated contribution of dioxin in the Puget Sound sediment in the modeled seafood consumption was 100%. Studies estimate that only 1-3% of the dioxin in migrating salmon is obtained from the Puget Sound.

DMMP Response: *The DMMP used all available, high-quality tissue data from non-urban areas of Puget Sound for our background risk calculations. While the use of bottom fish data may overestimate the body burden of dioxin in salmonids (attributable to sources in Puget Sound), there is no conclusive information documenting to what extent measured residues are acquired while at sea. Such information is particularly important for resident salmon. If dioxin body burden trends are similar to that which has been documented for PCBs, dioxin in resident salmon populations may be higher than that in ocean-going populations. Given these uncertainties, the DMMP decided it was appropriately conservative to use bottom fish dioxin to represent all finfish consumed.*

DMMP and other programs will continue to collect more sediment and tissue data in order to improve the data base for "natural background". Such data will be invaluable to continuing discussions on bioaccumulation test outs and other sediment/tissue relationship issues.

- No risk assessment of the proposed change in policy was conducted, despite its greater carbon footprint (including higher fuel consumption and the attendant air quality impacts, use of valuable landfill space) and increased risks of truck traffic on highways.

DMMP Response: *The ports have not provided any documentation to support the suggestion that the revised guidelines will result in increased greenhouse gas emissions. The agencies' analysis indicates that most of the dredged material tested for dioxin in 2008, 2009 and 2010 was found to be suitable for open-water disposal and much of that found unsuitable was unsuitable under the old guidance of 15 pptr as well. In 2008-2010, only 2% of the material tested for dioxin would have failed under the new guidelines due to dioxin alone. Of the 21 projects tested for dioxin during this time, only 3 more would be impacted by the new guidelines than by the old guideline and only 2 of these 3 projects would be impacted by dioxin alone. Of the 107 DMMUs tested for dioxin, only 4 more would be impacted by the new guidelines compared to the old guideline, and only 2 of these 4 DMMUs would be impacted by dioxin alone. Even if all of these impacted projects were taken upland, the increase in greenhouse gas*

emissions would be minor. The agencies considered quantifying the greenhouse gas emissions associated with the various alternatives. However, once the range of alternatives had been narrowed down to those that were consistent with State regulations, it was apparent that there was an insufficient difference between them relative to greenhouse gas emissions to warrant the expense that such an analysis would entail.

- **Significantly Underestimated Cost of Proposed Guidelines.** The agency's assessment of the cost implications of the revised policy was an incremental cost assessment, not a full program cost assessment. Furthermore, only direct costs were accounted for, and assumptions made in the direct cost assessment do not comport with the information supplied in earlier comments to the agency regarding

[3] U.S. Army Corps of Engineers, 2005. *Continued Use of Puget Sound Dredged Disposal Analysis Program (PSDDA) Dredged Material Disposal Sites*, March.

the types and number of projects affected and how the affect translates to missed opportunity costs.

DMMP Response: *The DMMP agencies have endeavored to include all pertinent information provided by stakeholders. For example, following the initial presentation of the project impact analysis at the March 2009 technical workshop, the ports provided information regarding upland disposal costs. This information was incorporated in the Project Impact Analysis Technical Memorandum prepared for the 2009 SMARM. At several meetings, the ports indicated they would provide additional information that would be critical to a more complete economic evaluation but little detailed information was submitted. Furthermore, the ports offered to provide their own analysis in the early stages of this activity, but did not follow through on this offer.*

Our retrospective analyses (the project-impact and small-business analyses), as well as our experience implementing the former interim dioxin framework, indicate that the costs and impacts to maritime industry and economy are overstated by the ports. Many of the projects cited in the ports' analysis as failing under the revised interim guidelines would have also failed under the old guideline of 15 pptr TEQ. We note that DMMP implementation of the former interim dioxin framework has not shut down dredging in Puget Sound. Most of the material tested for dioxin has been found to be suitable for open-water disposal. During the 2008-2010 dredge years, 21 out of 30 Puget Sound projects with suitability determinations included at least some testing for dioxin. Approximately 10% (212,000 cy out of 2.2 million cy) of the dioxin-tested material was found to be unsuitable for open-water disposal at a non-dispersive site. Only 165,000 cy of this material was found unsuitable because of dioxin alone, and this largely due to the restrictive nature of the former interim guidelines for the Commencement Bay site. Under the new guidelines the volume of material failing in 2008-2010 due to dioxin alone would have dropped from 165,000 cy to 38,000 cy.

Please be assured that the Port of Tacoma values efforts that protect the health of Puget Sound and our community. However, as noted above, we believe the revised DMMO approach is not a good management or environmental policy choice. We favor efforts that afford real improvement, and continue to oppose efforts that direct resources to, at best, marginal benefits when the costs are disproportionately high.

Thank you for this opportunity to provide our comments on this important issue. We encourage you to consider again comments that we provided in April 2009, a copy of which is attached for your reference), as well as the comments that you will receive in the current comment period from the Washington Public Ports Association.

Sincerely,

Sue Mauermann

Sue Mauermann
Director, Environmental Programs
Port of Tacoma

c: Johan Hellman, Assistant Director, Washington Public Ports Association
Ted Sturdevant, Director, Washington State Department of Ecology
Dennis McLerran, Regional Administrator, Region 10, US Environmental Protection Agency
Peter Goldmark, Commissioner of Public Lands, Washington State Department of Natural Resources
Colonel Anthony Wright, US Army Corps of Engineers

April 3, 2009

Dredged Material Management Program
c/o Floyd Snider
601 Union Street, Suite 600
Seattle, WA 98101

Re: DMMP Dioxin Project

Dear DMMP Agencies:

This letter provides comments from the Port of Tacoma regarding the Dredge Material Management Program (DMMP) proposal to establish new testing and suitability criteria relating to dioxin/furans as that proposal was described at the March 11th agency presentation.

As you know, the Port of Tacoma is an important part of Washington's working waterfront economy. The Port is among the largest cargo Ports in the United States, and creation of jobs through support of water-borne commerce is central to what we do for our community. Our waterfront facilities also support a wide range of waterfront tenants, including container terminals, cargo transportation companies, boat builders, seafood processors, wood products companies and manufacturers. Our tenants and customers range in size from very large multi-national corporations to very small family businesses.

In all of our activities the Port of Tacoma strives to combine sustainable waterfront economic activity with proactive environmental stewardship. We believe that through good management, these two goals can be achieved simultaneously.

The Port of Tacoma is intimately familiar with the DMMP through our involvement in waterfront commerce, facility development, and operations. We have also worked with the DMMP on beneficial sediment reuse projects, including projects that have created dozens of acres of new premium shallow-water habitat. Without a doubt, the DMMP represents one of the best examples of how to achieve both sustainable waterfront economic activity and environmental stewardship.

We support the DMMP process and applaud the agencies for their role in developing and successfully managing dredge materials in an environmentally protective and economically sustainable manner for the last 20+ years. It is because of the success of the program that we strongly disagree with the current dioxin policy proposal. We believe that much more work is required to ensure that we're using the best science and

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policy in this important decision. It's clear that this is a policy which should not be rushed to adoption this spring.

We also are committed to supporting the DMMP process through the conclusion of a dioxin policy development process. Our staff and their technical expertise are available to help the DMMP as it completes the work ahead. Toward this end, we provide the following initial comments and recommendations for use in correcting some of the deficiencies in the current dioxin proposal:

1. **The Problem Statement Needs Better Focus:** The basic policy question facing the DMMP is what suitability criteria are appropriate for dredged material managed at the Puget Sound disposal sites. The policy effort needs to stay focused on this goal. While this goal is compatible and supportive of other Puget Sound environmental initiatives, the focus of the DMMP should not be diverted from its original purpose. To do so would undermine over 20 years of successful multi-agency cooperation. Technical work performed in support of the policy evaluation needs to remain focused on applicable issues, and must clearly articulate benefits and impacts of the policy alternatives for updating dredged material suitability criteria for each of the disposal sites.

2. **Regulatory and Policy Issues Need to be Clearly Differentiated:** As discussed at the briefing on March 11th, the update of the dioxin policy must be conducted in a manner consistent with applicable federal and state regulations, and must be consistent with the EIS and permitting documents that are the foundation of the DMMP. These regulations, permits and documents provide the "guard rails" within which policy decisions should be appropriately made. This will ensure that the final policy is protective, appropriate and defensible. However, there are also complicated policy questions that arise due to the complexities of regulating historical compounds such as dioxins that are so ubiquitous in our urban bays. These policy decisions require good technical work at the staff level, and appropriate involvement of agency managers and decision-makers to ensure that the final policy decisions are not only within the "guard rails", but are appropriate given the range of environmental and pragmatic considerations that apply. During policy development it is critical that regulatory and policy issues be clearly differentiated so that transparency is maintained throughout the policy development process. Otherwise the final policy will not be defensible. It was clear at the briefing on March 11th that some muddling of these two issues has occurred, and this needs to be corrected.

3. **Policies and Procedures Must Consider Complexities of Dioxins/Furans:** There are a host of complex technical issues that need to be considered for any policy involving dioxin/furans. These include dealing with differences in chemical and biological behavior of the different congeners, understanding their actual fate and impacts in the environment, understanding the sources and distribution of the compounds in urban sediments, and understanding the current science with respect to their toxicity. These issues are not simple, but they have great bearing on a policy decision. It is clear that further work is required to ensure that these issues are appropriately taken into account during policy development.

4. **Analysis of Cost Impacts Needs Updating:** From our extensive work with shoreline cleanup, restoration and redevelopment, we are very familiar with the potential cost impacts associated with sediment management. We understand how complex the question of economic impacts can be, and we appreciate the difficulties faced by the DMMP staff in quantifying the impacts of the policy. The costs of upland disposal and the economic impacts of closing the disposal sites to a greater share of urban dredged materials have clearly been underestimated in the materials published by the DMMP.
   - The differential cost between DMMP-managed sediment disposal and upland landfill disposal ranges from about $90 to $120 or more, depending on the specifics of the project, the disposal pricing, and the logistical requirements to support the project. This differential is huge (10-20x the cost of open-water disposal).
   - The distribution of dioxin/furans in our urban bays has not been taken into account in estimating potentially impacted projects. With respect to dioxin/furans, the Port of Tacoma is fortunate that many of our projects involve dredging of deep native sediments in support of deep-draft navigation, or work within waterways that have been the subject of previous, expensive remediation efforts. This has meant that many of our recent projects have been less encumbered by dioxin/furan contamination than would otherwise be the case, despite the long history of industrial activity in Commencement Bay. However, the DMMP proposal as written would establish criteria that are well below typical urban background levels for most of the urban bays on Puget Sound, and this will affect future projects in Tacoma and elsewhere.
   - Increased disposal costs are only one metric of economic impact. The influence of a 10-20x increase in dredging costs varies from project to project. In some cases these costs can be borne by a project, and sometimes they can't, and when they can't, the projects will not proceed. Whether the impact of the proposed policy is significantly increased costs or cancelled projects, the impact will translate to lost jobs. This indirect effect needs to be considered in the economic analysis.
   - There are significant differences in environmental footprints (e.g., traffic, greenhouse gas emissions, use of limited landfill capacity) between open-water disposal and upland disposal of dredged sediments.

5. **Further Work on Risk Evaluation is Required:** The questions of human health and environmental protection are clearly foundational to any policy involving bioaccumulative contaminants. Extensive comment has been submitted to the DMMP on risk analysis issues, comments addressing concerns that we share. We will not repeat the specific concerns here. However, we must emphasize that those comments have not been addressed, despite the importance to good policy development of the issues .. We strongly support the recommendation that the DMMP convene a work group on risk analysis issues to ensure that the agency decision-makers have the benefits of good science on this point and that the agency analyses are fully vetted. It is surprising that this has not been conducted to date. This will add time to the process, but is in the best interests of the DMMP, the environment, the defensibility of any policy outcome, and the region's economic health.

6. **Historical DMMP Site Performance Should be Reviewed:** We concur with many of the commenter's at the March 11th briefing that the DMMP should consider the historical performance of the DMMP disposal sites as part of the policy development process. This has not been done to date, yet it seems that this would be a logical step to clarify whether there is actually a need to change the DMMP with respect to dioxins (i.e., have the disposal practices of the past 20+ years indicated negative impacts at the disposal sites?). According to the DMMP Biennial Report for Dredging Years 2006/2007 (which included dioxin data from sediments and biota in and around the Puget Sound non-dispersive disposal sites), "*Based on Puget Sound site monitoring conducted to date (including physical mapping, on and offsite sediment chemistry, sediment toxicity, offsite infaunal bioaccumulation, and offsite benthic community structure analysis), dredged material disposal has not caused adverse impacts at or adjacent to any of the non-dispersive sites. DMMP evaluation procedures have consistently met the site management objectives, and appear to be adequately protecting the disposal site environments and surrounding areas.*"

7. **Opportunities for Beneficial Reuse Need to be Preserved**: The Port of Tacoma is one of the Puget Sound leaders in nearshore habitat restoration, and we have made extensive use of clean dredge material in doing so. We have also incorporated sediment reuse in many of our development projects, resulting in resource conservation and environmental protection in parallel with cost-savings to taxpayers and to our customers. It is important that as part of any dioxin/furan policy update, we not inadvertently jeopardize sediment beneficial reuse opportunities. Doing so would be a huge detriment to environmental restoration as well as economic activity. Agency staff and decision-makers need to consider this as part of evaluating the implications of the final dioxin/furan policy.

One final note: we need to be careful to consider the long-range impacts of our policy decisions. The policy decision being contemplated will likely affect projects for two or three decades to come. We have seen great improvements in environmental quality within Puget Sound during agency monitoring for dioxins/furans over the past two decades, and believe that a good policy decision will help us continue this progress. We also have not seen adverse impacts at the non-dispersive disposal sites. The potential economic impacts associated with this policy are huge, and we need to take the time to verify that a new policy is needed, and if so, to get this policy decision right. We strongly encourage the DMMP to delay the adoption of a new dioxin policy until it can complete a better and more expansive evaluation so that any final policy is both protective of the environment and supportive of water-borne commerce. A pilot project, as recommended by some of the commenter's at the March 11th meeting, would be an appropriate part of this expanded evaluation. We also urge the DMMP to conduct forward policy development activities in a more open and collaborative manner.

We appreciate your consideration of our comments, and look forward to working with your staff in developing improved materials on which final policy decisions may be based. Please do not hesitate to contact me if you require further information. I wish to be copied on further technical studies or other communications related to the policy development.

Sincerely,

Sue Mauer

Sue Mauermann
Director, Environmental Programs

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Appendix 6B-4 (Mark Larsen, Anchor QEA)

www.anchorqea.com
June 30, 2010
David Fox
Dredge Material Management Office
U.S. Army Corps of Engineers
4735 East Marginal Way South
Seattle, Washington 98124-2255

Re: Comments Regarding April 2010 DMMP Proposed Changes to the Interim Guidelines for Dioxin/Furan Compounds

Dear David:
This letter provides comments regarding the draft proposal presented in April 2010 by the DMMP detailing proposed changes to the interim guidelines for dioxin/furan compounds. Thank you for considering our comments as you update the DMMP proposal.

1. Previous Anchor Comments Remain Relevant: Anchor had provided comments on the earlier proposals from 2009. All of those comments remain relevant to the current April 2010 proposal. We've attached these previous comments for your consideration (Attachment A).

2. Need to Incorporate TOC Normalization: The bioavailability of dioxin/furan compounds and other non-ionizing organic compounds (e.g., PCBs) is mediated by sediment organic carbon. TOC normalization is a long-standing element of both the DMMP suitability criteria for organic compounds, and the SMS sediment criteria. TOC normalization is also a key element of estimating bioaccumulation potential using biota-sediment accumulation factors and more-complex bioaccumulation models such as the Arnot-Gobas food web model. Both of which are routinely applied as part of MTCA/SMS and CERCLA cleanup evaluations for sediments sites. The importance of TOC-normalization has been acknowledged in the previous technical studies performed on behalf of the DMMP (e.g., 2008 SAIC study including BSAF development for seafood collected in the vicinity of the DMMP disposal sites) and in DMMP workshop materials prepared for the update of the dioxin guidelines (e.g., EPA bioaccumulation and risk estimates presented as part of the summer 2009 workshops). However, despite the importance of TOC normalization in estimating relevant metrics for dioxin/furan compounds, the background comparisons used in the guidelines are exclusively performed on a dry weight basis. This needs to be updated prior to finalization of the guidelines. The guidelines should include TOC normalized criteria for dioxin/furans in sediment, along with dry weight criterion that can be used for sediments with abnormally high or low TOC levels. The data are available from existing studies to develop these criteria, and this approach is

consistent with DMMP and SMS practice for other compounds in sediments.

***DMMP Response #1**: Although organic carbon (OC)-normalized values were incorporated into the SMS rule, it remains to be shown that OC-normalized values are better predictors of toxicity than dry-weight values. Indeed, the first studies that generated the AETs from which the SQS and CSL values were derived, reported equal reliability for dry-weight and OC-normalized guidelines. Recently, RSET made the decision to publish interim freshwater sediment guidelines that are dry-weight only, since there did not appear to be an advantage to providing OC-normalized values. We know of no state or country that has developed an OC-normalized dioxin TEQ value.*

For the past 22 years, the DMMP has always used dry-weight values for both screening levels and bioaccumulation triggers, with the single exception of the PCB bioaccumulation trigger. The PCB OC-normalized bioaccumulation trigger was derived by back-calculating from acceptable levels in tissues using a Biota Sediment Accumulation Factor (BSAF). Since the BSAF accounts for both the lipid and organic carbon content of the tissue/sediment pair, the resulting sediment value is expressed as a carbon-normalized value.

In contrast to the approach used for PCBs, the new DMMP guidelines for dioxins were derived using data from non-urban areas of Puget Sound. Thus, it is not necessary to OC-normalize, since the guidelines represent non-urban background and not a concentration associated with acceptable tissue levels. Furthermore, the data set used in generating the DMMP's guidelines included a wide range of total organic carbon (median 1.1%, range 0.2% to 4.4%) that reasonably represents values expected to be observed in dredged material. Thus, it isn't necessary to OC-normalize in order to redress any lack of carbon representativeness of the 2008 Ocean Survey Vessel Bold data set used to derive the 4/10 guidelines.

The addition of the bioaccumulation test-out option (for which procedures need to be developed in the next phase of the public process) was meant to address the issue of whether measured dioxin is bioavailable.

3. Need to Revisit the DMMU Maximum Value: The April 2009 policy update stresses that the criteria are based on achieving a DMMP long-term background-based goal for sediment quality within the disposal sites. The criteria include both a volume-weighted average (4 ppt) and a DMMU maximum value (10 ppt). Both the use of the maximum value and the specific concentration limit proposed for that maximum need to be re-evaluated. Given the application of the volume-weighted average concentration to the suitability decisions, the use of a 10 ppt maximum value is unnecessary to achieve the long-term goal stated for the disposal site. If a maximum value is included in the policy, the justification for how that value was derived and

why it is relevant to maintaining the long-term goal for the disposal sites needs to be better articulated.

DMMP Response #2: *The 10-pptr screening level was derived using the distribution of dioxin concentrations from 11 urban data sets. Concentrations from this distribution were assigned on a proportional basis to historical dredging volumes and volume-weighted averages were calculated at various concentrations. This modeling exercise demonstrated that restricting the maximum value disposed at non-dispersive open-water disposal sites to 10 pptr would result in a volume-weighted average under 4 pptr. A secondary consideration was that 10 pptr falls within the range of concentrations found during the OSV Bold survey.*

In response to comments on the April 19, 2010 draft interim guidelines, the DMMP agencies have provided additional flexibility by eliminating the automatic triggering of bioaccumulation testing for exceedances of the 10-pptr screening level. Case-by-case decisions to allow disposal of material not meeting the 4-pptr or 10-pptr screening levels may be made by the DMMP agencies based on the overall goal of meeting the non-dispersive disposal site management objective.

4. Need for "Work Group" Evaluation Consistent with 2009 Discussions: A key activity proposed during the 2009 workshops was the use of a work group to evaluate key issues underlying the current policy questions. The issues which were to be evaluated included 1) key pathway and risk issues (e.g., differential biota use of disposal sites, regional v. site-associated impacts to tissue quality) related specifically to the DMMP decision-making, 2) physical factors (e.g., sequential disposal, natural recovery, regional influences) that influence sediment concentrations at the disposal sites, and 3) how these issues may be addressed within the overall DMMP and its suitability criteria. At this time the DMMP is not proposing to move forward with these work group tasks, which represents a lost opportunity to "get the science right" on these important issues. These issues are especially important if the DMMP proceeds, as it is proposing to, with development of additional criteria for PCBs and other bioaccumulatives. It is not reasonable to expect that individual project decisions (i.e., case-by-case determinations) will provide an adequate forum for development of these important issues. Please reconsider the use of a work group format for development of information regarding these issues.

DMMP Response #3: *The DMMP agencies have historically used a work group format to deal with complex testing and evaluation issues. The DMMP agencies carefully considered the suggestions for further work group discussions on dioxin-related issues after the technical meetings held in mid-2009.*

At this point, the DMMP plans to convene a workgroup to develop the bioaccumulation testing protocol and bioaccumulation interpretive guidelines for open-water disposal. This will provide a mechanism to address some of the scientific issues associated with bioavailability. However, the DMMP elected not to expand the scope of the work group to include other issues suggested by Anchor QEA and other organizations. The rationale for this decision includes:

- *The DMMP revised the proposed guidelines to provide additional flexibility for case-by-case review of individual projects. These reviews will provide a real-world mechanism to explore issues such as sequencing.*
- *Early in the process, the DMMP decided not to designate the DMMP sites as sediment impact zones. The rationale behind this decision is documented in the SMARM 2009 issue paper presented by the agencies (page 13 of attachment 2 of the SMARM 2009 issue paper). Without that designation, there is limited flexibility to fully utilize some of the additional information and approaches proffered by Anchor QEA and other organizations when making regulatory decisions. Consequently, we concluded it would be premature to form additional workgroups unless there were changes to the state rules and/or agency policies on the use of SIZs. The DMMP may revisit the issue of work groups in the future when the MTCA/SMS rulemaking is farther along.*

5. Bioaccumulation Test Interpretation Needs Further Review: The re-incorporation of bioaccumulation testing as part of the suitability criteria is a positive element of the April 2010 proposal. We support this incorporation. However, the sole reliance on reference comparison in the interpretation of these tests is inappropriate. The bioaccumulation tests provide data relevant to risk/receptor evaluations, and the outputs are most appropriately used within an overall risk estimation process. More work needs to be done to provide an interpretive framework for these tests, and that framework needs to be relevant to the actual exposure risks that are being considered in managing the DMMP sites.

DMMP Response #4: *As indicated in Response #3, a workgroup will be formed to develop the bioaccumulation testing protocol and interpretive guidelines for open-water disposal. However, given the agencies' previous review of risk-assessment options, it is unlikely that the bioaccumulation test results will be used in a risk estimation process.*

6. Need for Future Evaluation of Consistency with MTCA/SMS Rule-Making: The guidelines will need to be re-evaluated in conjunction with the evolving MTCA/SMS rule-making process. Specifically, the MTCA/SMS rule-making process is addressing how human health risks associated with sediment bioaccumulatives (including dioxins, PCBs and other compounds) are evaluated within urban bays. Because MTCA/SMS consistency has been one of the considerations triggering updates to the

DMMP dioxin guidelines, the guidance will need to consider potential future updates as necessary to reflect findings from the MTCA/SMS process. This is consistent with the long-standing use of adaptive management within the DMMP.

DMMP Response #5: *We agree, and will update the guidelines as necessary to be fully consistent with MTCA/SMS rule-making changes.*

Thank you for your consideration of our comments. We continue to offer our support to the DMMP as you consider these issues in developing and updating the procedures and guidelines for this important program. Please do not hesitate to contact us if you require further information about the scope or intent of our comments.

Sincerely,

Anchor QEA, L.L.C.
Mark Larsen
Partner

cc:
Clay Patmont
David Templeton

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March 31, 2009
Dredged Material Management Program
c/o Floyd Snider
601 Union Street, Suite 600
Seattle, WA 98101
Re: Dioxin Project

Dear DMMP Agencies:

This letter provides Anchor QEA LLC (Anchor QEA) comments regarding the Dredge Material Management Program (DMMP) proposal to establish new testing and suitability criteria for dioxin/furans. These comments specifically respond to the proposal as defined by the DMMP agencies during February 2009 and as presented during the recent public meeting held March 11, 2009, in Seattle. These comments supplement those made previously by Anchor QEA during previous DMMP workshops, in comment letters submitted during 2007.

By way of background, Anchor QEA is an environmental sciences and engineering consulting firm focusing on cleanup, restoration, and redevelopment of waterfront properties. Our scientists and engineers work extensively on sediment quality and dredge material management issues for public and private clients, including Ports, Cities, Counties, tug and barge operators, cargo transportation companies, manufacturing businesses, shipyards, fish processors, construction companies, federal government agencies, and others. From our extensive involvement with the DMMP over the past 20 years, we have a strong understanding of the role the program plays in our waterfront economy, and in the businesses of our clients. We also know the important role that the DMMP has played in facilitating sustainable cleanup and restoration of Puget Sound over the past two decades.

As expressed in our previous comments and in our discussions at the recent March 11 meeting, we are very supportive of the DMMP and the cooperative decision-making framework on which it was established. This framework is critical to the success of adaptive management, which is a key part of the DMMP. We are also supportive of an appropriate update of the DMMP dioxin/furan policy to reflect the current science. However, we are not supportive of the current agency proposal, and we strongly recommend more careful and reasoned technical evaluations prior to attempting to finalize a decision. We believe that the stakes are high for this decision, as the proposed policy will produce little or no environmental benefits, will slow the pace of important cleanup and restoration efforts, and will clearly adversely impact the struggling Puget Sound economy.

We strongly encourage the DMMP to conduct further technical evaluations in order to

ensure that the final policy is consistent with good decision-making and is environmentally protective, recognizing the unique challenges associated with regulation of urban background contaminants such as low-level dioxin/furans. We recognize that this additional evaluation may take additional time to complete. However, this will be time well spent given the potential damage to the disposal program that could be caused by premature decision-making, however well-intentioned. There is clearly time to conduct this more reasoned analysis, particularly given the consistent trends of declining dioxin concentrations in Puget Sound sediments, marine mammals, and seafood.

We offer the following specific comments and concerns regarding the policy proposal and the supporting materials published to date by the DMMP:

- Existing Site Performance Should be Considered: The PSDDA program and the open water disposal sites have been in place for over 20 years. As part of the policy evaluation, the DMMP should review the performance of these existing sites. Despite limited previous testing for dioxin/furans and 20 years of activity, none of the site monitoring to date shows a significant increase in dioxin/furan concentrations at the disposal sites in comparison to the urban bays in which they are located. This demonstrates that the disposal program is working, and has been protective of existing sediment quality. This empirical demonstration of the existing program's effectiveness should be considered as part of the policy update.

DMMP Response #6: *The DMMP agencies* ***have*** *reviewed the performance of the existing sites. The expanded reason-to-believe guidelines are due, in part, to unexpectedly high dioxin levels found onsite at the Commencement Bay and Elliott Bay disposal sites. These elevated dioxin concentrations appear to be linked to projects in Blair Waterway and at Fisherman's Terminal that were not tested for dioxins. The following table includes all of the dioxin data collected to date during disposal site monitoring events. The Fisherman's Terminal project was the likely source of the dioxin spike seen during the 2007 monitoring of the Elliott Bay site. As can be seen in the table, the mean and maximum values for onsite stations at the Commencement Bay and Elliott Bay sites exceed the offsite concentrations. In short, the DMMP agencies do not believe the former reason-to-believe and suitability guidelines for dioxin were working as well as they should have been in protecting existing sediment quality.*

Dioxin/Furan Sediment Concentrations* at DMMP Nondispersive Sites

Disposal Site	Year	Onsite: Mean (Range), n = # of stations	Offsite: Mean (Range), n = # of stations
Anderson/Ketron Island	2005	3.1, n = 1	3.6 (1.7 – 6.8), n = 7
Anderson/Ketron Island	2008	1.1, n = 1	2.2 (1.5 – 3.1), n = 7
Commencement Bay	2007	5.2 (1.1 – 14.2), n = 4	2.4 (0.86 – 5.2), n = 10

Elliott Bay	2005	3.0 (0.7 – 6.7), n = 3	no samples collected
Elliott Bay	2007	9.7 (2.5 – 17), n = 3	8.7 (4.0 – 12.2), n = 11
Port Gardner	2006	1.8 (0.71 – 2.6), n = 4	4.1 (3.1 – 5.2), n = 9
Port Gardner **	2010	2.1 (1.4 – 2.6), n = 10	3.6 (3.0 – 4.3), n = 4
Bellingham Bay	2007	5.5 (4.9 – 6.1), n = 2	6.9 (4.3 – 10.5)[1],n = 9

*** Concentrations in ppt-dry weight-TEQ; data extracted from SAIC 2005, 2006, 2008, 2009, and 2010**
****Preliminary data undergoing validation**

- Risk Analysis and Management Goals Should Differentiate between Disposal Activity and Background Conditions: Since 2006, the DMMP agencies have been provided with extensive comments from consultants (including Anchor QEA, Windward, and Integral), Ports, and other regulated parties relating to the problems with the risk analysis approach used by the DMMP. These comments were provided first regarding the DMMP project-specific decision in Olympia, and then later regarding the risk framework favored by the DMMP agency staff for the current policy evaluation. The presentation on March 11 confirmed that nothing has been done in the current DMMP analysis to differentiate between potential risks associated with the open water disposal site use, and those associated with non-disposal-site background conditions in the urban bays. For an area background constituent like dioxin/furans, this is a fatal flaw in the analysis. Simply put, even if the open water disposal sites did not exist, seafood quality near the open water disposal sites would not change significantly. The converse is also true, that even a significant increase in open water disposal site concentrations could occur without significantly affecting seafood tissue concentrations. Yet none of this is reflected in the DMMP risk analysis. The risk analysis framework needs to be updated so that the true relationship between DMMP open water disposal site use/concentrations and potential changes in seafood quality can be better understood and put in the proper context. Good science should be used in order to establish an appropriate management goal.

DMMP Response #7: *The agencies carefully reviewed the incremental risk calculations prepared by several risk assessment specialists in 2007 and 2009. The DMMP agencies also performed their own incremental risk calculations and a worksheet with the resulting values was distributed to stakeholders attending the (May 18, 2009) DMMP dioxin technical workshop. A copy of the worksheet is available at the following web site:* *http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/Summary_of_Incremental_Risk_Calcs_051209&intro.pdf.*

The DMMP calculations were generated in response to earlier stakeholder suggestions that sediment values associated with specific risk increments (10E-5 or 10E-6) would be a possible approach to generating new dioxin guidelines. The exposure assumptions and approach used to

[1] Mean & range excludes Benchmark station BBB01 located near the Georgia Pacific Outfall with 22 pptr-dry- weight-TEQ

generate hypothetical risk-based sediment guidelines were determined by the DMMP agencies based on best professional judgment and/or consultation with experts from other resource agencies and do not reflect consensus with the stakeholder community.

The DMMP agencies decided not to proceed further with this approach. The rationale for this decision includes the following:

- *An incremental risk approach is one option for making case-by-case decisions within the context of a sediment impact zone. However, the agencies had previously decided not to designate the DMMP sites as sediment impact zones. The agencies concluded that the use of an incremental risk approach was not consistent with the intent of the Sediment Quality Standards (SQS). This was discussed in the materials provided at the 2009 annual meeting.*
- *The agencies concluded that use of an incremental risk approach provided limited flexibility for establishing revised guidelines. Only the use of the 10E-5 risk increment and very large foraging areas of sole and crab would provide more latitude for higher acceptable dioxin concentration based on incremental risk.*
- *It is likely that EPA will update the Integrated Risk Information System (IRIS) database to include a significantly higher cancer slope factor (CSF) for dioxin and furan mixtures. The EPA has proposed a revised cancer slope factor (CSF) for dioxin to reflect a six to ten-fold greater toxicity. Application of this CSF in the agencies' incremental risk calculations would result in a reduction of the allowable dioxin concentrations by an order of magnitude, thus making even the highest possible risk-based values roughly equivalent to the proposed 4/10 guidelines.*

This comment presupposes that the basis of all regulation and guideline development must be in response to a quantitative demonstration of risk. If this were indeed the case, it would be relatively easy for any small project to successfully argue that the risks associated with their activities within the aquatic environment would result in no quantifiable increase in risk to the system. As discussed previously, this perspective does not conform to the intent of the Washington State Sediment Quality Standards.

The DMMP's determination of unacceptable human health risk associated with background levels of dioxin contamination in Puget Sound restricts the agencies' ability to set dioxin guidelines at any concentration above that background level. Given that restriction, determining the site's risk contribution to an overall unacceptable risk throughout Puget Sound is unnecessary. Furthermore, such an approach disregards the cumulative impacts of contamination in the Sound, which is already manifested by the most contaminated high trophic levels in the world.

- Management Goals Should be Specific to Each Disposal Site or Type: The current DMMP proposal uses a "one-size-fits-all" criteria for the non-dispersive sites, and a similar uniform assumption for the dispersive sites. In fact, the conditions at the open water disposal sites vary significantly. Where these factors affect the site-specific exposure assumptions, we recommend they be incorporated into the risk evaluation and criteria setting process. This is important given differences in the open water disposal site locations, their depths, the quantities and types of seafood present at each site, the sedimentation/transport properties at each site, and other factors.

DMMP Response #8: *Rather than establishing disparate guidelines for the different sites, the DMMP agencies decided that a single management objective should be applied to all disposal sites in the Sound. This decision was based on a desire to maintain consistent guidelines across the program and to avoid creating an incentive for interbay transfer of dredged material.*

Additionally, the agencies have determined that site-specific risk approaches were inconsistent with the goal of meeting the intent of the SQS - given the above discussion regarding the decision of the agencies to meet the SQS - and that the SQS represents the goal of sediment quality throughout the state, not a site-specific value (see response #3 for details).

- Management Goals Should Consider Site Management Practices: The current policy proposal sets a management goal using a project-by-project average concentration limit, and a very restrictive maximum concentration. It is not clear how the maximum concentration was established. Given the presence of natural sedimentation and sequential burial during site operation, it is important to consider how these operational characteristics limit food chain exposures. These practices have no doubt assisted in maintaining the quality of sediments around the existing open water disposal sites during the past 20 years of operation. The tools are available to assess the performance of these practices through testing, monitoring, and focused data analysis/modeling, and should be implemented to support a sound policy decision.

DMMP Response #9: *See response #2 for details on how the 10 pptr screening concentration was developed, and the discussion on sequencing, natural sedimentation, and natural recovery.*

- DMMP Should Maintain a Bioaccumulation Testing Option: One strong aspect of the DMMP has been the tiered evaluation strategy for dredged materials. Bioavailability testing was previously part of the dioxin/furan testing protocol. We recommend that this option be retained, as it may provide important information regarding differences in bioavailability between different materials. Testing has shown that mixture effects,

sequestration, and weathering can result in substantial differences in contaminant bioavailability, particularly at low concentrations such as those that are the subject of the proposed policy. It is not clear why this testing option was dropped from further consideration.

DMMP Response #10: *See responses #3 and #4 regarding the intent to convene a workgroup to develop bioaccumulation testing guidance.*

- The Number of Projects Affected by the Policy is Significantly Under-Stated: The estimated number of projects that will be affected by the proposed policy is significantly understated. This error results from a significant disconnect between two aspects of the supporting information published by the DMMP. On the one hand, the information published by the DMMP emphasizes that low levels of dioxins/furans (exceeding 4 ppt) are common enough in most sediments within the urban bays of Puget Sound to require the policy. These urban bays are where most of the waterfront businesses are located that use the DMMP sites. But on the other hand, the DMMP apparently expects that only a very small proportion of dredging projects from these bays will be affected by the new policy (assuming use of the 4 ppt management goal), which runs counter to the existing sediment data. These two expectations are mutually exclusive. It appears much more likely that a restrictive management goal of 4 ppt would impact most dredging projects conducted in urban bays and waterways. The proportion of sediments within a given project may vary depending on the depths and details of the project. But our experience to date has shown that a very high proportion of our urban bay projects are affected to some degree at these very low dioxin/furan concentrations.

DMMP Response #11: *Based on our retrospective analysis, as well as our experience implementing the former interim dioxin framework, the DMMP agencies believe that the incremental impacts of the revised interim guidelines to urban projects are overstated by Anchor QEA. Many of the projects cited by WPPA, Anchor QEA and individual ports as failing under the revised guidelines would have also failed under the old guideline of 15 pptr. While you did not submit the basis for your analysis as part of your formal comments, based on discussions at the May 28, 2009 public workshop the DMMP agencies believe the analysis likely included the following urban projects:*

1) Port of Seattle T115
2) Delta Marine Industries
3) Port of Seattle T18
4) Port of Bellingham I & J Waterway
5) Port of Olympia East Bay Marina
6) Port of Anacortes Cap Sante Marina
7) Port of Bellingham Squalicum Harbor Gate 3

8) USACE Duwamish O&M
9) Port of Anacortes Dakota Creek
10) Port of Seattle T5
11) MJB Properties (Anacortes)

It is true that eight of these projects would be impacted under the revised non-dispersive guidelines, but it is important to note that six of these projects would also have been impacted under the old guideline of 15 pptr. Only two of these eleven projects (the Port of Seattle T5 and MJB Properties) would have been unimpacted under the old guideline but impacted under the revised non-dispersive guidelines. But dioxin was not the only issue at T5. Elevated TBT concentrations and bioassays failures also precluded some of the dredged material from this project from open-water disposal. Thus only a single project (MJB) would have been impacted by the new guidelines versus the old and, for that project, only one out of seven DMMUs would fail under the revised guidelines.

Since the completion of your analysis in 2009, the following additional urban maintenance projects were tested for dioxin and were not impacted by the results:

1) *Dakota Creek Industries (Anacortes)*
2) *Washington United Terminal (Tacoma)*
3) *Boyer Towing (Seattle)*
4) *10th Street Boat Launch (Everett)*
5) *Pacific Terminal (Everett)*
6) *USACE Duwamish (Seattle)*

In summary, while it is true that the revised guidelines will impact more urban projects than the former guideline of 15 pptr, the DMMP agencies do not believe the differential impacts will be as dire as those anticipated in your comment.

- Economic Impacts of Current Policy Proposal Will be Substantially Greater than Estimated: The economic impacts of the policy proposal have been significantly underestimated by the DMMP. The current underestimate results from three factors. First, the probable number of impacted projects is likely under-stated (see previous comment). Second, the incremental costs estimated for upland disposal are dramatically under-stated, relative to the costs associated with the existing DMMP open water disposal option. On all of our regional dredging projects, the actual incremental cost for upland landfill disposal versus DMMP open water disposal has ranged from $90/cubic yard to over $130/cubic yard, or 3 to 4 times the value stated by the DMMP agencies ($30/cubic yard). Our more recently completed projects in Olympia (Port of Olympia interim action plan pilot dredging) and Seattle (Port of Seattle Terminal 30 Dredging, King County Denny Way project) involved incremental costs of between $120 and $130 per cubic yard relative to the costs of open water disposal. Third, no estimate of secondary economic impacts has been

included. Yet, in our experience, a dramatic cost increase in the dredging aspect of a project jeopardizes much more than the dredging project. Other related activities (dock repairs, upgrades, new shipping activities and associated jobs) may be postponed or canceled due to the cost impacts of upland disposal. No attempt has been made to consider these types of economic impacts. These types of secondary costs should at least be acknowledged as uncertainties in the analysis if they are not included directly. A review of past disposal site use could provide additional information on the secondary economic activity associated with these dredging projects.

DMMP Response #12: *The DMMP agencies recognize that the revised guidelines will have a greater economic impact than the old guideline of 15 pptr, but believe that WPPA, Anchor and individual ports are overestimating this impact. As stated previously, relatively few additional projects will be differentially impacted relative to the old guideline. As for disposal costs, the higher upland disposal costs cited by Anchor were incorporated into the issue paper prepared by the agencies for the 2009 SMARM. Finally, the Dioxin Project Impact Analysis Technical Memorandum acknowledged that secondary impacts would occur, but it was beyond the means of the DMMP agencies to quantify these impacts.*

In arriving at the new interim guidelines, the agencies – within the constraints of state regulations and agency policy decisions – attempted to balance environmental and economic impacts. The agencies carefully evaluated impacts with respect to both historic and planned projects, and took input from stakeholders who are potentially affected by these decisions. The new guidelines reflect years of hard deliberations through which we have sought to provide protectiveness while minimizing economic disturbance.

- Program Benefits Should be Considered Holistically: In considering the value of the DMMP program, it is important to consider the role of the policy within the watershed and the health of Puget Sound. The disposal program does not introduce new contaminated sediments into Puget Sound. Only sediments already within the Puget Sound are managed by the program. The relocation of some sediments from the nearshore environment to these remote, deep-water sites in many cases provides overall environmental benefits not recognized in the current DMMP analysis. These benefits should be considered along with the protectiveness of the disposal sites in evaluating the impacts and benefits of any new policy proposal. This is important, because the current policy proposal, if implemented, would cause many of these benefits to cease by deferring or cancelling projects, slowing the pace of implementing important cleanup and habitat restoration projects in Puget Sound. During the meeting on March 11, there was considerable discussion about potential next steps in order to develop a workable policy. We believe there was general consensus on three points, and we encourage the DMMP to act on these three recommendations:

1. Convene a Risk Working Group: A technical working group should be convened

to review the agency risk analysis, evaluate the incremental risks specifically associated with the disposal site operations, and consider the various inputs and variables required to finalize an analysis. There are many factors that need to be considered carefully (differences in biota use of the disposal sites, home-range effects on seafood exposures, seafood harvesting and preparation practices, applicable consumption rates for different finfish and shellfish, and methods for considering other contaminants and exposure pathways). These are not trivial issues, and this workgroup will need to take the time required to complete its work because the impacts on the analysis range over 6 to 7 orders of magnitude. Attempting to rush this work prior to the 2009 SMARM would be inappropriate, given the importance of the risk conclusions to the final policy decision.

2. Initiate a Pilot Evaluation of Site Management Performance: A number of commenters proposed the implementation of a pilot study using existing site data, and using targeted data collection during new site operations. The purpose of these pilot activities would be to document and quantify how the process of sequential burial (from site operation and natural sedimentation) affects the exposure parameters at the disposal sites. This type of information would be extremely valuable in setting appropriate site-wide management goals (e.g., target area-weighted surface sediment concentration limit), project DMMU targets (e.g., project volume-weighted average limits), DMMU maximum limits, and defining protocols for sequenced disposal where this may be used as part of site management. We agree that such a pilot can be implemented with the combined expertise of the DMMP agencies and the disposal site users. An operational period of 2 to 3 years with time for data analysis and policy discussions would be suitable.

3. Update the DMMP Economic Impact Evaluation: The existing economic impact numbers provided by the DMMP are simply wrong. An improved estimate needs to be developed in order to evaluate the impacts of policy decisions. This policy decision will be with us a long time, and all indications are that most projects within urban bays will be affected to some degree. The potential economic impacts associated with the policy decision are huge and need to be considered along with the risk information and the other available policy options. The updated economic impact analysis should consider both direct and secondary economic impacts, as well as impacts on the pace of implementing important cleanup and habitat restoration projects in Puget Sound. The potentially affected volumes can be derived by evaluating the existing urban bay sediment data, evaluating trends in urban bay historical projects (e.g., what proportion of sediments represented recent sediments rather than deep native sediments), and developing typical project statistics for small, medium, and large volume projects. Direct costs can then be estimated using current unit cost ranges. These should be

expressed both as total costs and as relative cost impacts to each typical project type. Finally, secondary economic impacts associated with completed and proposed dredging projects should be considered. Past projects may be useful in developing a typical project economic multiplier. A historical review will remove the potential for "cherry picking" only high-impact projects for analysis.
None of these activities can realistically be completed prior to the SMARM in 2009. However, we need to take the first steps and move the policy decision-making process forward. The DMMP program is too important to rush, and it is too important to let stand still. Committing to each of these three activities by the SMARM in 2009 would be a great first step in resolving the current policy situation.

DMMP Response #13: *At the March 11 meeting, the DMMP agencies agreed to convene a risk workshop. A series of workshops were held following the 2009 SMARM and included discussions on relative risk and risk assessment assumptions.*

The DMMP agencies considered the pilot project proposed by the Port of Bellingham but determined it was impracticable because it represented a huge resource outlay and time commitment on the part of the agencies (as well as other entities) to conduct analyses which have, in part, already been performed in the last 3 years of the project. The agencies also concluded that the pilot as proposed was unworkable due to the lack of agreement on the basics of such a study, such as what data are needed, where and how it should be collected, and how it should be used to derive dioxin guidelines. Achieving consensus with the Ports (and other stakeholders) on these issues would be particularly difficult in light of the significant and fundamental disagreements between these groups on topics such as the applicability of WA Sediment Management Standards (SMS) to the DMMP's disposal sites and acceptable approaches for determining risk.

The economic analysis was revised based on feedback received after the March 11 meeting.

Thank you for considering our comments as part of the current policy evaluation. Individuals from our firm will participate in future workshops or DMMP efforts related to the policy. Please keep us informed of your deliberations, plans for meetings, and opportunities for involvement.
Thank you for your continued efforts to promote a clean and healthy Puget Sound and a vibrant working waterfront.

Sincerely,

Mark Larsen
Anchor QEA, LLC

Cc: Anchor QEA Partners & Project Managers

Colonel Wright, USACE
Interim RA, USEPA
Commissioner, DNR
Director, Washington Department of Ecology
David Dicks, Director, Puget Sound Partnership
BCC: Pendowski, Phillips, Behan, Bjornstad

Appendix 6C (Revised (December 6, 2010) New-interim Guidelines for Dioxin)

Dredged Material Management Program
New Interim Guidelines for Dioxins

December 6, 2010

OVERVIEW

The Dredged Material Management Program (DMMP) Agencies have completed a three-year process to develop guidelines for dioxin in dredged material that are consistent with Washington State's Sediment Quality Standards. These guidelines are intended for application when evaluating dredged materials proposed for disposal in unconfined, open-water sites in Puget Sound.

After an initial series of public meetings and extensive sampling throughout the main basin of Puget Sound, the DMMP agencies proposed updated guidelines at the Sediment Management Annual Review Meeting (SMARM) in 2009. Significant public comment was received on the proposed guidelines at the 2009 SMARM. In response, open technical workshops were held in May and June 2009, and additional input was received at those meetings from a full range of stakeholder interests.

The DMMP agencies deliberated on the input received at the SMARM 2009 and subsequent workshops, and revised the proposed guidelines based on that input. The revised guidelines were released for public review prior to the 2010 SMARM. Again, significant public comment was received following the 2010 SMARM. The DMMP agencies made minor modifications to the guidelines based on the input received. The DMMP agency directors approved the new interim guidelines on September 15, 2010 and established an implementation date of December 6, 2010.

The new interim guidelines represent a continuation of the DMMP's systematic approach to periodically updating sediment evaluation guidance. The new interim guidelines are meant to accomplish the following objectives:

- to reduce bioaccumulative risk to human and ecological receptors from dioxin;
- to insure that sediment dioxin concentrations at disposal sites reflect non-urban background in order to be consistent with the narrative human health requirements in the Washington State Sediment Management Standards;
- to incorporate recently-updated information on Puget Sound sediment dioxin background

The new interim guidelines are described below. Note that these guidelines remain "interim", as dioxin policies will continue to be refined in concert with the development of guidelines for other bioaccumulatives, especially dioxin-like PCBs.

UPDATED DIOXIN TESTING REQUIREMENTS

Testing for dioxins will continue to be required on a case-by-case basis in areas where there is reason to suspect presence of these chemicals. Factors which can trigger a "reason-to-believe" determination include the following:

- Location within an urban bay and having no historical information showing that dioxin is below interim guidelines.
- Proximity to current or historical point sources, such as outfalls
- Proximity to chlor-oxide bleach process pulp mills, chlor-alkali or chlorinated solvent manufacturing plants, former wood treatment sites, phenoxy herbicide manufacture and/or use and handling areas
- Proximity to areas with high polychlorinated biphenyl (PCB) concentrations
- Proximity to former hog fuel burners/boilers and areas with previous fires or incineration sources
- Proximity to areas previously sampled that showed elevated levels of dioxin

Dioxin testing will be required for all projects meeting one or more of the reason-to-believe factors described above. Deeper underlying sediments, which are confirmed as "native," may be exempt from testing. Native material within the dredge prism, and lying directly under sediment that is being tested for dioxins, should be archived for possible dioxin analysis.

These updated guidelines are consistent with the reason-to-believe requirements implemented in the last several years. Guidance for sampling density per project will remain unchanged.

In addition, in order to address uncertainties regarding the fate of sediments disposed at dispersive sites, the DMMP agencies may require dioxin testing for projects proposing disposal at dispersive sites. Specifically, for those projects for which dioxin testing would not normally be required under the reason-to-believe guidelines, the DMMP agencies may require dioxin analysis of a reduced number of sediment samples. The decision to conduct this testing will be based on the size of the project and the grain-size characteristics of the dredged material. DMMP agencies are planning to conduct a fate and transport study for disposal operations at the Port Townsend and Rosario Strait disposal sites. Depending on the outcome of this study, the expanded dioxin testing requirement may be retained or dropped.

UPDATED DIOXIN GUIDANCE FOR *DISPERSIVE DISPOSAL SITES* IN PUGET SOUND

For dispersive disposal sites, the revised guidelines include definitions of both a Dispersive Disposal Site Management Objective and a Dispersive Dredged Material Suitability Guideline.

Dispersive Site Management Objective: 4 pptr (parts per trillion, dry-weight) 2,3,7,8-tetrachloro-*p*-dibenzodioxin toxicity-equivalents (TEQ) will be defined as the Site Management Objective for all dispersive disposal sites in Puget Sound. This value is based on an upper bound estimate of the distribution of dioxin in sediments from non-urban areas of Puget Sound [1].

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[1] Specifically, 4 pptr is the nonparametric estimation of the 90% upper confidence limit for the 90th percentile of the distribution of the background Puget Sound Main Basin data set, rounded up to the nearest whole digit.

Dispersive Dredged Material Suitability Guideline: The Dredged Material Suitability Guideline is the maximum dioxin concentration allowed in any single Dredged Material Management Unit (DMMU). For dispersive sites, this guideline is set equal to the Dispersive Site Management Objective of 4 pptr TEQ. Other dioxin concentrations can be approved on a case-by-case basis, if demonstrated to be consistent with the anti-degradation provisions in the Sediment Management Standards (SMS) rule[2].

This Dispersive Dredged Material Suitability Guideline is consistent with previous background-based requirements for dioxin at dispersive sites, but has been updated based on recently acquired data.

UPDATED DIOXIN GUIDANCE FOR *NON-DISPERSIVE DISPOSAL SITES* IN PUGET SOUND

For non-dispersive disposal sites, the revised guidelines include definitions of both a Non-dispersive Disposal Site Management Objective and Non-dispersive Dredged Material Suitability Guidelines.

Non-dispersive Disposal Site Management Objective: Four pptr TEQ will be the objective for surface sediments within the boundary of a disposal site, to be achieved over time as the updated suitability guidelines are implemented. This objective will aid in case-by-case decision-making (see next paragraph) on the suitability of material for disposal and assure protection of human and ecological health. This objective is also based on an upper bound estimate of the distribution of dioxin in sediments from non-urban areas of Puget Sound[3]. Disposal site monitoring will provide the feedback necessary to determine whether the site management objective is being met.

Non-dispersive Dredged Material Suitability Guidelines: Proposed revised suitability guidelines will be used in a case-by-case decision-making approach that is consistent with the narrative human health standard in the SMS rule. The following Non-dispersive Screening Levels represent sediment concentrations of dioxin which the agencies believe can be safely disposed at non-dispersive, open-water sites. A project-specific evaluation would be necessary to allow disposal of material with higher levels. It is anticipated that this evaluation process will produce information and experience that will support the future adoption of specific suitability criteria by rule. The suitability guidelines will have three components:

(1) Nondispersive Screening Levels. DMMUs with dioxin concentrations below 10 pptr TEQ will be allowed for open-water disposal as long as the volume-weighted average concentration of dioxins in material from the entire dredging project does not exceed the Disposal Site Management Objective of 4 pptr TEQ.

(2) Case-by-Case Determinations: As has been the case throughout the history of the DMMP program, case-by-case determinations may be made based on consideration of the individual aspects of dredging projects. Case-by-case decisions to allow disposal of material not meeting the screening levels may be made by the DMMP Agencies based on the overall goal of meeting the Non-dispersive Disposal Site Management Objective. Case-by-case considerations will include the following: (a) material placement sequencing;

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[2] Case-by-case determinations will require the dredging proponent to submit a high level of supporting data on a regional scale to be reviewed by DMMP Agencies.

[3] Specifically, 4 pptr is the nonparametric estimation of the 90% upper confidence limit for the 90th percentile of the distribution of the background Puget Sound Main Basin data set, rounded up to the nearest whole digit.

(b) consideration of the possible cumulative effects of other bioaccumulative compounds within the project sediments; and (c) the frequency of disposal site use.

(3) Small Business Considerations for Nondispersive Sites: Public or Private enterprises defined as “Small Businesses” by Chapter 19.85 RCW[4], which are permit applicants for projects with total dredged volume less than 4,000 cubic yards, will be encouraged to submit applications for case-by-case consideration as long as all DMMU concentrations are less than 10 pptr TEQ dioxin. These projects ***may*** not be required to meet the volume-weighted average guideline if DMMP review determines that the Disposal Site Management Objective of 4 pptr will likely be met on an annual average basis, based on knowledge of other anticipated use of the identified disposal site. To clearly define what constitutes a project of less than 4,000 cubic yards, there are two key qualifiers. First, intentional partitioning of a dredging project to reduce or avoid testing requirements is not acceptable. Second, recognizing that multiple small discharges can cumulatively affect the disposal site, project volumes are defined in as large a context as possible. One example of this latter qualifier is recurring maintenance dredging of a small marina where "project volume" will be the projected dredging volume over 5 years. Another example is multiple-project dredging contracts where a single dredging contractor conducts dredging for several projects under a single contract or contract effort. Again, the "project volume" will be summed across all projects (as will any sampling and compositing efforts prior to testing).

BIOACCUMULATION TEST OPTION

When the sediment dioxin concentration in a dredging unit exceeds the 10 pptr TEQ screening level and the dredging unit is found unacceptable for non-dispersive disposal under case-by-case decision-making, the dredging proponent will have the option of pursuing bioaccumulation testing to determine whether or not individual DMMUs could qualify for open-water disposal. This option will be based on a modified version of the Tier III testing procedures included in the existing DMMP Users Manual.

A target tissue level (TTL) to be used in the bioaccumulation evaluation has not been determined for dioxins at this time. In the absence of a TTL, the dredging proponent who selects the option of bioaccumulation testing will be required to include exposure of test organisms to a suitable reference sediment as part of the bioaccumulation test. Concentrations in the project test-sediment tissue would be compared against concentrations in the reference-sediment tissue to determine the bioavailability of sediment dioxin and, thereby, the suitability of dredged material for open water disposal. Over time, a tissue database will be developed, which may allow for the adjustment of this protocol.

INCREASED MONITORING OF DISPOSAL SITES TO TRACK IMPACT OF UPDATED GUIDELINES

The effect of the updated dioxin interim guidelines on sediment quality at the non-dispersive open water disposal sites in Puget Sound will be monitored to provide information for adaptive programmatic management of the sites to meet Site Management Objectives.

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[4] In Chapter 19.85 RCW "Small business" means any business entity, including a sole proprietorship, corporation, partnership, or other legal entity, that is owned and operated independently from all other businesses, and that has fifty or fewer employees.

The agencies plan to increase the number of on-site sediment monitoring samples collected at each non-dispersive disposal site from 3 to 10 to allow statistical comparisons to be made with Main Basin/Reference Area dioxin concentrations. If the disposal site management objective for sediment of 4 pptr TEQ is not met, results of bioaccumulation testing of on-site sediments may be evaluated to determine whether overall site management objectives are being met. Otherwise, the site monitoring program will be very similar to the current program. The DMMP anticipates that monitoring frequency will be increased (if resources are available) to assist with the adaptive management of dioxins at the disposal sites.

DISCLAIMER

Although the underlying regulations referenced and described in this guidance document contain legally binding requirements, this guidance document does not substitute for those provisions or regulations, nor is it a regulation itself. In the event of a conflict between the discussion in this document and any statute or regulation, this document would not be controlling. Thus, it does not impose legally binding requirements on the DMMP agencies or the regulated community, and might not apply to a particular situation based upon the circumstances. The word "should" as used in the Guidance is intended solely to recommend or suggest, in contrast to "must" or "shall" which are used when restating regulatory requirements. While the guidance document indicates the DMMP agencies' anticipated approach to assure effective implementation of legal requirements, the preferential analytical framework is flexible, decisions made utilizing this framework are made on a project-specific basis through the application of best professional judgment, the framework encompasses alternative evaluation processes that may be applied at the election of the proponent, and DMMP agencies' decision-makers retain the discretion to adopt approaches on a case-by-case basis that differ from the guidance where appropriate. Any decisions regarding a particular project will be made based on the statute and regulations. Interested parties are free to raise questions and objections about the analytical approach reflected in the guidance and the appropriateness of the application of the guidance to a particular situation. The guidance is a living document and may be revised periodically through the SMARM process. The document will be revised, as necessary, to reflect any relevant future regulatory amendments. The DMMP agencies welcome public comments on the document at any time and will consider those comments in any future revision of the guidance document.

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Appendix 6D-1 (Delaney Peterson & Joy Dunay, Anchor QEA)

Note: DMMP responses can be found in blue italics, embedded in the Anchor QEA comment letter below.

June 30, 2010

Lauran Cole Warner
Dredge Material Management Office
U.S. Army Corps of Engineers
4735 East Marginal Way South
Seattle, Washington 98124-2255

Re: Comments Regarding April 27, 2010 DMMP Clarification Paper
PCDD/F: Revisions to the Supplemental Quality Assurance Project Plan

Dear Lauran:

This letter is in response to the April 27, 2010 DMMP Clarification Paper "Polychlorinated Dioxins and Furans (PCDD/F): Revisions to the Supplemental Quality Assurance Project Plan (SQAPP)."

There are three items in the proposed clarification that we recommend adjusting prior to finalizing the SQAPP revisions. These include the following:

The recommended level 4 validation on all PCDD/F data
The use of one certified reference material (CRM) for every PCDD/F analytical batch
The limitation of the use of one method for PCDD/F analyses.

Our comments are provided below for each of these three items.

1. Level 4 Validation: While we do agree that level 4 validations are beneficial to ensure that the calculations from raw data to reported data are accurate, a level 4 requirement for all data (100% of samples) is an unnecessary effort and added expense. The use of software programs that perform the calculations ensures consistency within the calculated data. If one calculation is performed correctly, it can be reasonably assumed that all such calculations within the data report are performed correctly. Therefore, we suggest limiting the level 4 validation requirement to 10% of the data. If errors are found, complete level 4 validations should be performed on the remaining data. If no errors are found, either level 2 or level 3 validations on the remaining data should be performed. Level 2 or level 3 validations will assess the results at extremely low reporting limits and the possible effects of interfering compounds. Level 2 and level 3 validations are also more consistent with other DMMP validation requirements.

   DMMP Response: The DMMP validation guidance for dioxin data derives from the document Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (EPA 2009), which uses the term stage to describe validation requirements rather than the

Contract Lab Program's concept of level of deliverables. The two terms are not completely interchangeable. The stages comprise a tiered system of validation. For example, Stage 4 includes the Stage-3 validation procedures as well as additional procedures distinct to Stage 4 (instrument performance and analyte identification). It is in Stage 3 that sample-specific recalculations are performed. The percentage of recalculations performed depends on several factors, including "the type of verification and validation being performed (manual or electronic)." The DMMP agencies agree that recalculations can be limited to 10% if calculations are being generated by an automated algorithm and no errors are found.

As stated in the EcoChem memo (Attachment A), the value of Stage 4 validation extends well beyond recalculation of sample-specific results. Stage 4 is particularly important in its assessment of interference, which can result in false positives and adversely impact DMMP suitability determinations. Dredging project proponents would therefore be well-served by Stage 4 validation.

2. Certified Reference Material Use: The use of CRMs can be beneficial to any analytical procedure to ensure that results are accurate for a given matrix. This is true for PCDD/F analyses. However, analytical and instrumental conditions remain constant enough within a short period of time that one CRM per project or per event should be sufficient. The extra cost of analyzing one CRM per analytical batch could be significant and would be detrimental to any project working within a budget. These funds could be put to better use. Information provided in the analysis of one CRM per event can be extrapolated to the remaining analytical batches that usually occur within a reasonable amount of time of the CRM analysis.

   DMMP Response: The value of a CRM is that it is the only quality control step that evaluates the extraction efficiency of analytes that are incorporated into (rather than spiked onto) the matrix in question. A critical factor affecting the extraction efficiency is the ability of the analyst to execute the extraction procedure. The only way to evaluate the constancy of the quality of extraction is to require a CRM to be run with each batch. By analyzing a CRM with each batch, batch-to-batch precision and accuracy can be assessed.

   The agencies understand that requiring CRM analysis with each batch has cost implications. There are both the cost of acquiring the CRM and the expense of analyzing it. But this must be balanced against the benefits of running a CRM with each batch. Inclusion of a CRM with each batch enables the detection of batch-specific problems with extraction. Given the investment required to conduct field sampling and analyze the sediment samples, the additional cost of running a CRM with each batch is a relatively minor price to pay to help ensure usable data. For most DMMP projects, all the sediment samples can be run in a single batch, thereby resulting in a single analysis of the CRM.

3. Method Identification: Method 1613B for PCDD/F analyses is a practical and effective method for achieving required results but it is not the only good method available. Additional high-resolution methods, such as method 8290, are just as effective and useful. As long as the other methods meet the detection limits and pass the performance evaluations as required, they

should work just as well and be available for DMMP projects. An alternative to specifying a method may be to require specific quality control (QC) steps or procedures to be incorporated into the method, such as requiring additional 13C12–labeled reference compounds. Since EPA "performance-based" and SW-846 methods can be modified to enhance performance, this may be a more effective way of ensuring that required QC measures are utilized while still allowing for the flexibility of alternative methods. Many labs have modified the 1613B method and 8290 methods to be identical.

DMMP Response: EcoChem was consulted with regard to this issue (see Attachment A). Based on your comment and EcoChem's input, the DMMP agencies have eliminated the requirement for the exclusive use of Method 1613 from the clarification paper. Analytical requirements for dioxin analysis will continue to be performance-based, using project-specific data quality objectives modeled after the DMMP dioxin QAPP.

If you would like to discuss these issues further, please contact us.

Sincerely,
Anchor QEA, L.L.C.

Delaney Peterson
Delaney Peterson

Joy Dunay
Joy Dunay

Attachment A

EcoChem, INC.
Environmental Data Quality

Memorandum

DATE: October 11, 2010

TO: David Fox (U.S. Army Corps of Engineers) and Erika Hoffman (U.S. Environmental Protection Agency)

FROM: Ann Bailey and Eric Strout, EcoChem, Inc.

SUBJECT: **Response to Anchor Comments on Dioxin Clarification Paper**

The purpose of this memorandum is to provide the DMMP agencies additional information to allow the agencies to fully respond to comments made in the June 30, 2010 letter from Anchor QEA. Each of the three comments made by Anchor (and the draft response from the DMMP agencies) is addressed below.

Response to Comment 1 (Stage 4 validation):

EcoChem agrees with the response to this comment, and that a 10% recalculation rate should be sufficient provided that no errors are found. However, as was done in the April 27, 2010 DMMP Clarification Paper, the DMMP may wish to also point out that the definition of a Stage 4 validation includes an emphasis on instrument performance (especially whether any interference is affecting the reported results) and analyte identification.

The detection limits for dioxin/furan compounds analyzed by high resolution mass spectrometry (HRMS) methodology can be significantly elevated by the presence of interference. Likewise, the presence of diphenylether compounds can cause a high bias or false positives for the reported furan results. Since dioxin/furan data are converted to a single toxic equivalence quotient (TEQ) value prior to interpreting the data, interference, bias, and false positives can have a significant impact on the decisions made using the dioxin/furan data.

Verifying that the reported data are correctly calculated is only a small part of the benefit of requiring Stage 4 validation of HRMS dioxin/furan data.

Response to Comment 2 (CRM)

EcoChem agrees with the response to this comment.

Response to Comment 3 (Whether 1613B should be the only analytical method)

EcoChem agrees with Anchor's comment that the DMMP agencies should specify quality control (QC) steps or procedures rather than specifying one method. While Method 1613B states that the method is 'performance-based' (Section 1.5) and provides procedures for establishing method

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equivalency after modifications are made (Section 9.1.2), the method, as written, has a few deficiencies.

The most important is that Method 1613B does not really address detection limits. The method cites "minimum levels" (ML), which are the equivalent of the lowest concentration standard in the initial calibration (discussed in Table 2 of the method). These ML (for sediments) are 1 ng/Kg (PPT) for the tetradioxins and tetrafurans, 10 ng/Kg for the octadioxin and octafuran analytes, and 5 ng/Kg for all other compounds. The method further states that any result less than the minimum level should be reported as "not detected" unless otherwise specified by the regulatory agency (Section 17.6.1.4.1).

However, the true detection limit for most compounds (assuming that no interference is present) is less than 0.5 ng/Kg, often around 0.1 ng/Kg for the tetras and around 0.3 ng/Kg for most other compounds.

If TEQ values are calculated as specified in the DMMP's 4/27/10 *Supplemental Information on Polychlorinated Dioxins and Furans (PCDD/F) For Use in Preparing A Quality Assurance Project Plan (QAPP),* the TEQ values are as follows:

- 5.70 ng/Kg using the Method 1613 minimum levels
- 2.98 ng/Kg using the DMMP target reporting limits
- 0.79 ng/Kg using 0.5 ng/Kg as an average detection limit

Of course, the above exercise assumes that no target analytes are detected and no interference is present. Still, the TEQ values show the benefit of reporting to the detection limits that can be achieved using HRMS analysis.

Method 8290 and other HRMS dioxin/furan methods also differentiate between types of detection limits. If there are no peaks present and the baseline of the chromatogram is flat, a detection limit is calculated using the baseline. This detection limit is often referred to as an 'Estimated Detection Limit' or EDL, and represents the lowest possible detection limit for that analyte in that sample. If a peak is present but the analyte identification criteria are not met, a detection limit is calculated using the height of the peak. This detection limit is often referred to as an 'Estimated Maximum Possible Concentration' or EMPC, and represents an elevated detection limit. These distinctions, in addition to affecting the TEQ value, also provide information to data users who are trying to do source identification or fingerprinting.

Another deficiency for Method 1613 is the requirement that 2,3,7,8-TCDF be confirmed on a secondary column. This was a valid requirement in 1994 (the last revision date for Method 1613), as none of the GC columns available at the time could successfully separate all of the target isomers. The DB5 column could separate most target isomers, but could not provide adequate resolution for the 2,3,7,8-TCDF peak. Today, variations on the DB5 column (such as the Agilent DB5-MS or the Restek Rtx-Dioxin2 column) provide full separation of all target analytes, negating the need for confirmation analysis. This allows for faster sample throughput at lower costs.

Finally, Method 1613B does not really address analytical precision, other than a comment that field replicates may be collected (Section 9.8). While Method 8290 does not require replicate analyses, the method does provide a discussion of how to assess precision if replicates are analyzed, including example relative percent difference (RPD) value calculations.

In summary, EcoChem agrees with Anchor that rather than specifying 1613B as the only possible analytical method, a set of data quality objectives (DQO) and/or method quality objectives (MQO) should be specified. This would help avoid confusion that could occur if 1613B is followed verbatim, and should result in higher quality data overall. Since most labs currently use a hybrid of Methods 1613B and 8290, the DQO/MQOs could be generated by 'picking and choosing' the best parts of each method, and then adding in additional elements as needed (such as precision).