Dredged Material Management Program
Dioxin Project

Analysis of Stakeholder Input

Appendix B
Questionnaire Responses

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Memorandum

To: DMMP Dioxin Work Group
From: Kate Snider
Date: June 13, 2007
Project No: HC-DIOXIN
Re: **Questionnaire Responses and Next Steps**

Please review this material in preparation for our meeting on Monday, 6/18, from 9:30 – 12:00 at the Corps in Seattle

I am transmitting to you today the questionnaire responses received. We received a total of 32 responses. It is a manageable number to review in full, so I am providing them to you to give you that option.

General themes/key points of the responses included the following:

Policy and Objectives

- Framework that allows suitability decisions within traditional timeframes
  - Manageable, systematic approach, predictable cost and schedule
  - Consistent and predictable evaluation procedures
  - Concern re: risk assessment schedule impacts to dredging timeframes
  - If dioxin testing required, not “kiss of death” for project
- Consistency with current PSDDA approach
  - Tiered approach—chemical level then bioaccumulation trigger—consistent with other PSDDA compounds
  - Maintain “reason to believe” threshold
  - Consistent with PSDDA EIS
- Use site-specific and realistic risk exposure assumptions
  - Site-specific risk assumptions based on location and conditions of disposal sites
  - Focus on tissue levels in consumable organisms and carefully assessed consumption rates
- If site-specific criteria, concern re: interbay transfers
- How to apply Site Condition 2 to bioaccumulation, acceptable minor effects

- Why dispose of detectable levels of dioxin in Puget Sound?
  - Disposal sites should not contribute to total loading to waters of state
- No interim guidelines until exposure and toxicity better understood
  - Decisions based on actual experience and monitoring not modeling
- Recognize DMMP and Cleanup objectives different
  - Utilize Feasibility Study type process similar to Cleanup program
- Address as regional policy issue
  - Regional approach for background, bioassays, and bioaccumulation
  - Regional policy re: ambient dioxin in urbanized areas
- Consistency with RSET, Puget Sound Alliance, other regional programs
  - Regional environmental management policies
- Extension of approach to other dioxin-like and bioaccumulative compounds
- Budd Bay and A-K Specific Concerns

Technical Substance of Issues

- Tiered approaches:
  - Different criteria for dispersive and non-dispersive sites based on difference in exposure
  - Develop site-specific concentration limits and bioaccumulation triggers
  - Background-based screening level with site-specific bioaccumulation trigger or risk-assessment option
  - Set site-specific bioaccumulation trigger levels based on site-specific risk assessments—with organisms and consumption rates specific to each disposal site.
  - Acknowledge that risk-based numbers may not be analytically achievable
  - Evaluate effects on water quality and marine organisms
- Require dredging and disposal processes so cleanest material disposed of last as cover
- Risk assumptions:
  - Do not use food web models with inappropriate assumptions
  - Address congener-specific toxicity (Ah receptors)
  - Determine site-specific tissue uptake rates using appropriate receptors
  - Carefully assess dioxin levels in consumable organisms and evaluate risk based on carefully assessed consumption rates
  - Site-specific receptors with higher trophic levels (mammals, birds)
  - Site-specific trophic relationships

  - Special distribution of target species and realistic ingestion assumptions
  - Site-specific spatial scales and site use factors
  - Account for vertical sediment column mixing by organisms
  - Human absorption/exposure model important to evaluate
  - Do not model—use real numbers for tissue and uptake
- Perform public health assessments utilizing existing background levels
- Background alternatives:
  - Perform statistical comparison between dredged sediments and disposal site-specific background concentrations
  - Use lower confidence level when making comparisons with background, not mean
  - Dioxin disposed of at sites with higher ambient dioxin levels only
  - Use reference not urban background
  - Consider a "reference-plus" approach
- Gather more dioxin data:
  - Perform comprehensive reference area sampling
  - Secure funds for background dioxin database compilation
  - Require 5-10 year dioxin monitoring
  - Characterize relationship between sediment concentrations and seafood tissue concentrations
  - Site-specific testing re: solubility of dioxins, impact of salinity and black carbon on bioavailability
  - Develop predictive model for dioxin concentrations in Puget Sound—define regional sub-basins based on similar character
- Recognize evolving science on environmental and health effects of low dose dioxins
  - How dioxins/furans accumulate and metabolize in biota
- Determine sampling methods/classification of materials
  - Define criteria for field and analytical studies
  - Consider high cost of analyses
- Include other compounds in assessment:
  - Compounds with dioxin-like behavior—PCBs, Ah receptors

Decision Process

- Truly cooperative interagency process
- Unanimous or consensus—EPWG and SMSIC as models
  - Review Evaluation Procedures Work Group (EPWG) methods from late 1980s

- Legally defensible, scientifically sound, and practical
- Rigorous exchange of ideas among sediment management community—list of issues based on this questionnaire
- Open process with input from all affected parties and stakeholders
  - Group members to develop issue papers for discussion at workshops
  - Series of workshops with poster and platform presentations and moderated discussions
  - Issue papers summarize path forward for each topic area
- Develop predictive model for dioxin concentrations in Puget Sound—define regional sub-basins based on similar character
- Be cautious—review frameworks from other locations
  - Review other out-of-state frameworks for applicability
- Evaluate with EIS and public hearings
- Follow up with A-K mailing list, make input more user-friendly

I am going to call a range of people who both responded to the questionnaire and who received the notice but did not respond. The purpose of my calls will be to receive their input on the most effective way to structure a set of workshops.

I plan to call the following people:

- Questionnaire Respondents
  - Dan Averill, DNR
  - Doug Hotchkiss, Port of Seattle
  - Allison Hiltner, USEPA (her responses did not come through)
  - Eric Johnson, WPPA
  - Jeremy Buck, USFWS
  - Heather Trim, PPS
  - Tom Gries, Ecology
  - Todd Thornburg/Mark Larsen, Anchor
- Received Notice but Did Not Respond
  - Glen St. Amant, Muckleshoots
  - Rich Brooks, Suquamish
  - Jeff Dickinson, Squaxin
  - George Walter, Nisqually
  - Merle Jefferson, Lummi
  - Tracey Collier, NOAA Fisheries
  - Randy Carmen, WDFW

I will update you at our meeting on Monday 6/18 about my status with those calls—they will be started but clearly underway.

My current initial thoughts regarding workshop structure:

Purpose

The purpose of the workshops is to receive input from a broad range of stakeholders—to assist the DMMP Agencies to determine how to move forward.

Types of Input

Input would be valuable on:

- Policy and objectives
- Technical substance of issues
  - Tiered evaluation alternatives
  - Risk assessment parameters
  - Background alternatives
- Decision process
  - Process forward to reach a revised framework
  - Stakeholder involvement with DMMP and SMARM-like process

Material Provided by DMMP and Floyd|Snider

Some grounding, starting point perspectives are necessary to bound the discussion.

- Policy and Objectives
  - DMMP purpose—suitability decisions for open water disposal
  - Regulatory context, relationship to cleanup decisions
  - PSI context, relationship to Puget Sound evaluation and goals
  - Update procedures for dioxin to address bioaccumulation and consumption
  - Relevant to other dioxin-like compounds and other bioaccumulation concerns
- Technical Substance
  - Disposal site types (dispersive, non-dispersive)—siting process used
  - Current framework for suitability determinations, tiered evaluation—how it addresses bioaccum
  - Site Condition #2 and lack of reference to bioaccumulation
  - Existing dioxin data, ongoing data collection efforts
  - A-K risk assessment assumptions and limitations

- Decision Process
  - Assumed process =
    - These workshops to receive stakeholder input
    - DMMP proposal for revised framework
    - Public/stakeholder review, comment, revision, adoption through SMARM-like process

Name: Richard Anderson

Company: Quality of Life Committee of Anderson I

Email: ATC1@Centurytel.net

Q1: The key issues are the effect of dredged materials on marine water quality and marine organisms, including fish, shellfish and marine vegetation.

Q2: Primarily, any proposed disposal of dredged materials should be evaluated by a legitimate Environmental Impact Statement. Results should be furnised to interested organizations and private citizens. Permits should not be granted before public hearings are held involving all affected parties.

Q3: Such a framework should be a proven approach based on actual experience and monitoring. We are not familiar with anything which meets these criteria.

Q4: YES

Q5: 1. Effect of disposed sediments on marine life, water quality, and waterfront property. 2. Alternatives to dredging and sediment disposal. 3. Alternative sites and methods of disposal.

Q6: YES! Please keep our organization informed! QOLC of Anderson Island 11407 Old Brolin Place Anderson Island, WA 98303

Q7: Thank you for the opportunity to make this input.

Name: Dan Averill

Company: WA DNR

Email: daniel.averill@dnr.wa.gov

Q1: From DNR's perspective as manager of state-owned aquatic lands, a few of the issues to consider include: a) beneficial use of dredged materials on state-owned aquatic lands containing dioxin concentrations, b) sampling methods (core, surface), frequency, and distribution c) classification of dredged materials, d) uncertainties or unknowns with regard to moving dredged materials containing dioxins from one place to another (inadvertent spreading of materials containing elevated dioxin concentrations), e) expand testing of dredged materials to include those areas outside regions where there is a "reason to believe" dioxins may be present in the sediments.

Q2: For some of those listed above: a) DNR is currently working on a beneficial use guidance document, as well as participating on a multi-agency workgroup addressing beneficial use matters (chapter in DMMP manual, applicability, utility, and so on). DNR would want to be engaged early and often if dredged materials containing dioxin are proposed for a beneficial use on state lands. I believe this subject will be a topic of discussion during the upcoming workshops. b) To address the issue of sediment testing in areas where there is "reason to believe" dioxins may be a concern: If not already available, research and map marine shoreline locations where historical timber/lumber (and industrial) activities existed for a period of time. Specifically, map wood products-related industries that would have created wood debris as a by-product, and then burned the wood debris in the presence of a saltwater environment (chlorinated process). Essentially, develop a predictive model for Puget Sound so as to predict areas where elevated dioxin concentrations may be present in sediments. This could also be considered a scoping process to precede a Phase I ASTM investigation.

Q3: I am not sure I could recommend one evaluation framework over the other at this point. It would be interesting to conduct an experiment: implement all three frameworks in the same region and observe the differences. While a risk based approach (human, wildlife, or both) would be the most protective of the three suggested frameworks, its practicality on a dredge by dredge operation schedule seems difficult, not to mention the detection limit discussion. Another practical experiment that might prove useful would be to compare numbers from a regional PSAMP site (or several) with a site-specific location to determine a protective dioxin threshold number. Sampling core and surface sediments throughout the areas may contribute a robust data set from which to make an informed decision. Finally, it may be useful to divide Puget Sound into distinct marine sub-basins (similar to what was done for the regional salmon recovery planning effort) when developing and evaluating a framework for suitable materials. This approach could be a hybrid between site-specific and regional background levels. Perhaps there is a way to incorporate a few strategic risk-based approaches within this as well?

Q4: Yes

Q5: For starters, those mentioned in Question 1. I am sure there will be many other important and timely topics suggested by others responding to this questionnaire.

Q6: Yes

Q7:

Name: Robert Brenner

Company: Port of Tacoma

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Q1: We think the key issues are: 1) Using uncertain and evolving science to assess the environmental and human health effects of low dosages of dioxins to develop the approach; 2) Developing a workable, cost-effective program; 3) Addressing dioxin as a regional policy issue versus a site-specific sediment issue; 4) Using food-web models with inappropriate assumptions (e.g. uptake rates to tissue); 5) The variable toxic effects of dioxin/furan congeners. 6) The use of chemical versus affordable, biological testing.

Q2: 1) Follow scientific method, rely on peer-reviewed and accepted studies, and use actual data rather than assumptions for decision-making. 2) Allow the data and conclusions from actual data collections and scientifically valid studies to determine the outcome. 3) When numbers/values are necessary for use in determining some potential effect, use actual rather than assumed values. 4) Determine site-specific tissue uptake rates using appropriate receptors.

Q3: Utilize the existing tiered approach to sediment issues. If sediments fail on chemistry, it should be allowed to test out using bioassays. Avoid the use of modeling as the end-all to this issue, unless each parameter has been determined scientifically and assumptions are avoided.

Q4: Yes, please.

Q5: Please see answers to questions above

Q6: Yes, please.

Q7: The DMMP agencies must maintain a workable, cost-effective open-water dredged material program that builds upon the success of the past twenty years of progressive regional sediment management policy.

Name: Elisabeth Britt

Company:

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Q1: The key issue that DMMP agencies should consider when developing a new framework for evaluating dioxin in dredged materials is the health risks to human and marine life from exposures to dioxin like compounds. Everyone is exposed to PCDD/F's and related compounds, and the measured concentrations of them in humans are referred to as body burdens. Like lead, there are concerns about typical or background population body burdens, and also concerns about point sources that may increase concentrations originating from some local source of exposure. One of the more difficult issues in risk assessment is the determination of the dose metric to use of animal to human extrapolations. Because of the differences in sensitivity between species, and appropriate animal to human extrapolation of tissue dose is required. In addition, the dose metric needs to reflect the magnitude and frequency of exposure for the toxic endpoint of concern. This is often particularly difficult because human exposures are frequently different from highly controlled exposures in experimental animals.

For dioxin like compounds, dose can be expressed in a variety of ways, including daily intake (pg/kg bw/day), current body burden (ng/kg bw), average body burden over a period of time, and tissue (e.g. serum or plasma concentrations. The US EPA has noted that body burden appears to be the most practical dose metric for appraising the risks from this group of compounds (US EPA, 2000). Furthermore, the average lifetime body burden under steady-state conditions is the most appropriate.

Q2: Through public health assessments As discussed previously, traditional risk assessment methods ignore existing background levels of exposure and consider only incremental risk estimates for maximally exposed individuals. Note that the above methods have been used to estimate risks associated with the background human exposure. They could also be used to look at incremental exposures as if there were no background exposure, a head in the sand approach to public health decision making which can hardly be called scientific. The public health assessment method takes into account current exposures as well as providing methods for considering single point sources of exposure adding to background. Incorporate public risk assessment Ascertain potential average background exposures to substances of concern at national or regional level Ascertain potential added individual exposure due to source under consideration Characterize health risks associated with typical background exposures Place compound in a priority class based on risk estimates for background exposures Base risk management decisions on priority classes of the substances of concern and the potential added exposure from the source. Class 1 substances: these would include those substances for which existing background population risks might be considered unacceptable by risk managers. Class 2 substances: These would include those substances for which potential risks associated with background population exposures are not considered significant, but for which there are some concerns about margins of safety. An example of a possible Class 2 substance might be the dioxin like compounds. Increased cancer risks have not been shown for background population exposure levels. Nevertheless, the highest general population exposure may occur for infants who are breast fed for a relatively long time. Hence, it is reasonable to have some concern about the margin of safety. When considering an added exposure to dioxin like compounds originating from a source, (like a pulp mill) management steps may be required so that the source would not add to the background level by more than, say 10% for the maximally exposed individual. Class 3 substances: These would include those substances for which background levels of population exposure are not a concern. Thus, a source may require increased control or management interventions only if the maximally exposed individual might receive a 100% increase in exposure above backgrounds. The above examples are given to illustrate an approach, but the actual classification of a chemical would require much more detailed consideration. The process of classifying chemicals in terms of public health risk would greatly aid in the assessment of emission sources or contaminated sites. Risk management decisions could be based on estimated or measured exposure without the need for extrapolation to scientifically meaningless levels of risk of the order of one in a million. Even more importantly, resources would be allocated in such a manner that would have a meaningful impact on human exposure and associated public health risks. One limitation of the proposed public health risk assessment approach is that it only deals with chemicals for which there are known background exposures. There will be a need for more population studies to investigate background exposures to some substances.

Q3: All evaluation techniques should incorporate "lowest" or no observable adverse effect levels and incorporation of "safety" factor approach. Furthermore, low level contaminated marine sediment, Dioxins and dioxin like compounds should not be disposed in the Puget Sound basin. They should be placed in a licensed landfill or contained aquatic disposal site in order that they may be removed or treated in the future, when cost effective, appropriate methods for treatment have been developed. The framework should incorporate the following: all government actions will lead toward eliminating the presence of sediments in the Puget Sound basin that cause adverse effects to biological resources or pose a significant health risk to humans. Programs for managing the dredging and disposal of sediments should result in a net reduction in the exposure of organisms to adverse effects. This includes all marine organisms. Sediment cleanup programs (which may include capping in place) shall be undertaken when reasonable to reduce, with the intent of eliminating, the exposure of aquatic organisms to sediments having adverse effects on those organisms. As methods become available, treatment shall be the preferred method of cleaning up contaminated sediments. Evaluation procedures must be: Consistent - evaluation procedures must be applicable on a uniform basis regardless of project site or variability. Flexible - evaluation procedures must be flexible enough to allow for exceptions due to project and site specific concerns Accountable -the need for, and cost implications of, evaluation procedures must be justifiable to the individual permittee and to the general public. Under no circumstances should cost be the final determining factor in decision making. Public health should come first. Objective-evaluation procedures are

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clearly stated, logical, and must be applicable in an objective manner. Revisable-evaluation procedures are based upon best available technical and policy information and will be revised periodically to incorporate new information and management decisions. Understandable-evaluation procedures must be clear and concise. Technically sound-evaluation procedures must be reproducible, have adequate quality assurance and quality control guidelines, and generally have standardized protocols. Verifiable- the implementation of the evaluation procedures must be verifiable. One means of judging effectiveness is monitoring at a disposal site. Monitoring should not be a hit and miss deal. Monitoring should continue every 2 years until the contamination is removed or treated.

Q4: yes

Q5: The elimination of open water disposal of "low level" contaminants in the Columbia River and Puget Sound basin. The practice of open water disposal is indefensible. We should not be moving contaminated sediment from one location to another. Contaminated sediment should be stored in a confined aquatic disposal site, or removed from the marine environment entirely.

Q6: yes

Q7: Current analysis of data consists of a comparison to guideline values that are developed using statistical evidence as a clear indicator of toxicity. However, ecological significance cannot be determined by this process. Determination of ecological significance requires both an understanding of the data and evaluation procedures and evaluation of those test results based on best professional judgment. In addition to data analysis and interpretation, evaluations on the acceptability of material for unconfined, open water aquatic disposal may be further influenced by administrative considerations of factors such as magnitude of the proposed discharge, the degree of environmental risk that the discharge may present, and other project specific features. Dioxin like compounds are stored in the body in fat. Measurements of them are made in fat - sometimes fat samples themselves, but more usually in fat in blood samples or fat in breast milk samples. Estimation of the total body burden takes advantage of the fact that the concentration in fat is constant throughout the body. Thus, whatever sample is used gives an estimate of concentration in fat. For example, if dioxin like compounds are measured in the fat in blood samples, it is assumed that the concentration is representative of the concentration of all fat in the body, and we can then use data concerning the percentage of total body weight which is fat to estimate body burdens. In industrial areas of the Northern Hemisphere, human breast milk collected in the period 1990-1993 typically contained PCDD/F levels between 10 and 35 ng I-TEQ kg on a fat weight basis. Where results are available over a period of time, it is clear that the levels are falling (Van Leeuwen and Younes, 2000). Thus, between 1988 and 1993, this decrease has been estimated to be in the range of 10 -60%, with the highest rates of decrease in areas with the highest initial concentrations. Levels of PCDD/F in breast milk from the USA, at 17 ng TEQ kg fat basis have been estimated to contribute 35-53 pg TEQ/kg bw/day during the first year of a child's life (ATSDR, 1998).

Name: Jeremy Buck

Company: US Fish & Wildlife Service

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Q1: For the DMMP, dioxins should be evaluated using a risk-based framework, with specific assessment and measurement endpoints identified within the watershed and specific site. Risk from dioxins should be evaluated along with planar PCBs to evaluate total dioxin-like activity in receptors, although measurement of total dioxin equivalents (TEQs) using toxic equivalent factors (TEFs) in an additive fashion for sediment is not very valuable because sediment alcks an Ah-receptor. Evaluations should include risk assessments based on transfer of dioxin-like compounds into mammalian and bird receptors (including bird eggs) as these are the more sensitive recoptors. Assessments should include evaluation of dioxins released or made available to receptors during the dredging process as well as during disposal. Tissue trigger levels should be developed for key organisms within the food chaing (stepped down from mammalian and avian egg threshold values for TEQs). Total dioxin potency in sediment can be measured with various assays as a cheap screening tool as an initial step to evaluate sediment.

Q2: Identify a risk-based framework to be used by the DMMP program and drege applicants. Identify if dioxin currently poses a risk to mammalian or avian wildlife within the watershed. Identify a inexpensive screening toola nd trigger values for the screening tool for sediment. Identify other tissue receptors (clams.etc) that can be evaluated on a site-specific basisi. Identify trigger values for avian and mammalian wildlife.

Q3: Same riisk-based framework and indicated above, but with more empahasis on the exposure pathway evaluating how dioxins get into tissue-based recepors at the disposal site.

Q4: My time is limited and Puget Sound is not in my jusrisdiction, but somebody from the USFWS Lacy office should attend.

Q5: Mammalian and avian receptors and identifying threshold or trigger values.

Q6: Possibly

Q7:

Name: Reid Carscadden

Company: Integral Consulting Inc.

Email: rcarscadden@integral-corp.com

Q1:

Q2:

Q3:

Q4: Yes

Q5:

Q6: Yes

Q7:

Name: David Fox

Company: U.S. Army Corps of Engineers - Seattle

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Q1: - The DMMP currently provides a consistent framework for the evaluation of dredged material. If the new framework is based on site-specific risk assessment or a comparison against site-specific background concentrations, then there is the potential for dredging proponents to opt for interbay transfers of dredged material for disposal. For example, a dredging proponent in Bellingham Bay might find that their dredged material is unacceptable for disposal at Bellingham Bay, but acceptable at Port Gardner. Such interbay transfers of dredged material – with measurable levels of dioxins - would likely be opposed by tribes and the community at large in the vicinity of the disposal site of choice. This is a potentially serious issue that needs to be addressed. - Dioxins are just one group of chemicals that need to be addressed for their bioaccumulative impact. The new framework needs to be logically extendible to other chemicals (PCBs, PAHs, etc.) that have bioaccumulative properties similar to dioxins. - While it appears that human health concerns may drive this process, it is important to also address the potential impacts of dioxins to threatened and endangered fish and marine mammals. - If a background approach based on reference areas is the direction that the workgroup takes in formulating the evaluation framework, it is difficult to see how guidelines can be established given the small number of samples currently available in the regional database. A comprehensive reference-area sampling and testing effort may be necessary to establish statistically robust guidelines. Also, given the cost of bioaccumulation testing, it may be advisable to adopt reference area guidelines against which dredged material can be evaluated without the need for sampling and testing of a reference area for each individual dredging project. - A straight-up comparison of bioaccumulation from urban-area dredged material to bioaccumulation from reference-area sediment will likely result in far greater volumes of dredged material found unsuitable for open-water disposal. We need to ensure that requiring dioxin testing does not become an automatic "kiss of death" for projects. This might mean adopting a “reference-plus” framework, similar to what is used in the DMMP bioassays. - The framework should include establishment of a bioaccumulation trigger based on the sediment concentration of dioxins so as to avoid the need to go directly to more costly bioaccumulation tests. - Other issues that are already under discussion: dispersive vs. non-dispersive guidelines, definition of background, how to apply Site Condition 2 to bioaccumulation.

Q2:

Q3:

Q4:

Q5:

Q6:

Q7:

Name: Tom Gries

Company: Washington Department of Ecology

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Q1: They should (please) take full advantage of the fundamental strengths of the PSDDA Program/DMMP: 1. Selection of the final framework must be made using a truly cooperative interagency process. No one agency should exert unreasonable constraints or demands, and the 'public' (in the largest sense) should be well-informed and participate. 2. The decision on final framework must be unanimous (as have almost all PSDDA/DMMP decisions over the history of the program) or else represent a very strong consensus. 3. The final framework must be legally defensible, scientifically sound, and practical. Practical in two senses: a) it must be clearly written and easily implemented by regulators, and b) evaluation and permitting of navigation dredging projects proceed along timelines similar to those enjoyed today. If all these features of the final framework lead to increased costs, then so be it (disposal costs in this region are among the lowest in the nation and have not been raised for more than a decade).

Q2: 1. Insist that agency leaders are familiar with the contents of the PSDDA EIS, principles and working agreements. And that they work together in spirit of cooperation that has been one of the program's hallmarks. 2. Insist that all experts (regulators, regulated, marine scientists, environmental advocates) are "at the table". 3. Insist that any legal opinions about the framework are rendered only after thorough discussion with staff having historical knowledge of the program.

Q3: The best alternative, in my view would be to carefully assess dioxin levels in consumable organisms conceivably currently exposed to disposal site sediments and then evaluate risk to sensitive human populations based on carefully assessed consumption rates. However, if too much of the information needed to implement this alternative is lacking, then some sort of area background alternative is appropriate. Then the discussion becomes focused on how to define the area background. However it is defined, it should remain static - it should not accommodate gradual degradation (death by a thousand cuts). I would defer that definition until more sediment dioxin data from potential 'background' locations become available. A background dioxin concentration based only on sediment near a disposal site may be less stringent for some sites than one based on a broader area. And the reverse may be true for other disposal sites.

Q4: Possibly, depending on dates and times.

Q5: Different ways of defining "background" concentrations of contaminants. How to conceptually, programmatically and operationally define "acceptable" or "minor effects" in the context of the DMMP and this contaminant. Discussion of whether these concepts need to be fundamentally revisited for other elements of the DMMP (not just relative to this contaminant).

Q6: Yes

Q7:

Name: Brad Helland

Company: WA Dept Ecology

Email: bhel461@ecy.wa.gov

Q1: Total loading to waters of the state - disposal sites should not contribute to dioxin/furan loading to the maximum extent practicable.

Q2: To assess source control, DMMP should require dioxin/furan analysis for all samples where there is any reason to believe that sediments are subject to either point or non-point sources. Until we know what concentrations are found in sediments, we have no way to control sources to the maximum extent practicable.

Q3: Minimizing loading to waters of the state.

Q4: Yes

Q5: Development of the framework and determining what is practicable.

Q6: Yes.

Q7:

Name: John Herzog

Company: GeoEngineers

Email: jherzog@geoengineers.com

Q1: Continuation of the "reason to believe" approach to dredge prism characterization. Recognition that the objectives of the dredged material management program are different that those for state and federal sediment cleanup programs.

Q2:

Q3:

Q4: yes.

Q5: All.

Q6: yes

Q7:

Name: Allison Hiltner

Company: EPA Region 10

Email: hiltner.allison@epa.gov

Q1:

Q2:

Q3:

Q4:

Q5:

Q6: Yes

Q7: Kate,
Just wanted to let you know I filled out the questionnaire, but when I clicked on the "submit" button, nothing happened, so I have no idea whether it was sent. In case it didn't get sent, I would like to be on the mailing list for future meetings on this topic. Thanks.

Allison Hiltner
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Name: Douglas Hotchkiss

Company: Port of Seattle

Email: hotchkiss.d@portseattle.org

Q1: EPA has been evaluating the toxicity of dioxin for over 20 years, yet there is still no consensus within the scientific community about the toxicity of very low concentrations of dioxins and furans. For example, the National Research Council (2006) recently concluded that EPA's ongoing dioxin reassessment has not adequately characterized the range of dioxin risk estimates because of it's exclusive reliance on point estimates of risk and linear extrapolation models. Consequently, the DMMP agencies should be cautious in developing a dioxin framework and should promote a flexible process to incorporate the most recent and rigorous scientific information. DMMP agencies, particularly EPA and USACE, have developed dioxin frameworks in other regions of the country, most notably New York/New Jersey Harbor. The Washington DMMP agencies should review other frameworks and evaluate their applicability and appropriateness for Washington. Because the most sensitive risk endpoint for a risk-based evaluation appears to be seafood consumption, the relationship between dioxin concentrations in sediment and dioxin concentrations in seafood species consumed by people should be better characterized, either through additional empirical data or bioaccumulation modeling, or both. The range of uncertainty present using current tools is far too great to use in a standard regulatory decision making framework. If seafood consumption is to be included as part of the risk-based evaluation framework, additional analyses of the appropriate spatial scales to which existing seafood consumption rates might apply is warranted. The existing seafood consumption rate data were derived for areas that are hundreds of times larger than the dredged material disposal areas that will be evaluated as part of the framework. This suggests that some type of site use factor be applied to the available seafood consumption data. The home range of the fish assumed to be consumed from the site also needs to be taken in to account. The assessment of dioxins is expensive. Therefore, the process ultimately established should: 1) be based on a clearly stated, realistic, reason to believe when dioxins might be critical to the regulatory decision and therefore should be analyzed in dredged materials and 2) define criteria for designing field/analytical studies to characterize dioxins (when appropriate) that take into account how these chemicals interact with the environment and risk potential, (compositing DMMUs may be more appropriate). This will enable project proponents to more accurately assess potential project costs.

Q2: Because of the ubiquitous nature of dioxins in the environment, the DMMP dioxin framework should be developed within the context of regional environmental management and cleanup policies. Many agencies and municipalities have been working on strategies to assess and reduce the environmental and health risks from dioxins. In addition, the dioxin framework should be generally consistent with the evaluation frameworks already in place in the area (i.e. Puget Sound, Gray's Harbor), which are the result of almost 20 years of consensus-based decision making in this region. . A good model would be the Evaluation Procedures Work Group (EPWG) that was used by the Puget Sound Dredged Disposal Analysis (PSDDA) study in the late 1980's. This predecessor to the current DMMP process used a thorough and candid discussion process to craft a sediment evaluation framework that while controversial, was ultimately accepted as a cost-effective and environmentally protective regional compromise. The DMMP framework should not be overly reliant on simple measurements of sediment chemistry. Such measurements can be useful for characterizing potential risks to benthic invertebrates, but for assessing bioaccumulative risks, tissue chemistry data should be collected. For example laboratory bioaccumulation tests are featured prominently in the dioxin framework used in NY/NJ Harbor. Sediment management science in Washington State is a product of the combined efforts of DMMP agencies and scientists representing affected stakeholders. There is a long history of successful collaboration in frameworks such as the Sediment Management Annual Review Meeting (SMARM) and the Sediment Management Standard Implementation Committee (SMSIC). In those forums, interested parties have been encouraged to propose new ideas, prepare issue papers, and debate scientific and regulatory policy in an open environment. For developing an effective dioxin evaluation framework, the DMMP agencies should plan for and implement procedures similar to those used by the Department of Ecology SMSIC to facilitate a rigorous exchange of ideas among the sediment management community. The results of this questionnaire should be used to establish the list of issues that should be discussed. For each issue, a series of options should be presented and discussed, with particular focus on the pros and cons. Members of the sediment management community should be invited to prepare issue papers discussing one or more of the issues. The issue papers can be distributed, reviewed, and then discussed at a series of workshops. Only by understanding and debating each technical or policy issue can be an effective evaluation framework be constructed. Once the issues are discussed, they can be combined variously into a series of frameworks that can be further debated.

Q3: A risk-based evaluation is desirable, but the evaluation framework should be developed within the context of specific management objectives. It is not sufficient to simply identify environmental and health protection as a management objective without precisely defining an appropriate degree of protectiveness. The risk assessment framework needs to account for differences between the process the DMMP uses to evaluate dredged material suitability and the process that regulatory agencies use to determine whether remedial action is warranted at a contaminated sediment site. The latter process, as exemplified by EPA's Superfund Program or Ecology's MTCA program, utilizes health-protective assumptions to estimate risks to human health and the environment. The risk assessment results are then used in the feasibility study (FS) to determine what actions are appropriate to address unacceptable risks (if any) at the site. During the FS, a number of other considerations, including background concentrations, practical quantitation limits, technical feasibility, and cost, are considered in making a risk-based framework. In contrast, in the site-specific dioxin evaluation applied at the Anderson-Ketron dredged disposal site in Olympia in 2006, the risk-based sediment concentration was calculated using a similar risk assessment approach to that used in the MTCA and CERCLA programs, but there were no associated feasibility discussions. In the absence of these feasibility discussions, the risk-based evaluation framework that was

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applied in that case was unnecessarily conservative. If risk-based evaluations are to be applied within a pass-fail framework (i.e., dredged material either is or is not suitable for open-water disposal) without any additional feasibility or cost considerations, the risk assumptions should be more realistic than those typically used in the MTCA and CERCLA programs. Alternatively, a more comprehensive framework could be constructed that includes conservative risk-based assumptions, but also includes more formal cost and benefit analyses. There are invariably actual public benefits associated with maintenance dredging that should be compared to the hypothetical benefits achieved by conservative risk-based assumptions. An appropriate evaluation framework for dioxin evaluation will account for ambient levels of dioxins, and use more realistic exposure pathway assumptions. The existing open-water disposal sites were carefully selected to be in very deep water in areas that minimized fishery impacts. Navigation dredging is by its nature in shallower areas, and moves sediments from shallower, more accessible areas into deeper, more protected areas. Dredging operations can also be timed so that the cleanest material is disposed of last, which further isolates these already very low-levels of dioxin. An accurate risk-based process should examine both ends of this risk: any increased risk of seafood ingestion from a deep-water site, balanced against the lower risks of ingesting seafood that benefits from the cleaner navigation areas. Spatial distributions of target species and realistic ingestion assumptions are also a key part of this process.

Q4: yes

Q5: All of 1 through 3 above.

Q6: yes

Q7: The Pacific Northwest has enjoyed a successful dredged material and sediment evaluation program for twenty years. One of the bedrock principles of this program has been the maintenance of a workable and cost-effective dredging and dredged material disposal program. Dioxin testing and evaluation is very expensive, and the DMMP agencies need to assess how to account for and accommodate the new levels of costs that are likely to result from this initiative. This process also needs to not lose sight of: - The importance of navigation dredging - The confidence and involvement of external stakeholders - Continuous adaptive management

Name: Eric Johnson

Company: Washington Public Ports Association

Email:

Q1: One of the key issues that the agencies must consider is the uncertain state of the science regarding the environmental and human health impacts of very low levels of dioxin. The 2006 National Academy of Sciences report to the EPA drove home the point that the data which the EPA was relying upon for its dioxin decision-making did not support the conclusion that dioxin was harmful at the levels that the EPA was regulating to.

Given this, the agencies must be very careful to not over-react to very low levels of dioxin in sediments. This is especially important because there is not good scientific work available yet that can establish the relationship between dioxin levels in sediments and how it relates to dioxin accumulation in biota. These "biota/sediment accumulation factors" must be better characterized through empirical data or bioaccumulation modeling, or both. The range of uncertainty present using current tools is far too great for use in regulatory decision-making.

There also needs to be a great deal more work done on the relationship between dioxin levels in seafood that is ingested by humans, and human health impacts. This relationship is at best unclear, at there is a great deal of work that needs to be done yet regarding sensitive populations, dioxin partitioning within seafood organisms, and many other issues.

There is also work being done nationally and internationally on many of these issues, and the DMMP agencies should review the applicability of this work to the needs of the Pacific NW.

Q2: These are extremely technical issues, and there is a lot riding on the outcome of these discussions. For this reason, the process of working through how the DMMP will handle dioxin needs to be done with an open process that allows input from all affected parties and stakeholders. This is critical if the DMMP is to retain its credibility and authority for managing sediments regionally. A good model would be the Evaluation Procedures Work Group (EPWG) that was used by the Puget Sound Dredged Disposal Analysis (PSDDA) study in the late 1980's. This predecessor to the current DMMP process used a thorough and candid discussion process to craft a sediment evaluation framework that while controversial, was ultimately accepted as a cost-effective and environmentally protective regional compromise.

This decision-making also must not occur in a vacuum. Ambient dioxin in urbanized areas is a regional policy issue similar in some ways to the area-wide copper and arsenic policy decisions that surrounded the ASARCO smelter cleanup. Dioxins at ppt levels are found throughout our state. It is not clear in many cases what the sources are; it is even less clear what the implications are or what environmental policy decisions should follow.

Q3: There needs to be a much better risk-evaluation process than what was performed as part of the Port of Olympia's suitability determination in 2006. That process used unnecessarily conservative assumptions, and an unworkable suitability determination resulted.

An appropriate evaluation framework for dioxin evaluation will account for ambient levels of dioxins, and use more realistic exposure pathway assumption. The existing open-water disposal sites were carefully selected to be in very deep water in areas that minimized fishery impacts. Navigation dredging is by its nature in shallower areas, and moves sediments from shallower, more accessible areas into deeper, more protected areas. Dredging operations can also be timed so that the cleanest material is disposed of last, which further isolates these already very low-levels of dioxin. An accurate risk-based process should examine both ends of this risk: any increased risk of seafood ingestion from a deep-water site, balanced against the lower risks of ingesting seafood that benefits from the cleaner navigation areas. Spatial distributions of target species and realistic ingestion assumptions are also a key part of this process.

Finally, it is important that any dioxin evaluation framework avoid an over-reliance on pure chemistry numbers for decision-making. The tiered testing approach of the DMMP, where an exceedance of a chemical trigger is followed up with additional biological testing, is a successful hallmark of both regional and national policy. A successful dioxin evaluation framework will continue this policy of tiered testing.

Q4: Yes

Q5:
- How to structure the discussion process that will develop a dioxin evaluation process
- The state of the national and international discussion on this issue
- Dioxin in sediment risk assumptions and exposure pathway considerations

Q6: Yes

Q7: The Pacific Northwest has enjoyed a successful dredged material and sediment evaluation program for twenty years. One of the bedrock principles of this program has been the maintenance of a workable and cost-effective dredging and dredged material disposal program. Dioxin testing and evaluation is very expensive, and the DMMP agencies need to assess how to account for and accommodate the new levels of costs that are likely to result from this initiative.

This process also needs to not lose sight of:

- The importance of navigation dredging
- The confidence and involvement of external stakeholders
- Continuous adaptive management

Name: Mark Larsen

Company: Anchor Environmental L.L.C.

Email: mlarsen@anchorenv.com

Q1: Use Appropriate Problem Definition and Risk Analysis: Any developed screening levels or associated policies should address: 1) reasonable (i.e., scientifically sound, not unrealistically conservative) biota use and exposure pathway/risk assumptions for risk analysis at disposal sites when setting dioxin screening levels, and 2) a reasonable assessment of baseline dioxin concentrations and risks within the urban bays and disposal site areas, and 3) current information regarding environmental effects of low-level dioxin concentrations. Develop a Tiered Evaluation Framework: To be scientifically sound and practicable, the final material evaluation framework should be tiered incorporating different material testing options or requirements at different concentrations, and also incorporating different materials management considerations applicable to different disposal sites (see key issue #3 below). Consider Differences Between Disposal Sites: Final evaluation framework may need to consider site-specific concentration limits and materials management options that reflect the behavior and exposure risks for the disposed sediments at the different disposal sites. For example, the disposal of slightly higher-concentration materials may be appropriate at high-use, depositional sites where material exposures to the bioactive zone are minimized by rapid mixing and burial with other placed materials. The same materials could be less appropriate for disposal at low-use, shallow-water sites or at dispersive shallow-water sites with higher biota use. Avoid Arbitrary Preclusions: Site-specific limitations must be appropriate to each category of site, and arbitrary preclusions must be avoided in order to maintain the integrity of the overall DMMP process. The current treatment of dispersive and non-dispersive sites under the interim policy should be re-evaluated, with appropriate concentration limits established for dispersive sites as well as for non-dispersive sites, recognizing that those limits could be different from one another.

Q2: Use of the current proposed workshops is a good start. However the resolution of the issue may require more time (i.e., > 1 year) than is currently proposed. This work should include a 1) update of the risk analysis framework, 2) development of PSDDA concentration levels and evaluation framework for suitability determinations and 3) development of a framework for project-specific material management options to be used as part of a tiered evaluation strategy.

Q3: PSDDA evaluation framework needs an updated and scientifically sound risk-analysis framework that reflects actual exposures and incremental risks associated with disposal site use: Toward this end, factors to consider include: 1) The extensive site-specific biota use information from PSDDA program studies in the 1980s and 1990s should be used to develop reasonable estimates of the potential for food chain impacts from bioactive zone sediments within the disposal site areas. Generally the PSDDA sites were intentionally located in low-use areas, reducing real risks of food chain impacts to human health or ecological receptors. 2) An updated risk evaluation framework should be developed that can be applied to the different sites, taking into account site-specific biota use and exposure assumptions (i.e., deep-water low-biota use sites have lower potential risks than other sites with higher biota use). 3) The risk assessment should accurately reflect the difference between baseline risks and those that could be incurred if dioxin-containing materials are disposed at the sites. 4) The updated risk analysis should be used as part of the process to inform the establishment of protective screening levels, bioaccumulation trigger and maximum levels for PSDDA suitability decisions. Site-specific PSDDA concentration levels should be developed for use in suitability determinations. Multiple screening levels may be required. An example could include the following: 1) Tier 1 Screening level: Low concentration screen to take into account current urban background concentrations coupled with the outputs of the updated risk analysis. This value would present a suitable incremental risk in the absence of any mixing or burial of the disposed material. 2) Tier 2 Screening Level: This concentration screen would take into account conditions present at many of the deep-water, high-volume sites with low biota use. At these sites, the disposal of smaller quantities of intermediate-concentration materials would not produce a significant incremental risk when the other materials placed at these sites are taken into account (i.e., the mixing and burial of target materials by other materials placed at the site severely limit the duration of potential biota exposure). 3) Bioaccumulation Trigger and Testing Option: A bioaccumulation testing option should be included in the assessment framework, because many low-level dioxin materials may not be bioavailable. Low bioavailability would terminate the sediment-biota exposure pathway. The evaluation framework should not arbitrarily preclude disposal of materials that do not present exposure risks, based solely on chemical concentrations. 4) Maximum Levels: For each site it may also be appropriate to establish a maximum level for dioxin disposal, similar to what has been established for other materials. As part of the evaluation framework, an allowance should be incorporated for project-specific management decisions. Such decisions could consider the management of intermediate concentration, low-volume materials as part of larger projects or series of projects (i.e., cover intermediate concentration materials with clean materials) provided that the material met certain restrictions.

Q4: Yes

Q5: Risk analysis update Development of evaluation framework Development of project-specific materials management decision framework

Q6: Yes

Name: Mark Larsen

Company: Anchor Environmental L.L.C.

Email: mlarsen@anchorenv.com

Q7: The evaluation framework should continue to use the “reason to believe” procedure as in the current framework, as dioxins (above background concentrations) are not of universal occurrence and tiered evaluation remains appropriate. Given the costs of dioxin testing, the evaluation framework should allow for reduced frequency of sampling or apply that testing in a tiered approach. The current use by the DMMP of composite samples (multiple DMMUs) to screen for potentially-significant concentrations should be carried forward as part of a tiered evaluation process.

Name: Kim Magruder Carlton

Company: Integral Consulting Inc., 1201 Cornwall

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Q1: Key technical and management issues that should be considered when developing a new framework for evaluating dioxin in dredged materials are 1), the development of scientifically defensible, site-specific, risk-based screening levels; 2) appropriate development and application of bioaccumulation models to support risk evaluations; 3) statistically sound approaches for determination of background and 4), the development of procedures for statistically valid comparisons of site data with disposal limits. Specific issues associated with these key topics are provided below. 1. Development of scientifically defensible, site-specific, risk-based screening levels • Development of a conceptual site model (CSM); • Evaluation of current toxicological, physical, and chemical data for PCDD/PCDF congeners; • Characterization of relevant human and wildlife, fish and benthic populations associated with disposal areas • Evaluation of important exposure parameters for human health, such as fraction of intake of target species relative to total seafood intake, site use/harvesting factor, seafood ingestion rates and seafood cooking methods; • Evaluation of important exposure parameters for ecological receptors, such as area use for migratory or other mobile species; and • Use of probabilistic or other uncertainty techniques to insure that uncertainty in risk results and disposal limits can be communicated to the general public and interested stakeholders 2. Appropriate development and application of bioaccumulation models in support of risk evaluations • Explicit examination of the assumption of steady state environmental and pharmacokinetic conditions; • Critical consideration of the assumptions used to characterize truly dissolved water column concentrations, concentrations in suspended solids and concentrations in bulk sediment of dioxins; • Explicit examination of non-linear uptake processes (e.g., use of biota-sediment accumulation factors when empirical data do not demonstrate linearity in uptake); and • Calibration and validation of all uptake models (e.g., Gobas-type models); 3. Statistically sound approaches for determination of background • Characterization of regional versus natural background; and • Development of statistically based sampling procedures with prescribed power and certainty. 4. Development of procedures for statistically valid comparisons of site data with disposal limits. • Avoidance of point-by-point comparison of dredged material versus disposal limits, with reliance instead on statistical procedures which consider the population of sampling information for dredged material (e.g., upper-bound and central tendency estimates)

Q2: The key issues should be addressed through a series of workshops with poster presentations, platform presentations, and moderated discussions. A work group should be established for each topic area identified in survey question (1). A final issue paper that summarizes discussion points, conclusions, and a path forward should be issued from each work group.

Q3: A two-tiered framework is recommended to determine the suitability of material for disposal at designated sites. The framework could include criteria for both a statistical comparison with (disposal) site-specific "background" PCDD/PCDF concentrations and a comparison to a site-specific, risk-based concentration (note the RBC should vary by site depending on target receptor species and consumer population). The dredged material could satisfy either criterion to be disposed of at the designated location. The framework should include methods focusing on evaluation of the entire body of sediment data rather than relying on a simple comparison of maximum or point estimate concentrations, recognizing the variability in the sampling data. [Further discussion considering criteria specific to dispersive and non-dispersive disposal sites is needed.]

Q4: Yes, representatives of Integral Consulting Inc. are interested in attending workshops.

Q5: We are interested in attending workshops that focus on the following topics: Development of risk-based screening levels (see items listed in survey question 1) Calibration and validation of uptake models Probabilistic assessment Characterization of background concentrations Benthic community structure evaluation (as it supports input parameters for the bioaccumulation/risk modeling)

Q6: Yes, Integral Consulting Inc. is interested in receiving further information about this process. Please include the following individuals from Integral on your mailing list regarding this process: Gene Revelas Integral Consulting, Inc. 1205 West Bay Drive NW Olympia, WA 98502-4670 grevelas@integral-corp.com Alma Cardenas Integral Consulting, Inc. 7900 SE 28th Street, Suite 410 Mercer Island, WA 98040 acardenas@integral-corp.com Kim Magruder Carlton Integral Consulting, Inc. 1201 Cornwall Ave., Suite 208 Bellingham, WA 98225 kmagruder@integral-corp.com

Q7: Thank you for giving us the opportunity to provide our input. We look forward to receiving further information and participating in discussions regarding the development of this process.

Name: John Malek

Company:

Email: John.Malek@comcast.net

Q1: 1.Risk Management factors,e.g.,uncertainities of risk projections, background concentrations on a system-wide basis v. a subsystem (i.e.,bay), capabilities of affecting a change (either increaseing or decreasing risk porjections) through existing technology, aleternatives to management of the risk, cost of action v. no action. Relative priority of this risk to aquatic ecosystem v. other aquatic problems.
2. Is the solution a technical problem (i.e., improved source control, better assessment techniques, better dredging control/management, directed dioxin cleanup) or a political/policy one (i.e.,dioxin is bad and we can't live with it regardless)?
3. Is the dioxin problem short-or long-term? Urban or rual? Ongoing source or legacy?
4. Do the answers to the above require a NEW framework for dredged materials, or do they just call for specific tweaking of the exising framework?

Q2: First convene multi-agency, Federal-State-Tribal policy group of decision makers. Force a determinaiton as to whether the issue is of sufficient regional importance to devote focussed attention to (which means fund and resource); interested stakeholders should have voice in this initial dialogue. Select a technical review group knowledgeable about current sediment assessment (perferably at a PNW Regional level). Supplement with technical experts in dioxins (and dioxin-like compounds) and risk assessment, but particularly Risk Management. Preliminarily assess #3 and 4 above. Develop appropriate risk scenerios for a full compliment of technical alternatives (this requires attention to #1 and 2 above) if technical solutions/improvements seem viable. Report technical recommendations to policy decision makeers. Most likely, some additional or focussed dioxin studies will be needed, and should be pursued. At this point, interim procedures should be defined and implremented as regionally agreed upon requirements.

Second, expand (and fund) existing monitoring programs to include dioxin(s) for next 5-10 years to identify locations, sources, trends (increasing or decreasing) with particular emphasis on (1) uptake from sediment to biota; (2) uptake from water column to biota; (3) trophic transfer to human health and ecological endpoints.

Q3: The existing "framework" is adequate, just the data base upon which reasonable evaluation can be made is lacking. A policy call must be made at the beginning as to what interim level of risk is acceptable at the open-water sites pending gathering of clear trophic transfer data? (I.e., background for the site, for Puget Sound.) The DMMP conceptual model that allows for some marginal material being able to be placed at DMMP sites because it is overwhelmed by the largely "clean" volumes has demonstrated that it is workable and provides some cushion for administration--typically the DMMP model has resulted in improved sediment concentrations at and in the vicinity of each site. Improvements needed include direct experience with bioaccumulation of dioxins into first level biota (how much and is there a threshhold) and subsequently whether secondary level biota further bioconcentrate levels or offer a transport mechanism off site. If "effects" (and potential risks) are limited to the sites, technical solutions are possible to manage or improve the situation. Staggering disposals etc.

Otherwise, all dredging and dispjosal (even Superfund and MTCA) will be forced to stop.

Q4: Yes

Q5: It doesn't matter. They will all be controversial.

Q6: Yes. John Malek 20342 131st PL SE, Kent, WA 98031-4101

Q7: I expect the solution will be a non-technical one.

Name: Teresa Michelsen

Company: Avocet Consulting

Email: teresa@avocetconsulting.com

Q1: Ensuring that risks of bioaccumulative chemicals are fully evaluated in a manner consistent with how other interagency workgroups in the region are thinking about them - e.g., Ecology's new dioxin rules, Puget Sound Alliance, RSET. Not setting up inconsistencies that will have to be addressed in the future among agencies. Addressing ESA issues up-front. I worry that a less restrictive approach will get adopted and used at some disposal sites, then there will be a tendency for DMMP to resist broader programmatic changes that may be more conservative because a precedent has already been set.

Q2: Actively reviewing these other approaches and considering them for use, rather than waiting for them to be presented by commenters. Taking the time to work with the other agencies and make sure everyone is comfortable with the approach before moving ahead. Balancing concerns of the Port districts with those of the ESA agencies. Not departing from widely accepted background and risk-based approaches because dioxins are particularly difficult - since they are also particularly toxic.

Q3: The larger question of how bioaccumulation issues fit into Site Condition 1 and 2 needs to be addressed, and I don't believe it really has been. PSDDA technical appendix is mostly silent on these issues, and a more comprehensive policy is needed. This would be applied to all bioaccumulative chemicals, not just dioxin. This would help determine what sort of risk assessment would be most appropriate, and whether it could resolve some of these issues (e.g., risk-based values would no longer be below background).

I don't believe any form of urban background should be used, since disposal sites are not in urban areas. I also do not think it is adequate to just not make conditions at the disposal site worse, since levels in sediments for dioxins in the central Puget Sound already exceed risk-based levels. If changes to risk assessment procedures are not adequate to address the issue, then comparison to reference area concentrations - which has always been the region-wide approach for bioaccumulation and bioassay tests - should be the standard.

Q4: Yes.

Q5: How the definitions of Site Conditions 1 and 2 affect risk assessment approaches and inputs to the equations, what type of background is appropriate for comparison, and how DMMP is actively coordinating to make sure it remains consistent with other regional programs.

Q6: Yes.

Q7: N/A

Name: Jerome Parker

Company:

Email: jerome.parker@comcast.net

Q1:

Q2:

Q3:

Q4:

Q5:

Q6:

Q7: This is an overdue and useful survey. However, it fails to describe who is managing the process. This is a major oversight that greatly reduces the value of the effort.

Also, the procedures for submission are far too technical. I don't want to have to consult geek friends to understand the meaning of the questions regarding submission.

Name: Scott Redman

Company: Puget Sound Action Team

Email: sredman@psat.wa.gov

Q1: Ecological effects to higher trophic level consumers Background concentrations at specific DMMP disposal locations Appropriately protective characterizations of background levels -- why not compare candidate materials to the site using a lower bound estimate of the mean background concentration (lower confidence limit of the mean) rather than the mean itself?

Q2: Continued analysis and discussion of what types of risks, harms, liabilities are acceptable for various parties.

Q3: I'm not sufficiently informed to suggest an answer at this point. I can see reasons for supporting a prohibition on open water disposal of currently detectable amounts of PCDD/F -- given the risks associated with low ("background") levels of dioxin contamination -- but I can also see the value of continue work with the risk-based and background-based approaches. If you pursue the background-based approach, I would recommend greater consideration of the uncertainties in characterizing background than I am reading into the proposal in the A/K document.

Q4: Yes -- I or someone from PSAT/PS Partnership would try to attend.

Q5: See above answers

Q6: Yes.

Q7: Thanks for the opportunity to engage. This questionnaire and associated material offered a good way for me to quickly get a hold of the necessary information and present my thoughts to you.

Name: Sue Robinson

Company: Parametrix, Inc.

Email: srobinson@parametrix.com

Q1: Given the ubiquity of dioxins/furans, background has to be a key consideration. Additionally, because risk-based levels are probably not analytically achievable, background becomes even more important. I think there needs to be some sort of process however, that, as analytical methods develop and toxicity data and endpoints are refined, can be revisited to determine if background is still the appropriate discriminator.

Q2: Background concentrations are going to vary by regional area. So identifying what a background concentration is as a disposal trigger should be considered on a case-by-case basis. Also, if disposal is allowed for concentrations at or below background, depending on the frequency of disposal at the location, overtime the background concentration will become elevated . This issue also needs to be considered.

Q3: This requires discussion. Bioaccumulation potential is a big issue with these compounds so this has to be a key discriminator. The toxicity of dioxins/furans to aquatic life is important, but the food chain magnification effects are going to have to be a central focus (i.e., for people, aquatic-dependent wildlife) and should protect for direct toxicity issues. Because we KNOW that these compounds bioaccumulate, the question becomes what is the cut-off for a critical level, which brings one back to background in most instances (because the risk-based levels in sediment are simply not achievable). Limiting bioavailability of these compounds is one way to keep bioaccumulation in check...

Q4: Yes, depending on time/location and my schedule.

Q5: Reality. Dioxins/furans are difficult to remediate to levels that are risk-based. Given this, what is practical considering analytical constraints...

Q6: Yes.

Q7: I might be interested in helping this group, if you are seeking volunteers for the committee...let me know. I am a volunteer on RESET and have worked on MANY sediment projects throughout the northwest, the country and the world.

Name: Pete Rude

Company: City of Seattle, Seattle Public Utilities

Email: pete.rude@seattle.gov

Q1: Please put me on mailing list.

Q2:

Q3:

Q4: Yes.

Q5: General interest. If mailing list communication provides warning of workshop schedule/content, that's all I need.

Q6: Yes.

Q7:

Name: Peter Seto

Company: Anderson Island Community Advisory B

Email: jordanruthseto@aol.com

Q1: Spoils dumping of materials likely or known to be contaminated with Dioxins should be permitted only where benthic Dioxin levels are measurably elevated already. In the AI/Ketron site, the covering of previously dumped spoils with glacial till of low Dioxin levels in 2005 will probably isolate the previously deposited sediments leading to low bio-absorbtion levels in current samples of filter-feeders and polycheates. This site should probably be used only for the disposal of known-uncontaminated spoils due to it's proximity to the Nisqually delta. Sample sizes of fauna seem too small. Modelling should account for the rate of vertical mixing by benthic organisms. Truly isolated dioxins could be isolated indefinitely if the biologically active layer is maintained free of contamination. Some addition data are available in the 1991 EIS for the Glacier Gravel mine at Dupont in appendix E. Dioxin levels in three samples were measured at 9,9 and 11 ppm Organic Carbon in three sample taken close to the AI/Ketron DMMP site.

Q2:

Q3: It seems clear that AI/Ketron should be evaluated using the third model...the human absorbtion/exposure model, due to the unusual circumstance of use of the area for subsistance food gathering by the Nisqually. Other sites which are closer to urban land uses could be evaluated with the ambiant and background models.

Q4: yes

Q5: Isolation of dioxin-contaminated spoils by intentional over-covering with uncontaminated spoils.

Q6: Yes

Q7: Recreational users on Anderson Island consume large amounts of Dungeness in season. This fishery should be addressed. Harbour seals use the AI/Ketron site extensively and rely on sole and other bottom feeder for much of the year. Introduction of dioxin in spoils could result in elevated lipid dioxin levels in these marine mammals.

Name: Stanley Stahl

Company:

Email: ss@stahlvacations.com

Q1:

Q2:

Q3:

Q4: Yes

Q5:

Q6: Yes

Q7: Attention: DMMP

Effectively you have made it almost impossible to respond to the questionarire. Your questionnaire web page will not copy, will not save to anywhere, will not print and will not submit, so I am answering your questions best I can, with the following answer.

A group of 8 concerned citizens met with your four agencies on April 5, 2007 to review your actions regarding the handing of the dredging of the dioxin contaminated spoils from the shipping channel in lower Budd Inlet. One of the 8 representing Audubon Society, and one representing People for Puget Sound. All four agencies present at that meeting made great overtures of soothing our concerns - we walked out of the meeting with the assurance that they were looking after our interests, that the Port was remiss in filing it's DETAILED plan to assess and layout a step by step procedure to address the dioxin found in the sediment being proposed to be dredged (topographical drawings), assurances that that application probably would not get submitted in time for a cutoff for Corps of Engineer funding to so dredge by September, and that we concerned citizens would be kept in the loop when more details were made available to them.

Never were contacted or informed of anything relative to anything about the dredging. Since then, the MTCA funded Sediment Investigation, known as SAP, which had been contracted by Ecology to a private firm SAIS for mapping test sites in the lower Budd Inlet area, to characterize the extent of the dioxin contamination, and theoretically to track down the sources of the dioxin, proceeded forward, also without keeping us in the loop about where the samples would be taken. Since then a newspaper article has indicated that Ecology will be contributing about half of the funds necessary to complete phase 1 of this so called "maintenance dredging" (about $2,000,000), and the Port of Olympia to somehow to find the other half, to pay for this so called "maintenance dredging". I would like to know where Ecology found $2,000,000 to do this partnership in dredging, when it also has not even gotten to the end of it's alleged PUBLIC COMMENT on the SAP sediment investigation, and when it asks the laboratory doing the testing whether the lab thinks an abbreviated WHO test for only 3 of the over 203 dioxin furans would be able to perceive the toxicity they were trying to determine are present. I guess the WHO test is a cheaper test - I don't know what the lab said in response, as it was not in the documents I requested. So if Ecology wants to nickel an dime on the dioxin testing to keep some of the MTCA funds from being depleted, then what? take those savings and spend them on dredging which will murk up the water column with stabilized layers of dioxin laden sediment, polluting the marine life and coating the beaches where children are exposed to the cancer causing, DNA altering dioxin?

First, the dredging calls for going to depths deeper and wider than the shipping channel ever was before, therefore this is not "maintenance dredging", and should be remanded to the Shorelines Board to be allowed to go any wider or deeper than it has presently been permitted to be.

Second, This dredging is being done in the midst of an alleged effort to characterize the extent of the CLEANUP OF TOXINS being undertaken by Ecology, and is in direct conflict with that effort, as the dredging even if done slowly and carefully will put a plume of dioxin laden material into the water column, into the marine life and onto the surrounding beaches, in harms way of people and the environment.

Third, he public comment period for the DMMP and also for the SAP Sediment Investigation are still in process, and cannot proceed without letting those comment periods go their full course. And even if they do go their full course, there is meant to be a consideration for the comments. In the case of the SAP study he public comments were state to be looked at in conjunction with the SAP, to determine if and what further testing might be required before proceeding with any remedial work, also taking into consideration the advent of the 5th Ave bridge dam being breached to restore the Capital Lake back into a tidal estuary. If that is gone the dredging would be of no consequence since the sediment coming forward from the breach would fill the dredged shipping channel immediately.

Fourth, the above mentioned SAP study has only superficially mentioned looking for the source of the dioxin contamination - in fact there is virtually no sitting of sampling from the areas where obvious historical polluters have left

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their contamination, even in light of the evidence of VERY high levels of dioxin found at Berth 2 and Berth 3 (Port's outfall "B" and outfall "C" respectively (above 52 PPT) , resulting from the Corps of Engineer testing completed in June 2006. This is something a 5 year old could deduce - that if you were to trace those two outfalls backwards you would find the source of the dioxin contamination at locations where there where known industrial activities. Same for West Bay, and same for just below the the Deschutes River. However, the sites chosen to be tested are either avoiding these areas completely (as with the Port peninsula itself), or are inadequate (three core samples taken in the center Capital Lake and three core samples in the north Capital Lake, only two of those six to be tested, with the other four to be archived, and none in the upper South Capital Lake, closer to where the polluting industries existed in the past) , or are very superficial (testing surface rather than core samples at West Bay).

Fifth, the dredging is alleged to be "maintenance dredging", but in truth is one of the many requirements of the Weyerhaeuser lease, which calls for the dredging as part of the proposed log yard lease, and as such must be considered in a proper environmental review to determine ALL of the impacts that will come about as a result of the Weyerhaeuser operation, which includes more trucks burning diesel fuel, more and larger ships burning diesel fuel, resulting form the dredging, as well as the derogatory affects of dredging itself in disturbing the layers of dioxin already found to be in the Inlet.

I could keep going, but it's almost useless to complain about this situation, which is obviously corrupt with collusion between the Port who has economic urgency to push forward subsidizing private industry for a theoretical profit (fact is the Port is and always has been subsidized, so the private businesses operating there re in turn subsidized by taxpayer dollars), and the various agencies who are not policing the polluters.

The idea that the Governor has alleged she is determined to clean up Puget Sound is absurd when the agencies under her are in cahoots with the Port and private industrial polluters who are continuing to leach orphan contamination, as well as newly created contamination into the very same body of water she is claiming she will caused to be cleaned up, THEORETICALLY because the taxpayers consider the beauty of Puget Sound their highest priority as polled by 97%, but are in need of being educated about the sick condition of the Sound beneath the surface as less than 50% as polled, leading to the mistaken conclusion that they would be willing to pay he bill if they knew how sick it is. The correct conclusion is that they will be deceived into thinking they are kicking in some $500,000,000 over 20 years to muck up the water, pollute the beaches and poison the marine life, while economic progress marches forward. This is a farce - the only way to clean up the sound is to go back and find the sources of the pollution, and to stop the new polluters from adding more pollution to the already sick Sound. This is a case where the Emperor has no clothes. She should be ashamed of herself (S. Glassoe, of the a Puget Sound Action Team, please pass this on to her highness for me).

Yes I want to attend workshops and learn more about the DMMP decision process, however that was the way 8 of us left it with the DMMP at our April meeting, but none of us were informed about he DMMP decision to move forward with dredging until it came out in the paper. What kind of workshop do you have in mind for us to attend?

As to what topics I would like to focus on at these workshops, I would like to focus on how exactly one would go about making a questionnaire that is virtually impossible to fill out and submit, and those methods of corruption and collusion that might get me some feathers from special interests in the private private sector as a result of duping the public taxpayers without going to jail.

Along with 8 other interested citizens, I have been on a mailing list to receive further information about this process, but have not received any further information - if you're not going to send us information, but rather make dictatorial decisions, why ask us to be on such a non-existent mailing list? But, for the record, YES, I would like to be on such a mailing list.

Name: Pete Stoltz

Company: Glacier Northwest

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Q1: 1) There needs to be a systematic approach that the project proponent can use to predict the cost and schedule of their project and make appropriate decisions. 2) The cost of analysis is very high and bioaccumulation testing would be prohibitive for many projects. The program should still try to tailor testing to a reason to believe, requiring less testing in areas where dioxin is less likely to occur and more testing where dioxin is more likely to occur. In the case of maintenance dredging, dioxin testing could be reduced or eliminated from some dredge cycles if concentrations below certain levels are observed within the dredge area and no ongoing sources are identifies.

Q2: I think I covered some suggestions above.

Q3: Probably a disposal site specific background screening level is a good place to start. Larger projects my find it reasonable to conduct a risk assessment and determine if a different number is protective. If risk assessment shows that a higher number is protective, that higher number should be adopted for that site.

Q4: Yes

Q5: Evaluation procedures.

Q6: Yes

Q7: I recognize that Dioxin is extremely toxic and that we need to managed dredged material appropriately. I also know that dredging is extremely important to the economic health of the region. It will be a challenge to develope procedures that are both reasonably protective of the environment and that are not excessively expensive, and that can be conducted on a reasonable schedule.

Name: Mike Stoner

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Q1: The focus of the effort should be to develop a feasible and implementable approach for dredge material management that is based on sound science, economic considerations, and risk management appropriate to urban bays. The evaluation framework should be able to incorporate site-specific information, particularly local area background levels for contaminants of concern, including dioxin compounds. In addition, the Port of Bellingham supports the comments provided under separate cover by the Washington Public Ports Association.

Q2: The dioxin issues should be addressed as part of the current PSDDA framework update. It should include peer-reviewed risk assessment work, development of suitability determinations and a framework for project-specific decisions.

Q3: The risk assessment procedures needs to be fundamentally improved over the approach that was taken for the Port of Olympia's suitability determination in 2006. See WPPA comment for detail.

Q4: Yes

Q5: Risk assessment update Development of evaluation framework Development of project-specific dredge material management decision-framework which supports consideration of local area conditions in urban bays.

Q6: Yes

Q7: This issue is of very high importance to the Port of Bellingham and other waterfront communities in Puget Sound. The cooperative approach that has been used successfully by the PSDDA agencies and Ports since the mid-1980 needs to be applied to this issue. The process should include a fundamental objective of supporting a sustainable approach that maintains the economic viability of our waterfront communities while addressing environmental and community issues.

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Q1:

Q2:

Q3:

Q4: Yes

Q5:

Q6: Yes

Q7:

Name: David Thal

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Q1: The best strategy to minimize risk from dredged material placement is to resist assuming that contamination is unlikely. Bioaccumulation studies can be useful in establishing site-specific risks. Recent studies have shown that salinity can have a dramatic effect on the solubility of hydrophobic organics in general. This should be taken into consideration in sampling and analysis plans. Updates to the EPA/USACE Inland and Upland testing manuals are anticipated this year. Planning should be informed by anticipated changes in these documents.

Q2: The alternative to assuming that contamination is unlikely is to perform GC/MS testing on fairly high resolution cores. I would recommend including input from Dr. Jack Q. Word of NewFields NW, and Dr. David Moore, of WestonSolutions, on the design of bioaccumulation studies. When standard elutriate testing and pore water testing is performed, side-by-side evaluations should be done before and after the tidal salt wedge passes the sampling point. Analytical flocculation and/or Solid Phase Micro-extraction may be a useful tool for determining the fraction of dioxins/furans that become bioavailable, and for determining the colloidally bound fraction. The presence of black carbon in the sediment should be part of the evaluation, since it can radically alter the bioavailability of hydrophobic organics. Draft updates to the EPA/USACE Inland and Upland testing manuals are anticipated this year, a draft copy should be requested from EPA. If more specific information is needed, please let me know.

Q3: While comparing the bulk, or carbon-normalized contamination of the material proposed for placement is a good principle upon which to build a framework, it is the bioavailability of the compounds that ultimately matters. I think that using sediment quality benchmarks based on Final Chronic Values are a sound approach, but the application of Equilibrium Partitioning Theory to estimate exposures needs to be refined to include site-specific partitioning. Ambient air quality surrounding dredge operations is often overlooked. Consideration of this should be forced by the guidance. I do subscribe to the use of the most recent WHO TEF scheme. I also believe that simply applying Kow-based Koc's often results in significant error in the estimates of exposure to benthic invertebrates.

Q4: Yes

Q5: Testing protocols. Permitting processes. Reducing uncertainty of analytical data. Fate and transport models

Q6: Yes

Q7: I welcome the opportunity to provide input, and look forward to more information. I do think that dioxin-like PCB congeners and, potentially brominated flame retardants should be addressed in some manner within the same discussion. Finally, based on the experience in the Great Lakes, the Newark Bay Complex and the Delaware River Basin, I think that it is important to assess the role of ambient sediment transport, the magnitude of air depositions and off-gassing from surface water and resuspension from storm events to assist in developing a picture of the total loading that a watershed will take over time.

Name: Todd Thornburg

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Q1: (1) Developing accurate estimates of background dioxin concentrations, including both natural background as well as ambient "urban" background as may be affected by nonpoint pollution (i.e. stormwater runoff, aerial deposition, etc.) (2) Developing realistic risk assessment scenarios which incorporate appropriate spatial and temporal scales of exposure (i.e. fish home ranges, harvesting areas, dietary fractions, etc.). The compounding of unrealistic assumptions (assuming, for example, that exposure occurs at a point in time and/or a point in space) can lead to ridiculously low and unachievable screening values. (3) Developing a framework that is consistent with the bioaccumulation work currently being advanced by RSET.

Q2: (1) Secure funds for background dioxin database compilation (2) Perhaps through a work group process involving regulatory agencies, user groups (e.g. Ports, consultants), and public input. Process needs to be transparent. (3) DMMP folks should have representatives on RSET committees, especially the bioaccumulation committee in the case of dioxin.

Q3: First, establish risk-based tissue screening concentraions for fish consumption using reasonable exposure scenarios considering the size and depth of the disposal sites, home range of fish that occupy the vicinity of the sites, dietary fraction that would be obtained from these sites, etc. Then, determine whether fish and shellfish at the disposal sites are elevated above risk-based levels. If yes, then a background-based approach is appropriate. If not, look at relationship between existing dioxin concentrations at the disposal site versus those observed in fish tissue (i.e. BSAF type approach) and future disposal of dioxin can be evaluated on risk basis.

Q4: yes

Q5: Development of natural and urban background values Development of risk assessment scenarios, risk-based tissue concentrations, and tissue-sediment relationships.

Q6: yes

Q7: thank you for opportunity to provide input

Name: Heather Trim

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Q1: High quality evaluations and decisions that result in the cleanup of Puget Sound There are a variety of means and so we greatly appreciate the opportunity for workshops where the pros and cons can be discussed

Q2: see above

Q3: Looking forward to discussing the issues in depth at the workshops. Would like to know more about the seafood consumption approach.

Q4: yes!

Q5: see above Also, there is a need for a discussion about interplay with Superfund and cleanup sites with DMMP

Q6: yes

Q7: Thank you

Name: Bill Williams

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Q1: We need better risk-based guidance to determine acceptable concentrations in sediments and other media for human health and wildlife risk estimates. It appears from my experience that the BSAFs and transfer values used by EPA (and others) to estimate uptake of dioxin to tissue are overly conservative. When this is combined with the existing overly conservative toxicity estimates (from laboratory studies and other generic studies) many mitigation projects would require or recommend removal of sediments that are not actually problematic. This can impact the benthos and benthos habitat in an adverse way that is worse than the remaining concentrations of dioxin. The dig and haul of sediments may not alleviate the potential effects of dioxins and dioxin-like PCBs) when they are actually water-borne or are the result of stormwater events. Use of Food Web models can result in overly conservative estimates of risk because of the range of values that can be used in each of the parameters of the model. Due to the uncertainties in these models, the resulting mitigation options they propose are often inappropriately overly conservative. To make matters worse, these models utilize BSAFs in each trophic level and when these are multiplied, the uncertainty propagates very large uncertainties. Site-specific transfer values and trophic values would provide more reasonable and realistic risk estimates.

Q2: It would be prudent to begin the process of using site-specific values for transfer coefficients and site-specific trophic (animal relationships and foraging strategies) to better estimate the most likely exposure scenarios. Use of generic food web and uptake models that merely substitute surrogate values to the most sensitive parameters will generate overly conservative estimates of risk and exposure. The resulting estimates, if used to develop mitigation options, can waste money, time, and adversely impact habitat when not necessary. The most appropriate approach would be to hold off on any interim or temporary guidelines because those numbers would become guidelines that need to be challenged once they are documented. I suggest that site-specific risk and cleanup approaches be submitted to a regulatory group (USACE?) to archive as examples that were successfully used in dredging operations. The lack of toxicity of sediments associated with many dredging operations should be used as a basis to allow the transport and/or disposal of sediments in otherwise more restricted locations. Use of overly conservative (high) estimates of toxicity when in fact there is little or no actual toxicity can severely restrict or stop dredging operations. Sediments should be tested more carefully, with considerable thought given to the adverse effects of confounding factors and false positives that result from unchecked effects of some laboratory studies.

Q3: There should be no interim guidelines until all of the outstanding exposure and toxicity issues are better defined. Use of any interim guidance would likely impede the development of more realistic guidance because interim always means use of safety factors and use of highly uncertain values due to the lack of actual data. Site-specific studies are critical.

Q4: Yes. Absolutely.

Q5: Actual documented issues of dioxin toxicity....beyond chloracne and studies based on factory exposures. Development of Food Web approaches that are not dependent on large uncertainties in the parameters used.

Q6: yes.

Q7: We need to develop more realistic dredge disposal scenarios and push hard to get regulatory agencies to understand the consequences of unrealistic risk estimates that are generated by using too many safety factors and generic surrogate data.

Name: Debra Williston

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Q1: Some thoughts include: existing disposal site conditions for dioxin/furans (D/F); how D/F accumulate in biota in the area of the disposal sites (be site-specific when possible), and consideration of D/F metabolism in biota and how that affects levels that accumulate in biota,. All these issues as well as spatial concentrations in media as that can affect how you apply a risk approach for D/F. If use a risk assessment approach, apply realistic exposure assumptions that considers spatial aspects and accumulation/metabolism of D/F.

Q2:

Q3:

Q4: Yes, I am interested in attending workshops and/or receiving copies of the notes from these workshops.

Q5: I am interested in how risk assessment methods would be used in this process as well as how new data can be used or incorporated into the process.

Q6: Yes

Q7:

Name: Jack Word

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Q1: 1. Need an acceptable/unacceptable concentration for human and ecological risk assessment (TEC for both Ah receptor and non- Ah receptor activities). 2. Need to establish a direct, site-specific uptake rate for dioxin/furan congeners from sediment (BSAF from literature is not sufficient). The uptake rates from sediment needs to be compared to uptake rates from water, suspended solids and prey items in order to determine the relative importance of sediment to the tissue contaminant levels. 3. Need to establish the relative use of specific sites by organisms to minimize the risk of assigning uptake of these contaminants from local sources when uptake occurs from a different location. 4. All dioxin/furan congeners are not equally toxic - TEF's and TEC's need to be used for both Ah and non-Ah receptor effects. 5. The availability of dioxin/furan congeners in sediment versus the availability when sediment is disturbed. 6. The 1/2 lives of dioxin congeners in tissues after exposure. 7. Complex mixture effects with PCB congeners to include those effects that act to offset Ah receptor dioxin influencing congeners. 8. Avoid the use of food-web models until a solid uptake rate is obtained for sediment related uptake. DO NOT USE CURRENT BSAF VALUES AS THE FIRST STEP IN THE MODEL.

Q2: 1. Define the problem to be investigated and establish a testing program that permits establishing the 'real' values not assumed values for uptake kinetics. 2. This should not be a consensus based approach to developing guidelines but an approach that allows demonstrating a direct relationship. Consensus of the values can then be established but we should not get into an early value where we are meeting or being lower than reference values, background values with a promise to get something better later. 3. Use a tiered approach to establishing guidelines. If a sediment guideline is exceeded - perform testing to demonstrate presence or absence of assumed uptake kinetics.

Q3: 1. I would not establish interim guidelines until 'real' values are obtained - Any interim guidelines will be used without having established a relationship between the sediment values and unacceptable tissue burdens. MODELING IS NOT THE WAY TO GO UNTIL WE HAVE REAL NUMBERS FOR TISSUE AND UPTAKE FROM SEDIMENT, WATER, SUSPENDED SOLIDS AND FOOD ITEMS.

Q4: Yes!

Q5: Those indicated above.

Q6: Yes.

Q7: Attempts have been made to establish federal guidelines for dioxin/furan contamination that is unacceptable. These have used models of uptake kinetics and TEF/TEC's to help establish interim values for sediment. To my knowledge, much work has gone on in these committees but none have come up with guidance values that have been accepted. My view is that too much of the work has been built around food web models that are initially based on uptake kinetics from sediment. This compartment is a target because it can be measured and levels of dioxin/furan concentrations are then used, assuming transfer rates that may not be very good. Tissues of fish, shellfish and wildlife may have dioxin/furan concentrations but how much relatively comes from the sediment compare to water and suspended solids is not well established.