DEPARTMENT OF
ECOLOGY
State of Washington

Concise Explanatory Statement

Chapter 173-204 WAC

Sediment Management Standards

Summary of rule making and response to comments

Appendices

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If you need this document in a format for the visually impaired, call the Toxics Cleanup Program at 360.407.7170. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Concise Explanatory Statement

Chapter 173-204 WAC
Sediment Management Standards

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Toxics Cleanup Program
Washington State Department of Ecology
Olympia, Washington

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Transcripts of Public Hearings

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Sediment Management Standards *Meeting/Hearing*

Contact Person: **Adrienne Dorrah**
PIC Code: **xxxx**
Facility Name and Address: **Pacific Market Center, 6100 4th Avenue South, Seattle, WA**

OPENING/INTRODUCTIONS:

Was there anyone who's decided that they wish to make verbal formal comments today or testimony? Nonetheless, I'm required to go through some of this language for the record and to record that, so you're more than welcome to stick around or otherwise free to go. So I'm DouGlas Palenshus and I'd like to thank you again for participating in today's public hearing on the proposed amendments to Washington State's Sediment Management Standards. Let the record show that it's 10:25 a.m. on September 26, 2012, and this hearing is being held at the Pacific Market Center at 6100 4th Avenue South, Seattle, WA. Legal notice of this hearing was published in the Washington State Register Issue WSR 12-17-084.

In addition, notices of this hearing and proposed rule amendments, which is one of 6 scheduled around the state, were posted in the Washington State Environmental Policy Act Register in August of 2012 and were Emailed to approximately 1,200 interested people on August 20, 2012 via listserves. Ecology also issued a press release August 16, 2012 through Ecology-News@listserv.wa.gov.

So at today's meeting and hearing no one wished to make public comments for the record. However, all testimony, comments received in written form if any at this hearing, along with all written comments received or postmarked by October 15, 2012 at 11:59 p.m. will be part of the official hearing record for the Sediment Management Standards proposal. Written comments should be sent to Adrienne Dorrah, Dept of Ecology, Toxics Cleanup Program, PO Box 47600, Olympia, WA 98504-7600. Email: RuleUpdate@ecy.wa.gov. Fax: (360) 407-7154

All testimony received at this hearing as well as the other five hearings held around the state along with all written comments will be part of the official hearing record for this proposal.

Ecology staff will prepare a document called a Concise Explanatory Statement which will respond to the oral and written comments and issues of concern that are raised during the public comment period. The agency will review the comments and make a determination whether to adopt the rule.

Ecology Director Ted Sturdevant will consider the rule documentation and staff recommendations and will make a decision about adopting the proposal.

Ecology will publish comments received along with our responses, showing to what extent comments influenced the final language of the rule. Ecology will post the comments and responses on our webpage.

Adoption is currently scheduled no earlier than December 14, 2012. If the proposed rule is adopted and filed with the Code Reviser, it is expected go into effect 6 months later.

On behalf of the Department of Ecology, thank you everyone for participating today.

And let the record show that this hearing is adjourned at 10:27 p.m., excuse me, 10:27 a.m. on September 26, 2012.

Sediment Management Standards Meeting/Hearing

Contact Person: **Adrienne Dorrah**
PIC Code: **xxxx**
Facility Name and Address: **Pacific Market Center, 6100 4th Avenue South, Seattle, WA**

So I'm DouGlas Palenshus, hearings officer for tonight's hearing on the proposed amendments to Washington State's Sediment Management Standards. Let the record show that it's 6:08 p.m. on September 26. This hearing is being held at the Pacific Market Center at 6100 4th Avenue South, Seattle, WA. Legal notice of this hearing was published in the Washington State Register Issue WSR 12-17-084.

In addition, notices of this hearing and proposed rule amendments, which is one of 6 scheduled around the state, six meetings, were posted in the Washington State Environmental Policy Act Register in August 2012 and were Emailed to approximately 1,200 interested people on August 20, 2012 via listserves. Ecology also issued a press release August 16, 2012 through Ecology-News@listserv.wa.gov.

So with no one wishing to make public comments and testimony, I'll simply close with mentioning that all testimony and comments received and postmarked by October 15, 2012 by midnight will be part of the official hearing record for the Sediment Management Standards proposal. Written comments should be sent to Adrienne Dorrah, Dept of Ecology, Toxics Cleanup Program, PO Box 47600, Olympia, WA 98504-7600.
Email: RuleUpdate@ecy.wa.gov, or faxed to 360 407-7154.

And all testimony received at any of the other five hearings held around the state - all written comments will be part of the official hearing record for this proposal.

Ecology staff will prepare a document called a Concise Explanatory Statement which will respond to the oral and written comments and issues of concern that are raised during the public comment period. The agency will review the comments and make a determination whether to adopt the rule. Ecology Director Ted Sturdevant will consider the rule documentation and staff recommendations and will make a decision about adopting the proposal.

Ecology will publish comments received along with our responses, showing to what extent comments influenced the final language of the rule. Ecology will post the comments and responses on our webpage.

Adoption is currently scheduled no earlier than December 14, 2012. If the proposed rule is adopted and filed with the Code Reviser, it will go into effect, expected to be 6 months later.

So I appreciate your assistance to make the Sediment Management Standards better, and trust that it will serve the best interest of Washington's people and our environment.

If we can be of further help, please don’t hesitate to contact Chance Asher. Again, her contact information is on the Focus Sheet. Phone 360-407-6914, or by email at chance.asher@ecy.wa.gov.

Thank you for coming to the meeting.

And let the record show that this hearing is adjourned at 6:12 p.m. on September 26, 2012.

Sediment Management Standards ***Meeting/Hearing***

Contact Person: **Adrienne Dorrah**
PIC Code: **xxxx**
Facility Name and Address: **Whatcom Community College, 237 West Kellogg Road, Bellingham, WA**

I'm DouGlas Palenshus, and I'd like to thank you for participating in tonight's public meeting and hearing; on the proposed amendments to Washington State's Sediment Management Standards. My two responsibilities were to make sure that everyone who wished to have an opportunity to make public comment for the record and to make a clear recording of those. In this case, no one has elected to make formal verbal testimony at this meeting tonight.

So let the record show that it is 6:53 p.m. on September 27, 2012, and this hearing is being held at Whatcom Community College at 237 West Kellogg Road, Bellingham, WA. Legal notice of the hearing was published in the Washington State Register Issue WSR 12-17-084.

In addition, notices of the hearing and proposed rule amendments which is one of six scheduled around the state, were posted in the Washington State Environmental Policy Act Register in August 2012 and were Emailed to approximately 1,200 interested people on August 20, 2012 via listserves. Ecology also issued a press release August 16, 2012 through Ecology-News@listserv.wa.gov.

And just to be sure, no one wished to make verbal testimony this evening.

So, all testimony received along with written comments received postmarked by October 15, 2012 by midnight will be part of the official hearing record for the Sediment Management Standards proposal. Written comments should be sent to Adrienne Dorrah, that's A D R I E N N E D O R R A H, at the Dept of Ecology, Toxics Cleanup Program, PO Box 47600, Olympia, WA 98504-7600. At Email: RuleUpdate@ecy.wa.gov. Fax: (360) 407-7154

All testimony received including at other five hearings held around the state, will be part of the official hearing record for the proposal.

The Ecology staff will prepare a document called a Concise Explanatory Statement which will respond to the oral and written comments and issues of concern that are raised during the public comment period.

The next step is to review the comments and make a determination whether to adopt the rule done by Ecology Director Ted Sturdevant who will consider the rule documentation and staff recommendations and will make a decision about adopting the proposal.

Ecology will publish comments received along with our responses, showing to what extent the comments influenced the final language of the rule.

Ecology will then post the comments and responses on our webpage.

Adoption is currently scheduled no earlier than December 14, 2012. If the proposed rule is adopted and filed with the Code Reviser, it is expected to go into effect 6 months later.

Thank you for coming. We appreciate your participation, and thank you.

So, let the record show that this hearing is now adjourned at 7:52 p.m. on September 27, 2012.

(another voice) 6:52

I did that once before, too, strike that, that’s 6:52 p.m. on September 27, 2012

Public Hearing for Chapter 173-204 RCW
Sediment Management Standards

Contact Person: **Adrienne Dorrah**
PIC Code:
Facility Name and Address: **Ecology Headquarters Building, 300 Desmond Drive, Lacey, WA**

Okay, Let the record show that it's 7:32 on October 1, 2012 and this public hearing is being held at the Department of Ecology's Headquarters Building located at 300 Desmond Drive in Lacey, Washington.

The legal notice of this hearing as well as the other hearings that are being held around the state, was published in the Washington State Register issue WSR 12-17-084.

In addition, notice of all the hearings and proposed rule amendments were posted in the SEPA Register in August 2012, Emailed to approximately 1,200 interested people on August 20, 2012 via listserves.

Ecology also issued a press release on August 16, 2012 through Ecology-News@listserv.wa.gov.

Okay, this is my last request. Does anybody want to provide any testimony? No. Okay.

Let the record show that the two members of our audience in attendance did not want to provide testimony, and we'll move on.

Okay. If you would like to send Ecology written comments regarding the proposed amendment, please remember they are due no later than 11:59 p.m. on October 15, 2012, and we will be looking at that time. Please sesnd them to Adrienne Dorrah (name was then spelled), with the Department of Ecology, Toxics Cleanup Program, PO Box 47600, Olympia, WA 98504-7600

You could also Email your comments. And the e-mail address is the word rule, capital R small ule update capital Update at ecy.wa.gov RuleUpdate@ecy.wa.gov

You may also fax comments, and the fax number is area code 360 407-7154.

All the testimony that's received at any of the public hearings as well as the written comments that come in to the agency are part of the official record for this proposal, and they receive equal weight in the decision-making process as far as Ecology is concerned.

Ecology staff is going to prepare a document called a Concise Explanatory Statement, and that document is going to respond to the oral and written comments and the issues of concern that are raised during the public comment period. Ecology will publish your comments along with the agency responses, showing to what extent your comments influenced the final language of the rule.

Ecology will post the comments and responses in the Rule file on our webpage, and anyone providing contact information (address, e-mail information and soforth) will be provided a link to the final rule and all related rulemaking documents.

The next step is to review the comments that are received and make a determination whether to adopt the rule. Ecology Director Ted Sturdevant will consider the rule documentation and staff recommendations, but he is responsible and will make the decision about adopting the proposal.

Adoption is currently scheduled some time in January 2013. If the proposed rule should be adopted, it will be filed with the Code Reviser and will go into effect 6 months later.

On behalf of the Department of Ecology, thank you so much for coming. We thank you for ensuring the quality of the Toxics Cleanup Program's Sediment Management Standards, and we trust that it will serve the best interests of Washington's people and our environment.

This hearing is adjourned at 7:35 p.m. Thank you.

Public Hearing for Chapter 173-204 RCW
Sediment Management Standards

Contact Person: **Adrienne Dorrah**
PIC Code:
Facility Name and Address: **Centerplace Regional Event Center in the Great Room, 2426 North Discovery Place, Spokane Valley, WA**

My name is Ann Knapp and I am the hearing officer for this evening's public hearing. We are here tonight to receive comments regarding proposed amendments to Chapter 173-204 WAC, Sediment Management Standards.

Let the record show that it is 6:40 p.m. on October 3, 2012, and this hearing is being held at Centerplace Regional Event Center in the Great Room, 2426 North Discovery Place, Spokane Valley, WA 99206. The legal notice of this hearing was published in the Washington State Register issue WSR 12-17-084.

In addition, notices of this hearing, one of six scheduled around the state, and proposed rule amendments were posted in the SEPA register in August 2012, emailed to approximately 1,200 interested people on August 20, 2012 via listserves, and Ecology also issued a press release on August 16, 2012 through Ecology-News@listserv.wa.gov.

Let the record show that about 3 people attended this public hearing and no one wanted to provide oral testimony. If you would like to submit testimony in writing to Ecology, please remember they are due no later than 11:59 p.m. on October 15, 2012. Please send them to Adrienne Dorrah, Department of Ecology, Toxics Cleanup Program, P.O. Box 47600, Olympia, WA 98504-7600. The e-mail is RuleUpdate@ecy.wa.gov. The fax number is 360 407-7154.

All testimony received tonight as well as the other hearings held around the state and all the written comments will be part of the official hearing record for this proposal. Ecology staff will prepare a document called a Concise Explanatory Statement which will respond to the oral and written comments and issues of concern that are raised during the public comment period. Ecology will publish the comments along with Ecology responses, showing to what extent comments influenced the final language of the rule.

Ecology will post the comments and responses in the Rule file on our webpage.

Anyone providing contact information, the address and your email and phone, and you can do that up front if you haven't already done that, will be provided a link to the final rule and all related rulemaking documents.

The next step is to review the comments and make a determination whether or not to adopt the rule.

Ecology director Ted Sturdevant will consider the rule documentation and staff recommendations and will make a decision about adopting the proposal.

Adoption is currently scheduled no earlier than December 14, 2012. If the proposed rule should be adopted that day and filed with the Code Reviser, it would go into effect 6 months later.

On behalf of the Department of Ecology, thank you very much for coming. We thank you for ensuring the quality of the Toxics Cleanup Program's Sediment Management Standards is good.

We trust that it will serve the best interest of Washington's people and our environment.

Let the record show that this hearing is adjourned at 6:45 October 3.

Again, thank you very much for coming.

Public Hearing for Chapter 173-204 RCW
Sediment Management Standards

Contact Person: **Adrienne Dorrah**
PIC Code:
Facility Name and Address: **Hampton Inn Richland, 486 Bradley Blvd., Richland, WA**

My name is Ann Knapp and I am the hearing officer for this evening's public hearing. We are here tonight to receive comments regarding proposed amendments to Chapter 173-204 WAC, Sediment Management Standards.

Let the record show that it is 7:05 p.m. on October 4, 2012, and this hearing is being held at Hampton Inn Richland, 486 Bradley Boulevard, Richland, WA 99352. The legal notice of this hearing was published in the Washington State Register issue WSR 12-17-084.

In addition, notices of this hearing, one of six scheduled around the state, and proposed rule amendments were posted in the SEPA register in August 2012, emailed to approximately 1,200 interested people on August 20, 2012 via listserves, and Ecology issued a press release on August 16, 2012 through Ecology-News@listserv.wa.gov.

Let the record show Ecology held the hearing on this rule proposal and one person attended the public hearing. Nobody wanted to provide oral testimony. If you would like to send Ecology written comments, please remember they are due no later than 11:59 p.m. on October 15, 2012. Please send them to Adrienne Dorrah, Department of Ecology, Toxics Cleanup Program, P.O. Box 47600, Olympia, WA 98504-7600. The e-mail is RuleUpdate@ecy.wa.gov, and the fax number is 360 407-7154.

All testimony received at this hearing as well as at the other hearing held around the state along with all the written comments will be part of the official hearing record for this proposal. Ecology staff will prepare a document called a Concise Explanatory Statement which will respond to the oral and written comments and issues of concern that are raised during the public comment period. Ecology will publish the comments along with Ecology's responses, showing to what extent comments influenced the final language of the rule.

Ecology will post the comments and responses in the Rule file on Ecology's webpage.

Anyone providing contact information, address, email information, will be provided a link to the final rule and all related rulemaking documents.

The next step is to review the comments and make the determination whether to adopt the rule.

Ecology director Ted Sturdevant will consider the rule documentation and staff recommendations and will make a decision about adopting the proposal.

Adoption is currently scheduled no earlier than December 14, 2012. If the proposed rule should be adopted that day and filed with the Code Reviser, it will go into effect 6 months later.

On behalf of the Department of Ecology, thank you for coming. We thank you for, thank you for ensuring the quality of the Toxics Cleanup Program's Sediment Management Standards is high.

We trust that it will serve the best interest of Washington's people and our environment.

Let the record show that this hearing is adjourned at 7:06 p.m. October 4, 2012.

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Appendix C

Copies of Written Comments

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AECOM

October 29, 2012

Adrienne Dorrah
Washington State Department of Ecology
Toxics Cleanup Program
PO Box 47600
Olympia, WA 98504
Email: RuleUpdate@ecy.wa.gov

Subject: Comments on Proposed Sediment Management Standard (SMS) Rule Revisions for managing contaminated sediments in Washington State

Dear Ms Dorrah:

AECOM appreciates the opportunity to provide comments on the proposed Sediment Management Standards (SMS) rule revisions, Chapter 173-204 Washington Administrative Code (WAC), released for public comment on August 15, 2012. We appreciate Ecology's efforts to produce a streamlined process for implementing sediment cleanup actions in Washington State. However, we are concerned that some these changes may complicate site investigations and delay cleanup actions. In addition to the comments submitted by AECOM on January 17, 2012 regarding achievable endpoints for the protection of human health, we are submitting the following five comments regarding remedy selection, construction, and compliance.

001

- **Selecting a Cleanup Standard.** We appreciate the efforts to streamline the SMS cleanup standard selection process, but the proposed rule stating "*the sediment cleanup level may be adjusted upward from the Sediment Cleanup Objective [SCO] based on whether it is technically possible and whether it will have adverse environmental impacts"* (WAC 173-204-560) is less flexible and does not acknowledge the complexities and uncertainties of working in a water environment. We strongly encourage Ecology to modify the language and retain technical practicability and net environmental benefit in the selection process. This is more supportive of sustainable cleanup actions that optimize risk reduction and benefits, encourage the use of the best available technologies, and allow for site-specific considerations.

002

- **Background Concentrations.** The process for determining background concentrations (for the protection of human health) should be transparent, collaborative, and peer-reviewed to ensure consistency among different project sites. Background concentrations need to consider the limits of technical feasibility and contributions from ongoing urban sources. In addition, the rule should discuss the concept of spatially-weighted average concentrations (SWACs) that are determined over the exposure area of interest. SWACs are more appropriate than point concentrations for the protection of human health and some ecological endpoints. The SMS rule should clarify that concentrations for the protection of human health are not typically applied on a point-basis.

003

- **Construction Time Frames.** The expectation that a site should be restored within "a single construction season" (WAC 173-204-500, Cleanup Process Expectations, line 1501) may not be appropriate for many sites. This is a design issue and should be removed from the rule. Because of our limited in-water work windows in Puget Sound, it may be difficult to implement cleanup work in one work season. In addition, this statement favors faster cleanups instead of better, more protective cleanups that also minimize short-term risks.

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004 • **Remedy Selection**. The remedy should be permanent to the maximum extent practicable. However, the bias towards dredging should be removed from the evaluation when selecting a remedy (WAC 173-204-570, Selection of Cleanup Actions, Lines 1571, 2920, and 2987). The selection of a remedy should balance short-term impacts, long-term benefits, cost, and technical practicability. There should not be an *a priori* preferred technology for the remediation of contaminated sediment; each site should be evaluated based on its unique characteristics. In fact, dredging will likely disrupt the natural recovery processes during the construction phase and result in additional recovery time needed after construction to achieve background concentrations.

----

005 • **Final Cleanups Under the SMS**. Under the proposed rule, there are no mechanisms in place to reach a final remedy without meeting the SCO; however, the SCO may not be achievable in many instances. The SMS rule should contain mechanisms to allow for achievable cleanup actions. The rule and guidance need to include a workable and final solution. One solution is to include Institutional Controls (ICs), when combined with active and passive remedies, as acceptable for meeting cleanup standards derived for the protection of human health.

We appreciate the level of effort Ecology has put into the rule revision process. Please do not hesitate to call or contact Anne Fitzpatrick at 206-624-9349 or email at anne.fitzpatrick@aecom.com for additional clarification of these comments.

Sincerely,

Anne Fitzpatrick
Sr. Managing Scientist, AECOM

Cc: John Ryan (AECOM)
Jason Palmer (AECOM)
Merv Coover (AECOM)
Greg Brunkhorst (AECOM)

File path: F:\PROJECTW\MTCA-SMS Revisions\AECOM responses\AECOM_working_Oct2012\AECOMCmts_SMS Rule Revisions_sentEcology_102912.docx

AECOM

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Memorandum

To	Washington State Department of Ecology, at RuleUpdate@ecy.wa.gov	Page	1
CC	Chance Asher – Washington State Department of Ecology		
Subject	AECOM Comments on the Proposed SMS Rule Revisions		
From	Anne Fitzpatrick (contact); AECOM Technical Services		
Date	January 17, 2012		

AECOM is providing the following general comments on four key concepts of the proposed Sediment Management Standards (SMS) rule revisions. In addition to these general comments, AECOM is also providing specific comments on the proposed revisions using Ecology's Rule Review/Comment Form (see Attachment 1). In general, the rule revisions are thorough and thoughtful, and we appreciate the level of effort Ecology has put into this process. We appreciate the opportunity to review the proposed revisions, and look forward to working with Ecology, stakeholders, and community members to develop a final revised SMS rule that provides a clear, efficient, and achievable process for implementing sediment cleanup actions within our waterways. Please feel free to contact me at 206-624-9349 if you would like to discuss or clarify our comments.

Setting the Maximum Allowable Level (Upper Bound)

006 We agree with and support the concept of a two-tiered evaluation for both ecological and human health. However, the maximum allowable level (MAL) needs to be implementable and practicably achievable. For example, the *Lower Duwamish Waterway Feasibility Study* (AECOM 2010) has
007 demonstrated that a MAL, calculated per the proposed language, cannot be achieved using technically implementable actions. Also, a MAL calculated using a hazard quotient (HQ) of one (1) or total site risk of 10^{-5} using default consumption rates will be impractical to meet regardless of the remedial action taken for many chemicals (e.g., dioxins and PCBs). This effectively eliminates the usefulness of a tiered approach.

We believe the MAL should be an achievable endpoint. We suggest allowing a total site risk as high as 10^{-4}. This approach would provide a reasonable range within which to set a site-specific cleanup standard that is actually achievable in the near term, provide incentive for early cleanup actions, and allow for progression toward the Sediment Cleanup Objective over the longer term. In summary, we recommend the following changes to the MAL:

- The human health risk range should match the acceptable CERCLA risk range of 10^{-6} to 10^{-4} risk, especially for certain chemicals. The MAL should be set to 10^{-4} risk.
- 008 An HQ >1, based on a range of seafood consumption rates that include recreational (occasional) fishing (otherwise there is no difference between the MAL and the Sediment Cleanup Objective).

----

009 • Regional background as an area-weighted average that includes contributions from non-point sources. It should represent the limit of technical feasibility (the best we can do). There is no point to having a regional background level that cannot be achieved.

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010 • Consider using modeling or other endpoints such as regional fish tissue concentrations, to determine regional background. Keep the cleanup level determination flexible so that other methods and endpoints can be considered.

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011 • Limit the evaluation to only those contaminants with human health risks.

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012 Interim vs. Final Cleanup under SMS

We believe that SMS should contain mechanisms to allow for an interim action or a final cleanup action. We also believe that Institutional Controls (ICs), when combined with active remedies, should be acceptable for meeting cleanup objectives. Under MTCA, cleanups are considered interim until the cleanup levels are achieved (in this case, until natural background levels are achieved). These “aspirational” goals may never be achieved in an urban setting. The rule and guidance needs to include a workable solution. The current SMS rule does not have a mechanism for interim actions.

The two scenarios presented by Ecology at the November 18, 2011 technical meeting were 1) a sediment site unit (with discrete and identifiable chemical signatures and sources), and 2) multiple sediment site units that fall within a larger bay-wide site (with some co-mingled signatures). We like the concept of site units, but need to understand how cleanups can be finalized in them. In the first scenario, a cleanup is considered “final” when sediment and PLP point sources can be controlled and sediment remedial is completed through active and/or passive actions to levels below the sediment cleanup standard. Institutional controls may be needed to control low levels of residual risk within the site unit. Further, we agree with Ecology’s approach for addressing recontamination with a remediated site unit (i.e., no further responsibility by PLP if recontamination is from off-site or non-point sources).

In the second scenario, interim actions can promote an immediate reduction in concentration when site-specific or bay-wide sources cannot be controlled to levels below the sediment cleanup standard. For units within a bay-wide site, we suggest SMS stipulate that institutional controls (ICs) can be used to mitigate risk above the sediment quality objective if the remedy is found to be permanent to the maximum extent practicable. This would allow for a final action at a site, such as the Lower Duwamish Waterway, where the sediment quality objective cannot be met regardless of the remedial action taken and degree of point source control. Without allowing ICs to be used as a means for achieving compliance, all sediment remedial actions will necessarily have to be considered interim actions. This does not provide any incentive for PLPs to initiate site unit cleanup, much less remediate the site below the maximum allowable level.

013a Liability Management and Site Closure

We support the idea of both partial and full liability settlement options as part of site closure. We encourage Ecology to maintain flexibility and streamline the process for determining settlement options for both individual site units and bay-wide sites. We support the idea of allowing PLPs to obtain a release from liability for larger bay-wide sites without the participation and/or settlement of all potential bay-wide PLPs. This flexibility provides incentives for PLPs to move forward with cleanup actions and provide a level of certainty for future potential liability.

013b The timing of site closure, and release from liability, should also remain flexible. As discussed in the December 8, 2011 Ecology meeting, if a PLP completes remedial actions within their site unit and contributes incrementally more effort to the bay-wide site, can they settle their liability ahead of a large multi-PRP allocation process? We are concerned that the bay-wide settlement options presented in the Ecology meeting would take several years or decades to implement because of the quantity of data and legal process required.

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014 Source Control

As discussed in the December 8, 2011 meeting, Ecology is looking to integrate cleanup and source control across Ecology programs, including the water quality program. For example, NPDES permits may include more contaminants that match those found in receiving sediments, and more impaired water bodies are expected when human health water quality data are considered. However, we are concerned that NPDES for permitted discharges represent only a small portion of the ongoing lateral loads. Chemical input from ongoing sources is a larger urban issue with numerous non-point source contributions that are not easily controllable. We want to control sources, but NPDES permits may not be the best mechanism for doing this (Ecology 2011). Site inspections, best management practices, and other physical-based controls may be more effective, and best managed by the water quality program. MTCA is not an appropriate tool for evaluating ongoing bay-wide sources. For example, the situation becomes complicated when affected site owners lease property to businesses that obtain their own NPDES permit. Businesses will not lease from properties where their NPDES permit discharge limits will be lower than other properties, and property owners will not have direct control over discharge concentrations. Who becomes liable? How will source control requirements change as bay-wide concentrations decrease? Some of our recommendations include:

- Use the existing water quality program (site inspections, BMPs) to improve source control efforts.

015
- Recontamination should be defined as concentrations above a sediment remedial action level or MAL, and not the sediment cleanup objective. Compliance monitoring should include adequate flexibility such that periodic and random exceedances do not trigger additional cleanup actions.

016
- Chemicals with typical ongoing urban signatures, such as bis(2-ethylhexl)phthalate and perhaps low level dioxins, should be handled differently than legacy chemicals.

017
- Compliance monitoring should start at the end of remedy construction, not the start of construction.

018
- Sediment criteria for listing an area on the 303D list as an impaired water body should be limited to the existing SQS/CSL sediment criteria. The SQS/CSL are point-based criteria reflective of localized conditions around an outfall. We do not recommend including SWAC-based or area-based screening levels, unless dilution zone/point of compliance is considered.

019
- NPDES allows compliance at the end of the allowable discharge zone, if human health criteria are considered, then similar compliance allowances should be considered for sediment with larger area-wide exposure areas.

020
- Several lines of evidence (modeling, data) should be encouraged when evaluating if source control is sufficient and what is achievable.

Other Issues

Specific comments described separately (see Attachment 1) for submittal to Ecology include several important issues highlighted below.

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021 • The use of a Remedial Action Level (RAL) or remediation level (RL) should be defined and incorporated into the proposed framework. The RAL would be the point concentration above which sediment is actively remediated.

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022 • Discuss the concept of spatially-weighted average concentrations (SWACs) that are determined over the exposure area of interest. This is particularly important for human health and some ecological endpoints.

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023 • Guidance should include a definition of monitored natural recovery (MNR) and incorporate adequate flexibility in the selection of cleanup standards and actions to allow MNR for applicable sites.

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024 • Multiple and preliminary cleanup standards should be considered in the development of alternatives as a tool to evaluate net environment, cost, and technical practicability. It can be a component of an alternative, or used a metric(s) in the evaluation of alternatives. They may be necessary to address different chemicals, pathways, receptors, spatial areas, and timeframes for recovery for a site.

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025 Other important issues for consideration by Ecology in the SMS rule revisions include:

- Construct of compliance monitoring and modification of MTCA's three-part rule for sediment.

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026 • Incorporation of the SMS net environmental benefit/cost analysis for selecting the cleanup standard into the MTCA Disproportionate Cost Analysis (DCA) for evaluating remedial alternatives.

We appreciate the level of effort Ecology has put into the rule revisions and efforts to streamline the process. Please do not hesitate to call or contact Anne Fitzpatrick at 206-624-9349 or Anne.Fitzpatrick@aecom.com for additional clarification with this memo or comment form.

References

AECOM 2010. *Lower Duwamish Waterway Feasibility Study. Draft Final.* Prepared for U.S. EPA and Washington State Department of Ecology. Prepared for the Lower Duwamish Waterway Group. Seattle, Washington. October 25, 2010.

Ecology 2011. *Surface Sediment Sampling at Outfalls in the Lower Duwamish Waterway, Seattle, WA. Data Report*. Prepared by the Washington State Department of Ecology. October 2011.

Attachment – Rule Review / Comment Form by AECOM

Washington State Department of Ecology
Sediment Management Standards Rule
Review/Comment Form

Reviewer Name:	**AECOM,** 710 Second Ave, Suite 1000, Seattle, WA 98104 Anne Fitzpatrick (contact), Merv Coover, Halah Voges, Greg Brunkhorst, Jason Palmer, Shannon Ashurst, John Ryan (206)-624-9349
Submittal Date:	January 16, 2012
Sections of Document Reviewed:	SMS sections 173-204-200, -500 - 590
Document Version/Date:	Draft Revisions, Part V and Definitions, dated October 2011 Preliminary Draft

	Page Number	Line Number	Comment
027	9	9	Definitions. Under the term “active cleanup action” add the word “monitored” in front of “natural recovery” and add to the end of the sentence that passive actions “can be part of an overall cleanup”.
028	11	68	Definitions. Suggest adding to the definition of ENR “ENR means……to reduce the toxicity, concentration, or change the physical characteristics of contaminated sediment.” ENR material is often coarser-grained than the native underlying sediment thereby placement changes the physical properties and scour potential of the bedded sediment.
029	11	83	Definitions. Delete the word “action.” The maximum allowable level can be met using monitored natural recovery.
030	12	99	Definitions. Include new definition from monitored natural recovery: “monitored natural recovery is a passive remedial technology wherein the natural recovery of sediment is monitored in an area that is above cleanup standards but below remedial action levels. Monitoring is required to ensure effectiveness.” (173-204-200)
031			Include: “remedial action levels” means the concentration above which active remediation takes place.
032	13	138	Definitions. The definition of regional background should also include non-point source contributions. Edit text to “Calculation of regional background must exclude areas with an elevated level of contamination due to the direct influence of known or suspected contaminant (point) sources including, but not limited to, areas within a sediment cleanup unit. However, contribution from ambient, non-point sources is expected.”
033	13	165	Definitions. The definition of sediment should also include “that it supports or could support aquatic biota. Sediment is placed by water-borne processes.” (173-204-200)
034	13	165	Definitions. Suggest adding a definition of “remedial action levels” or “remediation levels” above which active remediation takes place. This term will help clarify the process of developing remedial alternatives. (173-204-200)
035	14	196	Clarify that the sediment recovery zones are above the sediment quality objective but below the cleanup standard. We assume this is distinct from monitored natural recovery which is above the cleanup standard. However, why was the text changed from sediment quality standard to sediment quality objective? (173-204-200)
036	17	44	Agree – clause acknowledging that Agency cleanup process expectations may not be applicable to all sites is appropriate and necessary. (173-204-500(4))
037	17	59	Agree – when recontamination is not due to the party who conducted the initial cleanup, the party that conducted the initial cleanup should not be held responsible for subsequent cleanup. (173-204-500(4)(b))
038	18	69	Cleanup Process Expectations. Edit text to read “.. to achieve restoration within a time frame of 10 years starting from the end of construction”. The time clock should start at the end of construction, not at the beginning of cleanup because elevated concentrations will be expected during construction. At a minimum, suggest “from the start or end of construction depending on site conditions” and keeping it flexible to be determined on a site-specific basis. (173-204-500 (4)(c))
039	19	109	Edit text to read ”…Sediment cleanup standards define the chemical concentrations or biological effects levels that ~~that~~ must be achieved through active or passive cleanup measures.” This definition allows MNR to be adopted as appropriate to meet the standard. (173-204-500(5)(b))
040a	19	125	Applicability of New Cleanup Standards. Suggest text edit to read “(b) Cleanup standards determined in (a) of this subsection shall not be subject to modifications that require further cleanup action due solely to subsequent amendments to the provisions in this chapter on cleanup standards~~, unless the department~~

Washington State Department of Ecology
Sediment Management Standards Rule
Review/Comment Form

Reviewer Name:	**AECOM,** 710 Second Ave, Suite 1000, Seattle, WA 98104 Anne Fitzpatrick (contact), Merv Coover, Halah Voges, Greg Brunkhorst, Jason Palmer, Shannon Ashurst, John Ryan (206)-624-9349
Submittal Date:	January 16, 2012
Sections of Document Reviewed:	SMS sections 173-204-200, -500 - 590
Document Version/Date:	Draft Revisions, Part V and Definitions, dated October 2011 Preliminary Draft

	Page Number	Line Number	Comment
040b			~~determines that the previous cleanup action is no longer sufficiently protective of human health and the environment~~.” At a minimum, suggest adding to the end “… based on monitoring results”. Although part (a) suggests that sites already having Ecology-approved cleanup standards will be grandfathered in, part (b) opens the door to agency re-evaluation that could force additional cleanup to the newest, amended standards/requirements. It would leave uncertainty with the liable party. (173-204-500(6)).
041	33	84	Insert “or sediment cleanup unit” following “WAC 173-204-570.” When natural background defines the sediment quality objective, then a single “site” will be unreasonably large and the sediment cleanup unit will need to be shown. (173-204-560(4)(b)(ii))
042	33	86	Include “proposed or potential” in front of “sediment cleanup standards.” The sediment cleanup standards will not be determined during the RI stage. Different cleanup standards may be used for different alternatives at the FS stage and during the evaluation of alternatives. (173-204-560(4)(b)(ii)(A))
043	35	151	Include the parenthetical remark “(sediment cleanup standards may vary by cleanup action alternative)”. (173-204-560(5)(a)(iii))
044	40	11	Sediment Cleanup Standard. To avoid confusion in the use of terms, like the MAL, we recommend the following text edit: “The sediment cleanup standard defines the ~~maximum allowed~~ chemical concentration and level of biological effects permissible at the cleanup site to be achieved by year ten after ~~start~~ the end of the active cleanup.”
045	40	33	Sediment Cleanup Standard. Insert “(d) The department recognizes that for some sites it may not be practicable to comply with the maximum allowable level. In these cases, the sediment cleanup standard (and the MAL) may be adjusted upwards based on practicability as determined in WAC 173-204-580.” (173-204-570(2)(d))
046	42	32	Maximum Allowable Level based on HH Risks. Edit text to read “Compliance with this provision shall be based on a hazard quotient of one (1) or possibly higher depending on the chemical, site conditions, or other risk endpoints. The maximum allowable level for any chemical, even when site conditions are considered, will be no higher than an HQ of ten (10). The maximum allowable level, even when site conditions are considered, will be no higher than for protection of recreational consumers.” If both the objective and maximum allowable levels are the same HQ – what is the point? We know that an HQ = 1 cannot be met for many chemicals. (173-204-571(3)(a))
047	43	37	Maximum Allowable Level based on HH Risks. Edit text to read “Compliance with this provision shall be based on total site risk of no higher than one-in-one thousand (1 x 10^{-4}).” The allowable risk range should be consistent with CERCLA. We know that a 10^{-4} risk level cannot be met for many chemicals and the MAL should maintain some flexibility. (173-204-571(3)(b))
048	43	41	Maximum Allowable Level based on HH Risks. Edit text to read “The sediment cleanup standard or maximum allowable level shall not be established at concentrations that would result in area-wide concentrations above the regional background concentrations as defined in WAC 173-204-200…..” This part should acknowledge differences between point-based and SWAC-based concentrations. (173-204-571(3)(c))
049	43	42	Change “above” to “below” for consistency with Ecology figures. (173-204-571(3)(c))
050	49	1	Cleanup Screening Levels and Sediment Quality Standards based on Benthic toxicity in Freshwater Sediments. Proposed rule revisions look fine.
051a	39	13	Edit text to read “…to be achieved by year ten after the ~~start~~ completion of the active cleanup”. The reduced in-water work periods mandated by fish windows often extends cleanup actions into multiple

Washington State Department of Ecology
Sediment Management Standards Rule
Review/Comment Form

Reviewer Name:	**AECOM,** 710 Second Ave, Suite 1000, Seattle, WA 98104 Anne Fitzpatrick (contact), Merv Coover, Halah Voges, Greg Brunkhorst, Jason Palmer, Shannon Ashurst, John Ryan (206)-624-9349
Submittal Date:	January 16, 2012
Sections of Document Reviewed:	SMS sections 173-204-200, -500 - 590
Document Version/Date:	Draft Revisions, Part V and Definitions, dated October 2011 Preliminary Draft

	Page Number	Line Number	Comment
051b			years. This creates a bias against projects conducting more extensive active cleanup measures.
052	41	60	Maximum Allowable Level. "…the maximum allowable level shall be at least as stringent as all of the following:" This text, combined with the bullets that follow, is inconsistent with Figure 1 – Ecology Cleanup Program Proposal, which suggests the maximum allowable level would be the highest of 10^{-5} risk based concentrations, regional background, or the PQL. Suggest text edit of "…the maximum allowable level shall be at least as stringent as the highest of ~~all of~~ the following:"
053	41	68-71	Maximum Allowable Level. "Sediment cleanup standards developed under subsection (4) of this section shall not be established at concentrations above regional background concentrations as defined in WAC 173-204-200 or the practical quantitation limit, whichever is higher." This text is inconsistent with Figure 1 – Ecology Cleanup Program Proposal, which suggests the maximum allowable level would be the highest of 10^{-5} risk based concentrations, regional background, or the PQL.
054	52	29	Selection of Cleanup Actions. Delete 173-204-580(3)(d). "Permanent to maximum extent practicable" should not be a minimum requirement, because it would result in only one alternative passing the minimum requirements. Instead, it is an evaluation criterion and the idea is already embedded in WAC 173-204-580(4)(a)-(o).
055	52	30	Selection of Cleanup Actions. Delete 173-204-580(3)(e). Restoration time frame is already addressed 173-204-580(4)(g).
056	53	53	Selection of Cleanup Actions. Delete 173-204-580(4)(b). Meeting cleanup standards is already a "minimum requirement".
057	53	54-55	Selection of Cleanup Actions. Delete 173-204-580(4)(c). ARARs are already a "minimum requirement".
058	53	46	Selection of Cleanup Actions. The first cleanup selection criteria "overall protection of human health and the environment" 173-204-580(4)(a) seems redundant with criteria listed later. It is unclear whether it is a threshold requirement (or minimum requirement), or unique criterion intended to describe the magnitude of residual risks. To prevent confusion, we recommend one of two options: (1) if the criterion is equally weighted with the other criteria, then change the name of the criterion from "overall protection of human health and the environment" to "magnitude of residual risks", or (2) if the criterion is a compilation of the other criteria, then delete the detail listed in 173-204-580(4)(a).
059	54	73-74	Selection of Cleanup Actions. Delete 173-204-580(4)(j). Monitoring is already a "minimum requirement".
060	56	19	Sediment Recovery Zones. Include in definition: "the "sediment recovery zone" generally has concentrations between the sediment cleanup standards and the sediment quality objectives. (173-204-590(3))
061	58	59	Sediment Recovery Zones Delete underlined portions of item #5 that state "(5) Sediment recovery zone duration. Except as provided in (a) of this subsection, sediment recovery zones longer than 10 years shall not be authorized by the department." If the definition for a SRZ is changed to areas above the SQO (instead of the cleanup standard), it will take longer than 10 years to reach this goal, if ever. It is not consistent with Ecology's cleanup standard graphic. Instead, rely on subsection "c" for determination. (173-204-590(5))

Last revised by AGF on 01/17/12: Saved in project w/ MTCA-SMS revisions/AECOM responses 2012/ SMS Rule CommentForm

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

Name of Commenter:	Clay Patmont, David Templeton, and Mark Larsen (Anchor QEA. LLC)
Version of Document Reviewed:	___ Review Version (Reader Friendly) **X** Official Version
Date:	October 29, 2012

	Page Number	**Line Number**	**Comment**
	General Comment	N/A	We have been following the development of the SMS rule revisions for several years, and while the proposed amendments contain a number of improvements over the current rule language, other elements of the proposed revisions have the potential to exacerbate, rather than alleviate, some of the practical challenges posed by the current rules.
062	General Comment	N/A	The current draft of the SMS rule demonstrates that Ecology is trying to address many of the technical and policy issues and comments received previously in ways that meet the over-riding goal of making the SMS protective and implementable, including: • A multi-phase approach for sediment recovery over a long timeframe and broad geographic areas; • A regional background approach to allow incorporation of technical feasibility, cost considerations, and net environmental benefits in cleanup decisions; • Provisions for discrete sediment cleanup units and/or sites within larger bay-wide areas of sediment impact; • Consideration of practical incentives to encourage potentially liable parties (PLPs) to take action regarding problems they can control and potential cash-out settlements for larger bay-wide problems; and • Strategic analysis of how the SMS update will be interpreted and implemented by different federal, state and local environmental regulatory programs (e.g., Water Quality Program, NPDES industrial and municipal permits, MTCA, CERCLA, etc.).
063	General Comment	NA	Ecology undertook a great deal of outreach and involvement with knowledgeable professionals and other stakeholders leading up to the proposed SMS amendments, including several advisory committees. From our perspective, it appeared that both Ecology and the committee members put a great deal of time and energy into reaching workable solutions to problems that have posed a genuine impediment to moving forward with sediment cleanups. Based on sample rule language distributed in October 2011 and other materials Ecology presented at the last meeting held with advisory committee members in December 2011, the agency appeared to have charted a course for focused rule amendments that would create a workable path through some very thorny MTCA/SMS issues and help in expediting needed sediment cleanups. However, while the proposed rule amendments include some aspects of the pragmatic approach that resulted from the advisory committee process, other portions of the amendments represent very significant changes to the current rule that we understand were either never discussed, or were discussed and quickly put aside by the advisory committee as unworkable. The changes needed to align these rule amendments with a more practicable approach are fundamental enough that new draft language needs to be proposed.
064	17	65 – 69	The new requirement to establish sediment recovery zones at sites and cleanup units where cleanup levels cannot be met within ten years of the start of the cleanup is highly problematic. We understand that the final advisory committee made clear to Ecology that including the sediment recovery zone standards of WAC 173-204-590 in the new SMS rule revisions would stymie cleanup, as this element of the existing SMS regulations has proved totally unworkable in the real world because of "technical impracticability" and other similarly difficult criteria that need to be achieved to use this element of the SMS rule. Given that the highly conservative background or practical quantitation limit (PQL)-based sediment cleanup levels for bioaccumulative chemicals such as PCBs, dioxins/furans, and PAHs are anticipated to be exceeded at nearly every sediment cleanup site in part because of uncontrollable, diffuse non-point source inputs of these regional contaminants, the entirety of subsection (4) discussing sediment recovery zones needs to be deleted.
065	26	223 - 227	The proposed language of WAC 173-204-200(1) is problematic because it, combined with the provisions of WAC 173-204-570(3)(h), establishes "active" cleanup as the presumptive remedy at all sites. Please see our comment on the revised language of WAC 173-204-570(3)(h) below. The inadvisable presumptive approach to require "active cleanup" will only further stymie cleanup progress. Thus, the entirety of WAC 173-204-200(1) needs to be deleted. Similar edits need to be made to related parts of the SMS rule.

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	Page Number	Line Number	Comment
066	29	283 - 285	The definition of "contaminant" needs to be expanded to explicitly recognize that the bioavailability of sediment contaminants may vary significantly both within and between sites based on site-specific geochemistry and other factors. Sub-section (15) and other related sections and sub-sections need to be re-written to clarify that site-specific bioavailability considerations should be incorporated into the development of site-specific cleanup levels using approaches developed by the Interstate Technology & Regulatory Council (ITRC) and discussed in other relevant Agency guidance documents. Note that the ITRC's February 2011 Technical/Regulatory Guidance (which Ecology helped co-author): "*Incorporating Bioavailability Considerations into the Evaluation of Contaminated Sediment Sites*" states: "*Overall, this guidance establishes that bioavailability considerations should be incorporated in the exposure assessment process to obtain a clearer understanding of contaminant toxicity and exposure pathways such that remedy selection decisions can be focused and resources efficiently used. By incorporating bioavailability considerations into the early stages of site characterization, the risk assessment process, and remedy selection, a more effective remediation may be accomplished, which may well optimize overall cost. This web-based technical and regulatory guidance can help the user understand the proper application of these tools to assess bioavailability and more effectively protect human health and the environment.*"
067	34	389 - 393	While the general definition of "regional background" in sub-section (38) is workable with revisions (see below), the utility of this approach will be entirely dependent on how regional background is ultimately calculated, which presumably will be described in detail in the Sediment Cleanup User Manual. We understand that Ecology is developing a pilot study to examine this issue in greater detail, but we have significant concerns that the regional background calculation approaches that Ecology is currently considering are impracticable, as they do not allow sufficient differentiation between existing or prospective SMS site units and bay-wide contamination problems. This creates gridlock in the processing of the current backlog of sediment sites. Regional background should include contaminants contributed to the region from multiple urban stormwater sources, in order to distinguish those pollution problems from more discrete sediment sites that can be linked to a more specific, and likely historic, past practice. For example, detailed national and regional studies of dioxin sources have concluded that: 1) currently, the largest quantified source of dioxin emissions throughout the U.S. is the uncontrolled burning of household trash (backyard burning; http://www.epa.gov/wastes/nonhaz/municipal/backyard/health.htm); and 2) common non-point source inputs such as those resulting from historical roadside weed control have been identified as important sources of dioxin to regional sediments. The similarity of both soil and sediment dioxin concentrations and congener profiles in urbanized areas of Puget Sound to those found throughout the region provides further evidence that existing sediment dioxin concentrations are the product of a wide range of historical point and non-point source legacy releases, as well as ongoing non-point source inputs. Regional background problems should be addressed under the appropriate regulatory tool (e.g., Phase II municipal permits) and not site-specific MTCA/SMS enforcement. Calculation of regional background should allow for inclusion of certain contaminants if they are due to the influence of multiple urban sources. The concept of regional background should be specifically used to determine discrete SMS sites or site units.
068	36	435 - 442	The proposed revisions significantly and unrealistically shorten the maximum restoration timeframe for a cleanup. Informed by the committee members' collective experience with how long many cleanup projects take to implement, we understand that the final advisory committee considered and rejected the option of changing the rules from the current requirement that cleanup standards must be met with 10 years following completion of cleanup, to requiring that cleanup standard must be met within 10 years of *initiating* cleanup. However, the August 2012 proposal ignores the committee's recommendation. Thus, the next to last sentence of sub-section (46) needs to be revised to read: "*within ten years after the ~~start~~completion of the cleanup ~~action~~construction*." The

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			last sentence of this sub-section referring to sediment recovery zones needs to be deleted, consistent with the comment above regarding page 17.
069	xcv	1500 - 1507	Given the complexities of permitting and coordinating beneficial reuse opportunities at sediment cleanup sites it is unrealistic for Ecology to expect that sediment cleanup construction within sediment cleanup units (let alone entire sites) can be completed within a single construction season. This sub-section needs to be re-written to more simply state that: "*restoration will be completed as soon as practicable, consistent with the general requirements of WAC 173-204-570*."
070	xcvi	1508 - 1511	Similar to the comment on page 36 above, the entirety of this sub-section either needs to be deleted or the text of sub-section (d) revised to read: "….*within ten years after the ~~start~~completion of the cleanup ~~action~~construction*, …..".
071	cxxxi	2190-2203	Ecology's October 2011 sample rule language specified that, in determining where to set cleanup levels between the sediment cleanup objective ("SCO") and regional background, three factors should be considered: technical feasibility, cost and net environmental benefit. The document distributed in late 2011 to the final advisory committee titled "*Framework for Sediment Cleanup Decisions*" stated at p. 7 "*The current SMS framework allows consideration of cost, technical feasibility and net environmental effects both when setting cleanup standards in a range between the upper and lower bounds and during remedy selection. This has been successful because the system provides needed flexibility…In the revised rule, this paradigm will remain.*" Yet, despite this, the cost criterion has been dropped in the proposed amendments. This change is difficult to understand given that, by Ecology's own admission, the current rule's consideration of cost in setting cleanup standards is one of the parts of the rule that works well because of the flexibility it provides. Furthermore, the inclusion by reference in the proposed rule of WAC 173-340-360's disproportionate cost analysis ("DCA")in selecting cleanup actions does not take the place of cost consideration in setting cleanup standards, because the threshold requirement that cleanup standards must be attained within a reasonable restoration timeframe dictates which potential cleanup actions can be considered in the DCA. In order to preserve the flexibility that Ecology admits is afforded by the current rule, cost should be restored as a criteria for setting site specific cleanup levels under WAC 173-204-560.
072	clxxv	2906 - 2910	The August 2012 proposal appears to have ignored the Committee's advice and includes the requirement in WAC 173-204-570(3)(h) that "*Cleanup actions shall not rely primarily on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action*." The proposed language is problematic because it establishes "active" cleanup as the presumptive remedy at all sites, despite years of collective experience demonstrating that the unique challenges posed by sediment sites often make "active" remedies impracticable. This opinion is not confined to Washington; EPA's current sediment guidance states there is no presumptive remedy for sediment contamination. Consistent with this widely held position, we understand that the final advisory committee that addressed this issue held the consensus view that there is no presumptive sediment remedy, including a requirement for "active" cleanup, for any contaminated sediment site, regardless of the contaminant or the level of risk. Given the widely differing sediment cleanup situations in Washington State, the sediment cleanup remedy should always be the product of careful site-specific evaluations. With lower and lower cleanup levels for constituents like dioxins and PCBs, leading to very large sites, exchanging the site-specific evaluation for a presumptive remedy can and will lead to impracticably broad mandates for active cleanup – for instance, under the proposed rule language, for a 1,000 acre site an active remedy may have to be implemented on more than 500 acres, regardless of how great or small the exceedances of cleanup levels might be. Because the proposed language is both ignores real-world nature of sediment cleanups and partially discards the MTCA process by mandating an active cleanup in advance of compiling and evaluating all available options and data, we believe this portion of the proposed amendments is fatally flawed. The inadvisable presumptive approach to require "active cleanup" will only further stymie cleanup progress. Thus, the entirety of WAC 173-204-200(1) needs to be deleted. Similar edits need to be made to related parts of the SMS rule.
073	clxxviii	2957 - 2962	Refer to comments regarding pages 17 and 36. The entirety of sub-section (b) needs to be deleted.

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
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074	clxxxi to clxxxvii	3007 to 3136	Refer to comment regarding page 17. The entirety of WAC 173-204-590 Sediment recovery zones needs to be deleted.

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

Name of Commenter:	Gary Chandler, Association of Washington Business 1414 Cherry Street SE, Olympia, WA 98501
Version of Document Reviewed:	**x** Review Version (Reader Friendly) _ Official Version
Date:	October 29, 2012

	Page Number	Line Number	Comment
	General	--------------	The Association of Washington Business (AWB) is Washington's oldest and largest statewide business association, and includes more than 8,000 members representing 700,000 employees. AWB serves as both the state's chamber of commerce and the manufacturing and technology association. Several AWB members have worked with the Department of Ecology (Ecology) on its proposed Sediment Management Standards (SMS) amendments and related guidance documents. AWB would like to acknowledge the time and effort of Ecology staff in working with knowledgeable professionals and stakeholders to bring forth the proposed SMS rule amendments. AWB members have been following the development of the SMS rule revisions for a number of years. While the current draft SMS rule demonstrates Ecology's commitment to address many of the technical and policy concerns in the existing SMS rule, there are still opportunities for improvement. AWB has solicited feedback on the draft SMS rule from its members. The following comments do not necessarily represent the viewpoint of our entire membership, but are offered to help Ecology in making further revisions prior to final adoption. In places where there are conflicting comments, both have been included for consideration by Ecology. Thank you for your consideration.
075	General	--------------	AWB supports Ecology's decision not to add a default fish consumption rate to the SMS rule.
076	General	--------------	Maintaining site-specific flexibility to establish sediment cleanup levels with a range using the existing two-tiered framework and to identify and implement site-specific remedies that are protective and practicable is critical to achieving successful sediment cleanups.
077	General	--------------	A predisposition on dredging can increase the risk to affected populations (e.g., subsistence fisherman) contrary to environmental justice considerations. In some cases, removal of sediments causes a greater health risk than leaving in place or capping or partial removal and capping.
078	17	65-69	Some of our members have expressed concerns over the requirement to establish sediment recovery zones at sites and cleanup units where cleanup levels cannot be met within ten years of the start of the cleanup. They report that this requirement is highly problematic. AWB's understanding is that members of the Sediment Cleanup Advisory Committee made it clear to Ecology that including the sediment recovery zone standards of WAC 173-204-590 in the SMS rule revisions would present challenges to cleanup, as this element of the current SMS regulations has proved unworkable in the real world due to technical impracticability. Given that the highly conservative background or practical quantitation limit (PQL)-based sediment cleanup levels for bioaccumulative chemicals such as PCBs, PAHs, and dioxins/furans are anticipated to be exceeded at nearly every sediment cleanup site (in part because of uncontrollable, diffuse non-point source inputs of these regional contaminants), this requirement should deleted. Other members support maintaining the provision for sediment recovery zones for areas where it is not practicable to achieve sediment cleanup standards within a ten-year restoration time frame; however, the time frame should begin at the <u>completion</u> of active cleanup actions rather than at the start of such actions. (See Comment on Page 36 below).
079	26	223-227	The proposed language of WAC 173-204-200(1) is problematic because it establishes "active" cleanup as the presumptive remedy at all sites. AWB's understanding is that the Sediment Cleanup Advisory Committee addressed this issue and had a consensus view, consistent with EPA's current sediment guidance, that there is no presumptive sediment remedy. The proposed amendment inappropriately codifies a presumptive remedy and incorporates a bias

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			against natural recovery or other approaches. Given the differing sediment cleanup situations in Washington, the sediment cleanup remedy should always be the product of careful site-specific evaluations. Thus, the entirety of WAC 173-204-200(1) should be deleted. Similar edits need to be made to related parts of the SMS rule.
080	29	283-285	The definition of "contaminant" needs to be expanded to recognize that the bioavailability of sediment contaminants may vary significantly both within and between sites based on site-specific geochemistry and other factors. Subsection (15) and other related sections and subsections should be revised to clarify that site-specific bioavailability considerations should be incorporated into the development of site-specific cleanup levels using approaches developed by the Interstate Technology & Regulatory Council (ITRC) and discussed in other relevant agency guidance documents. Note the ITRC's February 2011 Technical/Regulatory Guidance (which Ecology helped co-author): "<u>Incorporating Bioavailability Considerations into the Evaluation of Contaminated Sediment Sites</u>" states: *"Overall, this guidance establishes that bioavailability considerations should be incorporated in the exposure assessment process to obtain a clearer understanding of contaminant toxicity and exposure pathways such that remedy selection decisions can be focused and resources efficiently used. By incorporating bioavailability considerations into the early stages of site characterization, the risk assessment process, and remedy selection, a more effective remediation may be accomplished, which may well optimize overall cost. This web-based technical and regulatory guidance can help the user understand the proper application of these tools to assess bioavailability and more effectively protect human health and the environment."*
081	31	330-340	The definition of "natural background" should be modified to include PAHs and dioxins in the examples of persistent organic compounds that can be found in suficial soils and sediment throughout much of the state due to global distribution of these hazardous substances.
082	34	389-393	While the general definition of "regional background" in subsection (38) is workable with revisions (see below), the utility of this approach will be entirely dependent on how regional background is ultimately calculated, which presumably will be described in detail in the Sediment Cleanup User Manual. AWB understands that Ecology is developing a pilot study to examine this issue in greater detail, but we have significant concerns that the regional background calculation approaches that Ecology is currently considering are too stringent to be practical. Previous case study applications using approaches similar to what Ecology is now considering do not allow sufficient differentiation between existing or prospective SMS site units and bay-wide contamination problems. This creates gridlock in the processing of the current backlog of sediment sites. Regional background should include contaminants contributed to the region from multiple urban stormwater sources, in order to distinguish those pollution problems from more discrete sediment sites that can be linked to a more specific, and likely historic, past practice. Regional background problems could then be addressed under the appropriate regulatory tool (e.g. Phase II municipal permits) and not site-specific MTCA/SMS enforcement. Finally, calculation of regional background should allow for inclusion of certain contaminants if they are due to the influence of multiple urban sources. The concept of regional background should be specifically used to determine discrete SMS sites or site units.
083	36	435-442	The proposed revisions significantly and unrealistically shorten the maximum restoration time frame for a cleanup. Informed by the Sediment Cleanup Advisory Committee members' collective experience with how long many cleanup projects take to implement, the Committee considered and rejected the option of changing the rules from the current requirement that cleanup standards must be met within ten years following completion of cleanup, to requiring that cleanup standard must be met within ten years of *initiating* cleanup. The August 2012 proposal ignores the Committee's

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			recommendation. Thus, the next to last sentence of subsection (46) needs to be revised to read: "within ten years after the completion of the cleanup action." The last sentence of this subsection referring to sediment recovery zones should be deleted (consistent with the Comment on Page 17 above).
084	xcv-xcvi	1500-1507	The sentence stating that sediments with limited contamination will be restored within a single construction season using active cleanup actions is unrealistic and should be deleted. The restoration time frame should be expected to be as short as practicable using a remedy selected through the remedy selection process in WAC 173-204-570.
085	xcvi	1508-1511	See Comment on Page 17 above. This subsection (d) should either be deleted or, at a minimum, revised to read: "within ten years after the completion of the cleanup action."
086	cxxxi-cxxxii	2190-2208	The current proposed language does not adequately provide for adjustment of the cleanup level to regional background. Further, the concept of "technically possible" is highly problematic because it specifically excludes any consideration of cost. Without an ability to consider cost, there could be cleanup scenarios where it is "technically possible" to achieve the sediment cleanup level, but the remedy would not be cost-effective. This language should be modified to allow factors such as cost, net environmental effects, and technical feasibility.
087	clxvii	2761-2768	The table headers states that reference sediments can be used to substitute for control sediments in comparing test sediments to criteria listed therein. The table fails to present this comparison and only presents a comparison to controls. The table should illustrate both applicable comparisons to ensure that when brought into practice, practioners do not simply assume that all comparisons are to be based on the controls. Controls are designed to ensure that the test is run correctly and not necessary to make comparisons against site (test) sediments. The preference would be to use reference sediments. Selection criterion for reference sediments should be consistent with EPA guidance, which means the following: upgradient in the same watershed as the study site; comparable physical setting as the study site; similar water depth and flow as the study site; similar sediment grain size distribution, sediment TOC content, and water quality as the study site; and relatively uncontaminated or minimally impaired. The table seems to imply that the selection criteria for reference sediments are based on actual bioassay test results, which is inappropriate and ignores the above selection guidance.
088	clxxv	2899-2900	The time frame for achieving compliance with sediment cleanup standards should be ten years from the completion of active cleanup actions, consistent with the current rule, rather than from the start of cleanup. The same change should be made throughout the proposed amendments.
089	clxxv	2906-2908	Evaluation of whether a remedy is permanent to the maximum extent practicable is addressed in WAC 173-204-570(4). That analysis should not be undermined by Ecology in other portions of the rule. The first sentence in subsection (h) should be deleted. It is unnecessary and is inconsistent with the disproportionate cost analysis.
090	clxxviii	2957 - 2962	Consistent with Comments on Page 17 and 36, this subsection (b) should be deleted. In the alternative, the time frame for achieving compliance with sediment cleanup standards should be ten years from the completion of active cleanup actions (consistent with the current rule) rather than from the start of cleanup. The same change should be made throughout the proposed amendments.

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
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Date:		October 29, 2012
Page Number	**Line Number**	**Comment**
clxxxi-clxxxvii	3007-3136	See Comment on Page 17. This section should be deleted.

091

The Boeing Company
P.O. Box 3707
Seattle, WA 98124-2207

October 26, 2012

BY EMAIL

Ms. Adrienne Dorrah
Washington Department of Ecology
Toxics Cleanup Program
P.O. Box 47600
Olympia, WA 98504-7600

Subject: Proposed Amendments to Chapter 173-204 WAC, Sediment Management Standards (SMS)

Dear Ms. Dorrah:

The Boeing Company (Boeing) appreciates the opportunity to submit comments on the Washington State Department of Ecology's (Ecology's) *Draft Sediment Management Standards (SMS) Rule Proposed Amendments*, dated August 15, 2012 (Ecology 2012b). Boeing recognizes the substantial work performed by the Agency in preparing and proposing draft rule language, and we value the opportunity to review and comment on this work.

Boeing is committed to working with Ecology and other stakeholders to ensure that meaningful progress is made in developing an effective, efficient, and sustainable means for achieving a cleaner environment and improved levels of human and environmental health.

092 Boeing appreciates the addition of many of the important concepts in the SMS rule amendments, as discussed in the public venues over the past few years. In particular, Boeing supports the inclusion of sediment cleanup units, the two-tier framework, sediment recovery zones, and site-specific human health and higher-trophic-level assessments.

093 However, there are a number of important changes that need to be made to the rule language prior to finalization. It is imperative that cost, feasibility, and net environmental benefits be included in the derivation of sediment cleanup standards. This is critical information that must be available to stakeholders and decision-makers.
094 The sediment cleanup unit process must include settlement provisions to provide
certainty and /delete the hierarchy of remedial technologies to allow for site specific
095 flexibility./In addition, it is essential that the document be amended to state that the
096 definition of "sediment" excludes sediment in engineered storm water systems.

Comments

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097 **1. The inclusion of the sediment cleanup unit concept is vitally important to expedite sediment cleanups (Washington Administrative Code [WAC] 173-204-500).**

Boeing strongly supports the inclusion of the sediment cleanup unit concept because it allows individual parties to move forward with remediation of a given area prior to the resolution of all concerns in a larger harbor, waterway, or bay, which can take decades to resolve. This concept will result in better and faster cleanups, consistent with Ecology's preferred toxics reduction strategy:

> …we are seeing that some regulations can lead to requiring high-cost/low-value measures that serve little purpose while carrying great expense….it is time to ask whether we can devise new approaches in Washington State that create a win-win-win for our environment, public health and our economy, by achieving better, faster reductions in toxic pollution while avoiding those high-cost/low-value scenarios.

(Sturdevant 2012). /While we strongly support the sediment cleanup unit concept, we have the following concerns and requested changes:

098

- As part of the promulgation of the proposed amendments, it is imperative that a case study be done in conjunction with the revision of the draft guidance document (Ecology 2012a) in order to work out the important details regarding how this concept will be implemented. Without further guidance, initial participants in this process will be overly burdened with proof of concept, including the establishment of sediment unit boundaries, regional background, and allocation should recontamination occur. What level of proof will be required for a party to "demonstrate, upon department approval, that the recontamination is caused by a source or a permitted release not under the authority or responsibility of the person(s) conducting the initial cleanup?" What re-opener protection would be provided? Can Ecology require actions of others to prevent recontamination in order to protect initial participants in the process? To address these uncertainties, it is essential that a small task force be formed to conduct a thorough case study, which would then be available for review and comment. While Ecology has recognized the importance of case studies as part of the process to date, a case study that incorporates all of the critical components of process implementation has not been conducted.

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- Ecology's summary of WAC 173-204-500 states that the section would address partial/final settlements and the process for settling cleanup liability, but settlements are not clearly addressed in the section. In order to accomplish Ecology's intended purpose, WAC 173-204-500 must clearly state that potentially liable persons (PLPs) who conduct remedial actions to address their contribution to contamination in a sediment cleanup unit are provided with the covenant not to sue and contribution protection authorized by the Model Toxics Control Act (MTCA). Boeing requests that the following language be added to WAC 173-204-500 (lines 1488-1490): "Ecology will apply the sediment cleanup unit concept in concert with Chapter 70.105D RCW so that PLPs who conduct remedial action in sediment cleanup units shall obtain the covenant not to sue and contribution protection provided for in RCW 70.105D.040."

100 **2. The two-tiered concept is a significant improvement but only if it represents a true tiering process for sediment cleanup levels (WAC 173-204-560 and -561).**

Boeing supports incorporation of the two-tiered concept to establish a tiering process for sediment cleanup levels. This tiering process is needed because previous sediment cleanup levels involving excess cancer risk thresholds of $1x10^{-6}$ for individual carcinogens and $1x10^{-5}$ for multiple carcinogens and natural background were unworkable in many environments, especially near urban environments where the goals may never be reached. If appropriately applied, the tiering process should result in better and faster reductions in toxic pollution.

101 However, for the two-tiered concept to be effective:

- Regional background concentrations must be greater than natural background concentrations near urban areas with diffuse sources; and
- The upper tier must include a $1x10^{-4}$ excess cancer risk threshold for sites with multiple carcinogens.

In the proposed amendments, regional background is defined as "the concentration of a contaminant within a department-defined geographic area that is primarily attributable to atmospheric deposition or diffuse non-point sources not attributable to any source." (WAC 173-204-560). The trick is defining the influence of a "diffuse non-point source," such that recontamination will not occur following costly sediment remediation. The following requested revisions to the definition of regional background are essential to clarify the intent:

- WAC 173-204-200(38) (lines 389-393) "Regional background" means the concentration of a contaminant within a department-defined geographic area that is primarily attributable to diffuse ~~nonpoint~~ sources, such as atmospheric deposition or storm water, ~~not attributable to a specific source or release~~<u>outside a depositional zone of discharge</u>. Regional background is generally expected to be greater than or equal to natural background, and less than area background as that term is defined in WAC 173-340-200.
- WAC 173-204-560(5) (lines 2275-2279) **Regional background.** Regional background is the concentration of a contaminant within a department-defined geographic area that is primarily attributable to <u>diffuse sources, such as</u> atmospheric deposition or <u>storm water, outside a depositional zone of discharge</u>~~ diffuse nonpoint sources not attributable to any source~~. Regional background for a contaminant shall be established by the department in accordance with the requirements of this subsection.

101 cont. Boeing recognizes the challenges in defining regional background in areas with large storm water inputs and encourages Ecology to provide additional case studies using real data. The single Ecology example provided to-date did not prevail when calculating a regional background concentration greater than natural background.

> Surface sediments in this Bellingham Bay background data set contain an average total PCDD/F concentration (1.62 ng/Kg TEQ) that is not statistically different from the average concentration found in a 97 station data set (BOLD+) that represents nonurban areas of greater Puget Sound (1.56 ng/Kg TEQ).

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(Ecology 2011b). Furthermore, in Port Angeles, Ecology calculated a preliminary natural background that was lower than the natural background calculated from the Bold survey data. These examples are the "high-cost/low-value" scenarios that Ecology has expressly stated it wants to avoid.

Without the ability to calculate a regional background concentration high enough to address "the urban cloud" (i.e., the concentration likely to result from urban sources not addressed through a specific site cleanup and its associated source control actions), this limitation in concept will derail the two-tiered structure that is needed to move cleanup actions forward. Specifically, by allowing upper-tier cleanup levels to be set below urban background values, which are due to regional/area sources, non-compliance is virtually guaranteed within a few years due to recontamination of the clean surface. This result will discourage cleanups, and risk reduction will not occur.

It will also be critical for regional background to be applied on a spatial basis consistent with its intended purpose. Specifically, regional background should be applied on a spatially weighted average concentration (SWAC) basis if the intent is human health, fish, or wildlife protection. These species have wider exposure areas than do single sediment sampling locations. In addition, it is important to ensure that regional background datasets encompass a range of sediment types and are not biased toward very low organic content or sandier sediment; sediment types should be reflective of the area in question.

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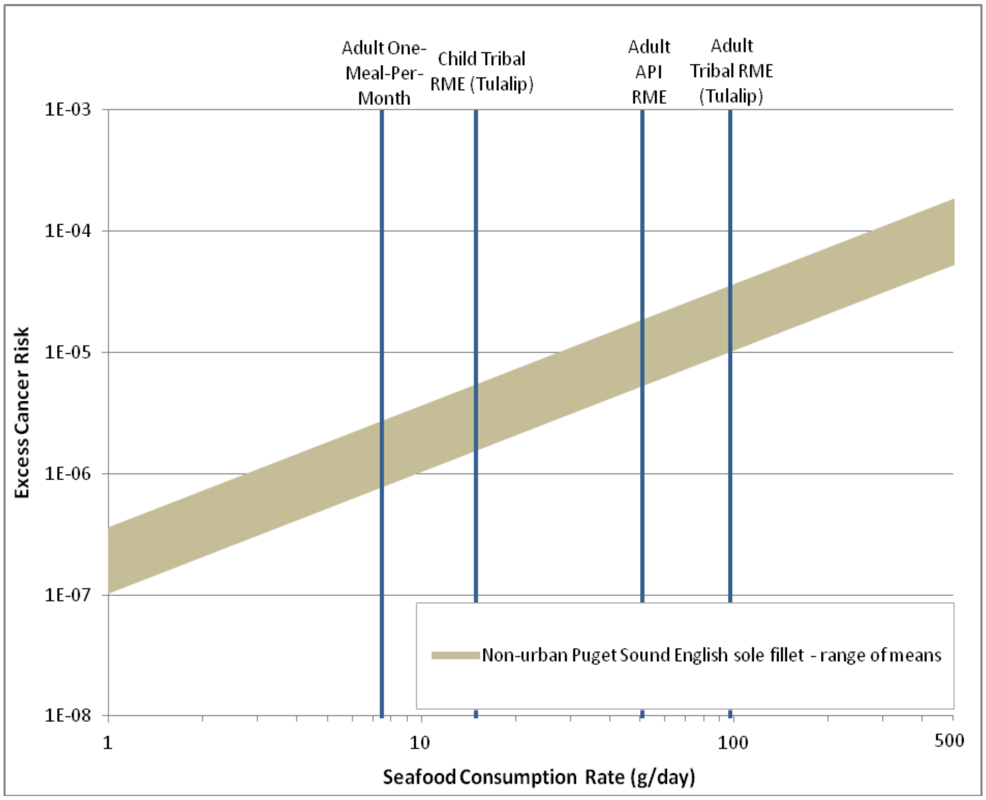
102 With respect to the risk thresholds, while the tier from $1x10^{-6}$ to $1x10^{-5}$ for individual carcinogens is helpful, little progress will be made without also tiering the threshold of $1x10^{-5}$ for multiple carcinogens. The upper tier for multiple hazardous substances and/or multiple exposure pathways should be 1×10^{-4}. In addition, Ecology should consider a risk threshold tiering from 1 to 2 in the non-cancer hazard quotient for urban sites.

A $1x10^{-4}$ upper-end risk threshold is consistent with the risk range in **Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA), and would facilitate the management of sites that fall under both MTCA and CERCLA authority. CERCLA has an acceptable excess cancer risk range of $1x10^{-6}$ to $1x10^{-4}$ for all sites (upland and sediment) (40 Code of Federal Regulations [CFR] 300). Specifically, MTCA requires that cleanup levels must be at least as stringent as requirements in other applicable state and federal laws and regulations; this proposal would be consistent with that requirement. Also, the risk range would provide more case-by-case

102 cont. flexibility for Ecology, which would allow cleanups to move forward more quickly because short-term goals could be established and actually met.

Target excess cancer risks typically range from $1x10^{-6}$ to $1x10^{-4}$ in various regulatory programs. Although the low end of that range is most health protective, this target is not achievable for some chemicals, particularly bioaccumulative chemicals, such as polychlorinated biphenyls (PCBs) and dioxins/furans, in most areas in Puget Sound. Given the ubiquitous nature of some of these chemicals in the environment, coupled with the range of seafood consumption rates that are being considered, even background cancer risk estimates are typically in the $1x10^{-5}$ range for individual chemicals (Figure 1), with cumulative risks often in the $1x10^{-4}$ range when multiple chemicals are considered.



Source: Adapted from Windward (2010)

Figure 1. Excess cancer risks calculated using total PCB concentrations in English sole fillet composite samples collected and from non- urban Puget Sound locations as a function of seafood consumption rate

Thus, without a true tiering in risk thresholds, the two-tier concept becomes only a tiering in background levels because the risk thresholds for carcinogens will likely not be achievable at the fish consumption rates being considered. To address this concern, Boeing requests that the text in WAC 173-204-561(3) (lines 2340-2345) be revised as follows:

> (ii) Carcinogens. For known or suspected carcinogens, sediment concentrations for which the upper bound on the estimated lifetime excess cancer risk for individual carcinogens is less than or equal to one in one hundred thousand ($1x10^{-5}$). If there are multiple carcinogens and/or

102 cont. exposure pathways at the site and the total lifetime excess cancer risk for the site exceeds one in ~~one hundred~~ten thousand ($1\text{x}10^{-\cancel{5}\underline{4}}$), then the cleanup screening levels shall be adjusted downward ~~in accordance with WAC 173-340-708 or other~~ using methods approved by the department."

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103 **3. Cleanup standard criteria should continue to be based on cost, technical feasibility, and net environmental benefit rather than technical possibility and adverse environmental impact (WAC 173-204-500 and -560).**

Cost, technical feasibility, and net environmental benefit must be meaningfully included in the remedy selection process. It is essential that Ecology use the phrase "to the extent practicable" instead of "technically possible" to allow for consideration of these concepts. Without cost and feasibility as key criteria, Ecology's goal to avoid "high-cost/low-value" scenarios will not be met. Actions will be brought forth that are extravagant and not plausibly achievable, establishing requirements and raising expectations that cannot be met.

WAC 173-204-500(4) currently states: "…the department will pursue sediment cleanup decisions and cleanup standards that are as close as practicable to the sediment quality standards of WAC 173-204-320 through 173-204-340, *including the consideration of net environmental effects, cost and technical feasibility*"(emphasis added). In contrast, The language in proposed WAC 173-204-500(5)(a)(i) states: "The sediment cleanup level shall be the sediment cleanup objective and shall be adjusted upward as required based on what is *technically possible* and whether meeting the sediment cleanup objective will have an *adverse impact* on the aquatic environment, including natural resources and habitat." (Emphasis Added).

The summary on page 9 of the proposed amendments (Ecology 2012b) states that in WAC 173-204-570 "the MTCA 'disproportionate cost' and SMS 'cost effectiveness' terms and concepts have been integrated," presumably to partially address this concern. However, the text in this section does not support that statement. Concepts involving cost, practicability, and disproportionate costs are not specifically cited in the proposed amendments, except to state the preference for permanent solutions to the maximum extent practicable with reference to a remedial hierarchy that favors dredging (see comments below). These established concepts should be retained.

Accordingly, we request that Ecology revise WAC 173-204-500(5)(a)(i) (lines 1540 – 1543) to read:

The sediment cleanup level shall be the sediment cleanup objective and shall be adjusted upward as required to the extent practicable based on ~~what is technically possible and whether meeting the sediment cleanup objective will have an adverse impact on the aquatic environment, including~~ cost, feasibility, and net environmental benefit to natural resources and habitat.

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104 **4. The rule should not include a remedial hierarchy (WAC 173-204-570).**

In proposed amendments to WAC 173-204-570(4), Ecology put forth a "guide" to assess the relative degree of long-term effectiveness of cleanup action alternatives. This guide is meant to serve as a replacement for the previous upland guide in WAC 173-

104 cont. 340-360. It is imperative that Ecology not prioritize remedies as part of the rule. Given the changing landscape of remediation technologies and the ability of predictive analyses to assess the potential for both short- and long-term impacts from subsurface contamination, the hierarchy of remedial technology should be deleted from the rule entirely.

Deleting the hierarchy is consistent with the US Environmental Protection Agency's (EPA's) *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (EPA 2005), which states:

> EPA's policy has been and continues to be that there is no presumptive remedy for any contaminated sediment site, regardless of the contaminant or level of risk…. project managers should evaluate each of the three potential remedy approaches (i.e., MNR, *in situ* capping, and removal through dredging or excavation) at every sediment site. Project managers should develop a conceptual site model that considers key site uncertainties. Such a model can be used within an adaptive management approach to control sources and to implement a cost-effective remedy that will achieve long-term protection while minimizing short-term impacts.

The EPA guidance also notes:

> Project managers should keep in mind that deeper contaminated sediment that is not currently bioavailable or bioaccessible, and that analyses have shown to be stable to a reasonable degree, do not necessarily contribute to site risks. In evaluating whether to leave buried contaminated sediment in place, project managers should include an analysis of several factors, including the depth to which significant populations of organisms burrow, the potential for erosion due to natural or anthropogenic (man-made) forces, the potential for contaminant movement via ground water, and the effectiveness of any institutional controls (ICs) to limit sediment disturbance.

As stated by EPA (2002, 2005), there is no presumptive remedy for sediment sites and all remedies that can meet remedial action objectives should be considered. In addition, EPA recognizes that combinations of remedial actions are likely to be the most effective way to manage site risk; in fact, dredging alone may not meet risk reduction goals depending on the site-specific conditions (e.g., location of in-water structures, uncertainty in the delineation of subsurface contamination, ability to overdredge, and presence of debris). (EPA 2005; NRC 2007). The overemphasis on dredging as a preferred remedy (included in five of the top eight remedies) is not in keeping with national guidance on sediment remediation nor does it make sense in terms of risk management.

An analysis of pre-dredging and post-dredging contaminant concentrations in surface sediments was performed using data from 26 sites by a consortium of scientists and engineers for the National Research Council (NRC). The analysis noted a wide range of outcomes: some sites showed increases in contaminant concentrations, some showed no change, and some showed decreases in contaminant concentrations. (NRC 2007). While dredging may be appropriate to remove contaminated sediments at sites where

104 cont.

navigational channels need to be maintained or where buried contaminated sediment deposits are likely to be subjected to erosion and transport, dredging should not be the *de facto* choice. Instead, site-specific characteristics must be carefully evaluated, including factors such as the substrate (residual contamination is likely to be greater in the presence of cobbles, boulders, or buried debris), the hydrodynamic environment, and the location of contamination relative to slopes and bedrock. (EPA 2005; NRC 2007).

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In addition, although not addressed in the proposed amendments, financial assurance requirements for containment options have in the past been set at such high levels that implementation of these technologies is precluded. These requirements result in a biased outcome; alternative financial assurance options need to be explored to ensure that all suitable remedies, including containment options, can be considered.

If Ecology believes that some guidance regarding long-term effectiveness is needed, then key considerations for assessing the long-term effectiveness of active sediment remedial technologies, such as dredging, containment, and enhanced natural recovery, is more appropriate. This level of guidance would emphasize the importance of site-specific evaluation rather than present a de facto list with dredging as the preferred remedy.

It is critical that the following revisions to WAC 173-204-570(4) (lines 2920-2938) be made:

> (4) **Using permanent solutions to the maximum extent practicable.** This subsection describes the requirements for determining whether a cleanup action consists of permanent solutions to the maximum extent practicable, as required under subsection (3)(d) of this section. When making this determination, the process and criteria in WAC 173-340-360 shall be used. However, when assessing the relative degree of long-term effectiveness of cleanup action alternatives, the following considerations, among others as determined by the department, shall be evaluated on a site-specific basis ~~hierarchy, in descending order, shall be used as a guide~~ in place of the hierarchy in WAC 173-340-360:
>
> ~~(a) Source controls in combination with other cleanup technologies;~~
>
> ~~(b) Dredging and beneficial reuse of the sediments;~~
>
> ~~(c) Dredging and treatment to immobilize, destroy, or detoxify contaminants;~~
>
> ~~(d) In-situ treatment to immobilize, destroy, or detoxify contaminants;~~
>
> ~~(e) Dredging and disposal in an upland engineered facility that minimizes subsequent releases and exposures to contaminants;~~
>
> ~~(f) Dredging and disposal in a nearshore, in-water, confined aquatic disposal facility;~~

104 cont.

~~(g) Containment of contaminated sediments in-place with an engineered cap;~~

~~(h) Dredging and disposal at an open water disposal site approved by the department;~~

~~(i) Enhanced natural recovery;~~

~~(j) Monitored natural recovery; and~~

~~(k) Institutional controls and monitoring.~~

(a) the hydrodynamic environment

(b) the depth of contamination

(c) the magnitude of contamination

(d) the substrate (residual contamination is likely to be greater in the presence of cobbles, boulders, or buried debris)

(e) the location of contamination relative to slopes and bedrock

(f) the location of in-water structures

(g) the potential for subsurface contamination to be exposed through disturbance, including bioturbation

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5. Limitations on monitored natural recovery must be removed to allow the flexibility to account for net environmental benefit (WAC 173-204-570).

Depending on site conditions, specific contaminants and contaminant concentrations, MNR may be an effective and permanent action, at least for portions of sediment sites. MNR should not be over-generalized as being a less "permanent" action. As written, proposed amendments to WAC 173-204-570(3)(h) suggest that monitored natural recovery (MNR) would not be allowed if it is technically possible to implement a more permanent solution, even for situations where environmental damage to habitat, particularly those that support threatened or endangered species, would be needed to secure a permanent solution. The proposed rule could be interpreted as never allowing MNR. More flexibility is needed to allow for decisions that address net environmental benefits and conform the rule to Ecology's goal to avoid "high-cost/low-value" scenarios.

The following revision is requested to WAC 173-204-570(3)(h) (lines 2906-2910):

> (h) Cleanup actions shall not rely primarily on ~~monitored natural recovery or~~ institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action. Where institutional controls are used, they must comply with WAC 173-340-440 and preference shall be given to the types of institutional controls with a demonstrated ability to control exposures and ensure the integrity of the cleanup action.

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106 **6. The restoration timeframe should begin at the completion of cleanup actions and should not require single season construction for sites with "limited contamination" (WAC 173-204-500).**

The proposed amendments state that "…the department recognizes longer restoration time frames may be necessary at sites with more extensive and widespread contamination, including sites with ubiquitous chemicals from point and nonpoint source discharges. At such sites, the department expects cleanup actions will include a combination of active and passive cleanup actions and will achieve restoration as soon as practicable following completion of the active cleanup actions." WAC 173-204-500(4)(c). Boeing agrees with this statement's acknowledgement of the disturbance associated with active remedies and the need for the restoration timeframe to commence following construction.

This concept of initiating the restoration timeframe following construction should be consistently applied throughout the rule. Boeing requests the following revisions:

- WAC 173-204-570(3)(e) (lines 2897-2900): Unless otherwise determined by the department, cleanup actions that achieve compliance with the sediment cleanup standards at a site or sediment cleanup unit within ten years from the ~~start~~ completion of the active cleanup action shall be presumed to have a reasonable restoration time frame.

- WAC 173-204-570(5)(b) (lines 2957-2962): **Time frames longer than ten years.** The department must authorize any restoration time frame longer than ten years after the ~~start~~ completion of the active cleanup action. To be authorized, the proponent must demonstrate that cleanup actions cannot practicably achieve sediment cleanup standards at the site or sediment cleanup unit within ten years ~~after the start~~ from the completion of the active cleanup action.

- WAC 173-204-590(1) (lines 3015-3018): Sediment recovery zones are necessary at sites and sediment cleanup units where the department has determined the selected cleanup actions cannot practicably achieve sediment cleanup standards within a ten year restoration time frame from the ~~start~~ completion of the active cleanup action.

- WAC 173-204-590(2)(b) (lines 3028-3031): The areal extent of the sediment recovery zone shall extend beyond the area within the site or sediment cleanup unit where the department has determined the cleanup action cannot practicably achieve sediment cleanup standards within a ten year restoration time frame from the ~~start~~ completion of the active cleanup action.

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107 In addition, the rule should allow for more than one construction season even for areas of limited contamination. There are a number of reasons why areas of limited contamination could take more than one construction season. Examples include limitations of in-water work periods, sequencing of overall site cleanup, coordination with iterative source control actions, control of site-specific sources, and location relative to hotspots. Furthermore, active remedies should not be

107 cont. assumed. The appropriate remedy and duration at all sites should depend upon an assessment of site-specific conditions.

Boeing therefore requests that WAC 173-204-500(4)(c) (lines 1500-1502) be revised as follows:

> Restoration time frame. ~~The department expects that the sediment component of sites and sediment cleanup units with limited contamination will be restored within a single construction season using active cleanup actions such as dredging or capping. However, the~~ The department recognizes longer….

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108 **7. The derivation of human health cleanup criteria should remain flexible and site specific (WAC-173-204-561).**

Boeing agrees with the decision to retain site-specific flexibility in deriving sediment cleanup levels based on protection of human health by:

- Not including a default fish consumption rate (FCR) in the Washington State SMS rule;
- Including consideration of the percent of seafood diet from the general vicinity of the site;
- Including consideration of the size of the site relative to the fish and shellfish home range; and
- Including relevant studies and best available science related to FCRs.

This policy is consistent with Ecology's goal of achieving better, faster reductions in toxics for the protection of human health by allowing key considerations based on sound science to be addressed on a site-specific basis.

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109 In line with these concepts, it is essential that WAC 173-204-561 (lines 2350–2351) specifically state that salmon consumption is not included in FCR in the default reasonable maximum exposure (RME) scenario. Under most circumstances, site-specific cleanups will not significantly affect body burdens of bioaccumulative compounds in salmon and risks will not be further reduced. Contrary to Ecology's stated goal, including salmon consumption in the FCR will result in a "high-cost/low-value" scenario. Instead, as allowed by the proposed amendments, salmon consumption could be added to a site-specific RME if sufficient information is available to support its inclusion on a case-by-case basis.

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110 **8. NPDES process should be kept separate from MTCA/SMS (WAC-173-204-400 and Lines 28 to 34).**

Regulations contained in WAC-173-204-400 that involve sediment source control may have the unintended consequence of imposing a number of SMS-related requirements in National Pollutant Discharge Elimination System (NPDES) permits, including the possibility of SMS-driven effluent limits. WAC-173-204-400 sets up a process that

110 cont. could focus on a particular NPDES permittee without uniform consideration and application of source controls throughout a cleanup site or regional source issue. Therefore, SMS monitoring should be conducted only as part of an Order implemented outside NPDES permits and applied uniformly to all appropriate parties materially discharging to a cleanup site.

If monitoring requirements were added to NPDES permits, implementing new source control requirements could present a significant administrative and technical burden. Individual and general NPDES permit would require a major permit modification, with a public review period, subject to appeal. This process could be lengthy, uncertain, and cumbersome and could promote inefficient and uneven application of source control regulations and liability. Already, several recently renewed individual NPDES permits in the Lower Duwamish Waterway include SMS-related monitoring provisions for the CERCLA/MTCA site. Yet adjacent facilities subject to general NPDES permits (i.e., the industrial storm water general permit (ISGP) (Ecology 2009) and the sand and gravel general permit (Ecology 2011c)) are not required to implement similar actions. Instead, SMS regulations should be implemented evenly and concurrently as part of an Order rather than through NPDES permits.

For these reasons, Boeing requests the following change to WAC 173-204-400(6) (lines 764-774):

> (6) In establishing the need for, and the appropriate, individual permit monitoring conditions, the department shall consider multiple factors relating to the potential for a discharge to cause a violation of the applicable sediment quality standards of WAC 173-204-320 through 173-204-340 including but not limited to:
>
> (a) Discharge particulate characteristics;
>
> (b) Discharge contaminant concentrations, flow, and loading rate;
>
> (c) Existing monitoring conditions, established limits, contaminant concentrations, flow and loading rates associated with adjacent or nearby discharges to ensure consistency.
>
> (~~c~~d) Sediment chemical concentration and biological effects levels;
>
> (~~d~~e) Receiving water characteristics;
>
> (~~e~~f) The geomorphology of sediments;
>
> (~~f~~g) Cost mitigating factors such as the available resources of the discharger; and
>
> (~~g~~h) Other factors determined necessary by the department.

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111 In addition, the following changes are requested to WAC 173-204-400(2) (lines 744-752) to make the language consistent with the language in 400(1)(c).

111 cont.

> (2) Permits and other authorizations of wastewater, storm water, and nonpoint source discharges to surface waters of the state of Washington under authority of Chapter 90.48 RCW shall be conditioned so that the discharge receives all known, available and reasonable methods of prevention, control, and treatment, and/<u>or</u> best management practices prior to discharge, as required by Chapters 90.48, 90.52, and 90.54 RCW. The department shall provide consistent guidance on the collection, analysis, and evaluation of wastewater, receiving-water, and sediment samples to meet the intent of this section using consideration of pertinent sections of the *Department of Ecology Permit Writers' Manual,* as amended, and other guidance approved by the department.

The existing storm water permit BMP process, including Ecology's associated guidance and sector-specific BMP requirements, is an accepted process for achieving sufficient treatment based on need. AKART should not be automatically applied to any and all discharges regardless of their specific nature.

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112 **9. Where appropriate, sediment impact zones (SIZ) should be used, as intended in the current rule (WAC 173-204-410)**

One tool included in the current rule as well as the proposed amendments is the sediment impact zone (SIZ). These zones are authorized "where the applicable sediment quality standards of WAC 173-204-320 through 173-204-340 are exceeded due to ongoing permitted or otherwise authorized wastewater, storm water, or non-point source discharges and authorized by the department within a federal or state wastewater or storm water discharge permit, or other formal department authorization." Boeing supports this part of the rule because it avoids the "high-cost/low-value" scenarios Ecology has expressly stated. Boeing requests including a SIZ in a case study to highlight how the various tools should be used in concert with one another. For example, its use would be particularly well suited to address contaminants that are ubiquitous in urban storm water.

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113 **10. Proposed freshwater chemical and biological criteria have a number of technical issues that should be addressed prior to finalizing the rule (WAC 173-204-563).**

One of the major changes to the proposed SMS amendments is the addition of freshwater sediment criteria. Boeing agrees with Ecology that it is important to streamline and standardize the management of freshwater standards; however, Boeing has several concerns related to both the proposed chemical and biological criteria, as described below.

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114 ***Chemical Criteria***

Marine and freshwater chemical numeric criteria were developed using different statistical models and datasets that result in disparities (if not conflicts) in the management of freshwater versus marine sediment.

- The freshwater criteria were derived using the floating percentile model (FPM) and the marine criteria were derived based on apparent effects

114 cont. thresholds (AETs). The FPM provides useful screening values, but because the rate of false positives (predictions of toxicity when a sample is not toxic) tends to be high for individual chemicals, this method is less useful as a regulatory or cleanup decision tool. Application of these criteria is highly uncertain, and may result in heavy reliance on bioassays, counter to what appears to be the intent of this regulation. /It is essential

115 that the cost-benefit analysis more realistically assess the potential impact of using the FPM to derive freshwater criteria through the use of a case study example.

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- Bioassays may also be required at certain locations because seven of the freshwater chemicals in Table VII have undefined cleanup screening levels (CSLs) (i.e., lead selenium, zinc, di-n-octyl phthalate, monobutyltin, tetrabutyltin and pentachlorophenol). According to WAC 173-204-563(2)(m), detections above these undefined CSLs will require the use of bioassays to make decisions regarding compliance with SMS at sites that might otherwise have been managed based on chemical criteria alone. The implications are either greater site investigation costs or greater uncertainties in evaluating remedy effectiveness, both of which can be particularly burdensome at smaller, less complex sites. It is requested that CSLs for these chemicals be further investigated and established rather than be promulgated in this undefined manner.

117

- Additional issues of consistency between management of freshwater and marine sediments include normalization and decision thresholds. The marine criteria for non-polar organic compounds are carbon normalized, whereas the freshwater criteria for these compounds are not. This creates an inconsistency in how data are evaluated, particularly in estuarine environments. Both marine and freshwater standards should use the same organic carbon (OC) basis for normalization.

118

- Chemicals regulated in both freshwater and marine sediments are managed at different decision thresholds, creating the potential for recontamination or violation of the SMS in estuarine environments where both freshwater and marine sediments exist. As an example, if up to 3,200 mg/kg zinc is allowed in freshwater sediments, but only up to 450 mg/kg zinc is allowed in marine sediments, sediment transport processes alone may contribute to exceedances downstream in estuarine systems. Thus, additional guidance regarding how decisions would be made in estuarine systems is needed, perhaps through the use of a case study.

119

- Furthermore, defining freshwater versus marine environments is problematic and deserves additional guidance. Freshwater sediments are defined as sediments with pore water ≤ 0.5 parts per thousand (ppt) salinity (WAC-173-204-200(20), Line 302). However, the water quality standards (WQS) apply marine water quality criteria (WQC) where water column salinity is > 1 ppt (WAC-173-201A-260(3)). It is possible that overlying water could be subject to a marine WQS while sediments could be defined as freshwater, or vice versa. It is critical that the proposed

119 cont amendments clarify how temporal variability and water stratification in estuarine systems factor into this classification for sediments.

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120 Boeing requests the following chemical parameters be removed from Table VII or revised as indicated below:

- **Butyltins** should not be included in freshwater criteria. These chemicals are not typically detected or analyzed for in freshwater sediments. Furthermore, given the fact that these compounds are rarely analyzed in freshwater sediment, it is likely that the dataset used in the development of these criteria was limited relative to other analytes and therefore much more uncertain.

121
- **Sulfides and ammonia** should not be included in freshwater criteria. These chemicals tend to form as a function of sediment geochemical conditions (sediment oxygenation, pH, biodegradation, organic material, etc). While there can be toxicity associated with the presence of these chemicals, they typically do not have anthropogenic sources.

122
- **Total petroleum hydrocarbons (TPH)** should not be regulated in sediment as proposed. These mixtures can have wide ranging chemical makeup and toxicities due to weathering, source type and other factors. Therefore, it is requested that the TPH standard be removed from the freshwater standards. Effects from the toxic components of TPH are already addressed by the total PAH criterion.

123
- The **silver** sediment cleanup objective in Table VII should be changed from 0.57 mg/kg to 0.58 mg/kg because 0.58 mg/kg is the value reported in Ecology (2011a).

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124 ***Biological Criteria***

- The freshwater sediment cleanup objective (SCO) and CSL biological criteria (Table VIII) are based on test responses relative to control sediments, not reference sediments, due, in part, to the difficulties in identifying freshwater reference locations. This contrasts with the evaluation of marine sediments that require use of a reference sediment when determining compliance. Comparison to controls is problematic for several reasons. Control sediment is typically formulated by laboratories to provide the best outcome for control performance. OC content tends to be higher in control sediment, which may skew growth results higher in controls than in test sediments. Also, control sediments do not reflect the natural variability and heterogeneity in freshwater sediments. Consequently, biological criteria based on control samples may erroneously identify an adverse effect. Therefore, it is essential that Ecology identify reference sites for freshwater sediments. Absent a suitable reference sediment bioassay, Ecology should allow for more flexibility in decision making.

125
- Bioassays based on longer-term exposures, such as the 28-day amphipod test, do not necessarily equate to greater protection. These longer duration tests be listed as an option and not mandatory. Longer-term bioassays are

125 cont. also subject to a number of confounding factors. As an example, the presence of predatory oligochaetes in field-collected sediment can influence the growth results in the amphipod *Hyalella* tests. In addition, studies have found that longer duration tests may not be as reliable in predicting toxicity. Side-by-side comparisons of 10-day and 20-day *Chironomus* tests have shown similar results. Longer-term tests are more expensive and have greater variability in response, making interpretation more difficult. Consequently, the costs of longer duration tests do not justify the limited additional information provided.

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126 ◆ Given the requirements to use two species, three endpoints, one chronic test, and one sublethal endpoint from the tests listed in Table IX, there are really only two options that are available: 10-day *Hyalella* and 20-day *Chironomus* or 28-day *Hyalella* and 10-day *Chironomus*. The proposed rule should be revised to acknowledge this current limitation and clarify the actual options for testing.

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127 ◆ The proposed rule needs to incorporate a consistent decision rule regarding significance of a biological test result. Currently, text and tables are inconsistent in the probability threshold used to determine significant differences between test and reference samples ($p = 0.05$ versus $p < 0.05$ versus $p \leq 0.05$). It is requested that the same decision rule used in marine bioassays be incorporated for freshwater bioassays ($p \leq x$).

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128 ◆ And finally, analysis of pH, alkalinity, hardness and temperature is required in an overlying site water sample for freshwater sediment bioassays (WAC 173-204-563(3)(f), line 2727). However marine sediment bioassays (WAC 173-204-562(3)) do not have this same requirement. It is not clear how the sample water quality data would be interpreted in concert with the sediment bioassay. A justification for this analysis should be provided or this requirement should be deleted.

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129 **11. The sediment recovery zone (SRZ) is a useful concept, but its context should be better defined (WAC 173-204-590).**

The inclusion of sediment recovery zones in the proposed amendments is a very positive step.

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130 These areas are defined when "cleanup actions cannot practicably achieve sediment cleanup standards at the site or sediment cleanup unit within 10 years after the start of the cleanup action." Note that consistent with comments on the restoration timeframe, the 10-year period should commence following the cleanup action.

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131 Also, it should be clarified in the proposed amendments whether establishment of a SRZ would allow for the issuance of a final cleanup action plan. Boeing requests the following revision:

> WAC 173-204-590(2)(e) (lines 3036 – 3039): The department shall describe the sediment recovery zone in the cleanup action plan<u>, whether it be a final or interim plan,</u> or other decision document prepared under WAC 173-204-3038.

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132 **12. The cost-benefit analysis is overly optimistic (Ecology 2012e).**

Based on our experience, this document provides an overly optimistic view of the impacts of the proposed SMS amendments on all parties based on several unrealistic assumptions. Boeing requests that the cost-benefit analysis be significantly revised to realistically evaluate:

- The process time and investigative costs needed to derive regional background and how this determination would be funded whether at the State level, which Boeing recommends, by individual parties in a region or sediment cleanup unit, or otherwise;

133
- The scope and duration of source control (i.e., monitoring and containment or removal actions) by all affected parties and for all material sources in an area as an element of any remedy;

134
- The likelihood of additional freshwater sites being identified and the associated analytical and bioassay costs associated with those additional sites; and

135
- Impacts of removal of cost as a consideration in setting cleanup standards, which may lead to selection of remedies with disproportionate cost and limited risk reduction benefit.

136 A key benefit identified in the report is that remediation and settling of disputed site clean ups will be expedited. This expediency is then translated into higher property values and easier property transactions. Given the new freshwater SMS, the incorporation of human health and higher-trophic-level risk considerations, the ambiguity for how background will be established, and removal of cost as consideration in setting cleanup standards, this outcome seems highly unlikely.

137 Another overly optimistic assertion in the cost-benefit analysis is that site boundaries may be reduced, thus reducing site characterization, clean up, and monitoring costs. The example provided assumes that natural and regional background is different for dioxin, leading to cost savings. However, as discussed earlier, in the one case (Bellingham Bay) where regional background for dioxins/furans was calculated, it was deemed to be essentially the same as natural background (Ecology 2011b). In such cases, there would be no savings under the SMS amendments as currently drafted. Further, in cases where regional background is to be used as a cleanup standard, the course for determination of regional background is unclear and may be lengthy and expensive. Additional case studies and process delineation (e.g., who would evaluate regional background and how would this determination be funded) are needed.

138 The cost-benefit analysis incorrectly assumes that the promulgation of freshwater SMS will not increase the number of freshwater sites identified or analyses required. The cost benefit analysis asserts there will be a net benefit because the number of required bioassays will be reduced based on sites “passing” a screening against the freshwater SMS, and therefore fewer (or no) bioassays will be required. Again, given that there will now be a set of numeric criteria to which any freshwater sediment chemistry data may be compared, it seems more likely that the number of freshwater sites will

138 cont. increase. Also, because seven chemicals have unbounded freshwater CSLs (lead, selenium, zinc, di-n-octyl phthalate, monobutyltin, pentachlorophenol, tetrabutyltin), bioassays will be required whenever a CSL is exceeded. In addition, butyltins are included in the proposed freshwater SMS, but are not typically analyzed in freshwater sediment. Analyzing butyltins in freshwater sediment will increase analytical chemistry costs. Thus, the cost-benefit analysis is too optimistic considering the likelihood of an increased number of freshwater sites being identified and an increase in analytical and bioassay costs.

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139 The cost-benefit analysis (Ecology 2012e) does not include impacts of removing cost as a consideration when setting cleanup standards or selecting cleanup actions. Section 3.5.1 notes that the "use of regional background concentrations to establish sediment cleanup standards will be limited by the proposed revisions that eliminate cost as a consideration when setting cleanup standards. Liable persons may incur costs to perform additional sampling to define regional background." Given the inclusion of human health and higher-trophic-level risk considerations, many sites may be driven to background. The final portion of the statement indicates the ambiguity associated with establishing background and acknowledges the costs, which will likely be great. Removal of cost as a consideration may lead to selection of very expensive remedies with limited or marginal risk reduction benefits. This and the cost associated with establishing background were not evidently considered in the cost benefit analysis, but should be added.

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140 Another issue is the use of an incorrect value in the dredged material management example presented in Section 3.9.1. This analysis used the regional background dioxin/furan toxics equivalent of 11 ng/kg rather than 14.6 ng/kg provided in Section 3.5.1.2. This error may affect the results of the analysis presented, and reinforces the need for a more transparent presentation of how regional background concentrations would be derived and the associated costs estimated.

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141 **13. Contents of the work plan, RI, and FS documents should be designed to expedite the process, set clear and reasonable expectations, and optimize the efficiency and effectiveness of data collection (WAC-173-204-550).**

The work plan/RI/FS process is vital to selecting an appropriate cleanup action. Therefore Boeing supports the inclusion in the work plan of a conceptual site model and the cleanup alternatives likely to be considered in the FS. Inclusion of these elements is likely to lengthen the time required to finalize the work plan, but may expedite the overall process by requiring an early focus on the likely outcome.

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142 In addition, Boeing supports the inclusion of proposed sediment cleanup standards and sediment cleanup unit boundary in the RI, again to expedite process, but only if technical practicability is a consideration in the boundary. Consideration of practicability in setting the boundary in the RI is critical to setting realistic expectations and expediting results. The proposed biologically active zone and points of compliance should be established in the RI because these factors are risk based and need to be consistent with assumptions made in the ecological and human health risk assessments presented as part of the RI.

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143 We recognize that requiring a recommended compliance timeframe in the RI may be difficult prior to the identification of remedial alternatives in the FS. Therefore, we recommend deferring this element to the FS by moving the following text from WAC 173-204-550(6)(d)(iii) (lines 2048-2050) to WAC 173-204-550(7)(k):

> (iii) A recommended compliance time frame for permitted contaminant sources which affect or potentially affect implementation of the timing and scope of the site cleanup action alternatives.

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144 **14. Derivation of cleanup standards for higher-trophic-level species should be site-specific and flexible (WAC-173-204-564).**

Boeing supports the site-specific flexibility allowed in the derivation of sediment cleanup levels based on the protection of higher-trophic-level species, with the following cautions.

- Requiring every site to conduct an ecological risk assessment (ERA) may be overly burdensome. Site managers should have the flexibility to determine what level of analysis is necessary for especially small sites with limited contamination. Therefore, the following revision is requested to WAC 173-204-564 (lines 2793-2794): “To establish such concentrations, a site-specific ecological risk assessment meeting the requirement of this subsection ~~must~~may be ~~performed~~required, if deemed necessary by the site manager.”

145

- Behavioral endpoints for Endangered Species Act (ESA) species should not be specified in the rule. Therefore, the following revision is requested to WAC 173-204-564 (lines 2800-2804): “(i) For higher-trophic-level species ~~protected under the Federal Endangered Species Act, Title 77 RCW, or Title 79 RCW, a minor adverse effect means a significant disruption of normal behavior patterns such as breeding, feeding, or sheltering. For all other higher trophic level species~~, minor adverse effects are effects that impair the higher-trophic-level species reproduction, growth or survival. Species protected under the Federal Endangered Species Act, Title 77 RCW or Title 79 RCW, may need special consideration.”

  It is unlikely that dietary toxicity thresholds relevant to “breeding, feeding, or sheltering” are available for many chemicals. Which endpoints would be considered representative of these behaviors? If data were available, what would an appropriate threshold concentration be? In terms of ESA species, most studies were not designed to derive EC0 values (i.e., concentrations that cause a non-lethal effect in zero percent of an exposed population) with reasonable confidence. How would these behavioral endpoints be assessed in the absence of the appropriate effects data? Because these types of questions will be fundamental to all necessary site-specific risk assessments, we strongly encourage Ecology to develop specific guidance for public comment. This would provide a good foundation for all site-specific, higher-trophic-level species risk assessments. In developing such guidance, Ecology may also see that

145 cont. sediment toxicity thresholds that are driven by survival, growth, and/or reproduction in sensitive benthic species directly exposed to sediments may be protective of behavioral effects in higher-trophic-level species. Similar patterns have been observed in water column exposures where behavior may be a more sensitive endpoint than survival in a fish, for example, but the associated criteria are still found to be protective because they are driven by a much more sensitive invertebrate. Evaluating these types of questions earlier will help to streamline the site-specific risk assessment process later.

146

- Population-level modeling (such as that implied through the consideration of population numbers and recruitment/immigration) should not be a requirement for an ERA, although these factors can be qualitatively included in the selection of receptors of concern. The text on lines 2805-2806 should be revised to state: "(ii) For the selection of receptors of concern and their exposure analysis, the species life history, feeding and reproductive strategy, population numbers, range, and the potential for recruitment/immigration of individuals to the site can be considered."

147

- The cleanup levels definition should be revised as follows (lines 2791 – 2793): "Sediment cleanup objectives and cleanup screening levels based on protection of higher-trophic-level species shall not be established at concentrations that do not have the potential for minor adverse effects."

148

- The threshold for identification of chemicals potentially affecting upper-trophic-level species should be consistent with the persistent bioaccumulative toxin (PBT) determination in WAC 173-333-320 (i.e., octanol-water partition coefficient [K_{OW}] of 5.0, not 3.5) (line 2813).

149

15. Site-specific tissue data should be used to identify and screen chemicals of concern in sediment during the RI/FS (WAC-173-204-560).

Comparing site-specific tissue data to background tissue data early in the RI/FS process is an improvement to the rule. When done appropriately (by comparing tissue data for specific species that will be included in the risk assessments), this comparison opens the door to incremental risk assessment, a concept embraced by EPA. Incremental risk assessment is a laudable approach because it acknowledges background risk, and thus sets reasonable expectations for site recovery following remedial actions.

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150 On the other hand, tissue data following sediment remediation should not be used as a performance criterion. Although tissue monitoring is an effective tool to evaluate residual risk levels to inform risk communication, it should not be overstated as a measure of remedy success. Many factors can affect concentrations of chemicals in tissue. Thus, Boeing requests the following revision to WAC 173-204-560(6)(b) (lines 2301-2304):

> Use of tissue analysis. At the department's discretion, and when determined to provide appropriate protection for human health or the environment, contaminants in tissue may be used to identify and screen chemicals of concern in sediment during the remedial

investigation/feasibility study ~~and to evaluate compliance with sediment cleanup standards~~.

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151 **16. Alternative analytical methods should only be required if they will be important in remedial decision making (WAC 173-204-563).**

If efforts are unsuccessful to achieve both method detection limits (MDLs) and practical quantitation limits (PQLs) that are at or below the SCOs in Table VII, then a weight-of-evidence approach to assess the significance of this data quality issue must be allowed. Because the data reporting language requires that values between the MDL and PQL be reported as estimated, additional analyses should only be required if the MDL is above the cleanup value.

Additional costs are likely to be incurred in order to reach MDLs below human health criteria for many organic compounds, including pesticides and semivolatile organic compounds (SVOCs) such as polycyclic aromatic hydrocarbons (PAHs). For example, there is no analytical method to achieve the human health criteria for n-nitrosodiphenylamine. Furthermore, reducing these MDLs below human health criteria is unlikely to be cost effective because where the human health criteria are below the MDL, they are unlikely to drive remediation. Therefore, alternative methods should only be required if the analyte is likely to be important in remedial decision making and if MDLs are above SCO values.

Boeing requests the following revisions to WAC 173-204-200 (lines 373-378):

> (35) "Practical quantitation limit" means the lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability during routine laboratory operating conditions, using department approved methods. When the MDL~~limit~~ for an analytical method is higher than the concentrations based on protection of human health or the environment, the department may require the use of another method to lower the ~~practical quantitation limit~~MDL.

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152 **17. Certain definitions should be more specific and all definitions must be used consistently.**

The definitions used throughout the SMS should be consistent. Specifically, we recommend the following changes and/or clarifications:

- **Sediment** –The definition of sediment should make it clear that SMS and reporting limits (RLs) should only be applied to bedded sediment, not suspended particulates or settled particulate matter present within engineered storm water best management practices (BMPs), engineered drainage features (e.g., bioswales, wetlands, detention/retention ponds, sediment traps, catch basins, drainage ditches), or wastewater lagoons or evaporation ponds. The SMS should encourage the use of such passive systems that remove potential source material from reaching sediment environments. Boeing requests the following revision to WAC 173-204-200 (lines 400-405):

152 cont.

(40) “Sediment” means particulate matter settled or present as particles on the bed or bottom of a body of water to which biota or humans may potentially be exposed, and the surface water is present in the water body for a minimum of six ~~contiguous~~ consecutive weeks on an annual basis and the sediment is located at or below the ordinary high water mark. Sediment includes particulate matter located in the biologically active zone or exposed to the water column by human activity (e.g., dredging), pore water flux, or other hydrological or natural action. Sediment does not include suspended particulates or settled particulate matter present within engineered storm water best management practices (BMPs), engineered drainage features (e.g., bioswales, wetlands, detention/retention ponds, sediment traps, catch basins, drainage ditches), or wastewater lagoons or evaporation ponds.

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153 ♦ **Natural background -** The definition should acknowledge other key contaminants (e.g., PAHs and mercury) that can be regionally or globally distributed. Boeing requests the following revision to WAC 173-204-200 (lines 330-340):

(27) “Natural background” means the concentration of a hazardous substance consistently present in the environment that has not been influenced by localized human activities. For example, several metals and radionuclides naturally occur in the bedrock, sediment, and soil of Washington state due solely to the geologic processes that formed these materials and the concentration of these hazardous substances would be considered natural background. Also, low concentrations of some particularly persistent organic compounds such as polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs) and metals (such as mercury) can be found in surficial soils and sediment throughout much of the state due to global distribution of these hazardous substances. These low concentrations would be considered natural background. Similarly, concentrations of various radionuclides that are present at low concentrations throughout the state due to global distribution of fallout from bomb testing and nuclear accidents would be considered natural background.

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154 ♦ **SCOs and sediment quality standards (SQS) –** These terms need to be used consistently throughout the rule. Based on the definitions below from WAC 173-204-200, our understanding is that the SCO represents the lower tier (highest of PQL, risk-based threshold concentration, natural background), whereas the SQS are criteria associated with no effects to biological resources (or more specifically, benthic invertebrates).

(42) “Sediment cleanup objective” means the goal for protection of human health and the environment and is established under the authority of chapter 70.105D RCW. The sediment cleanup objective is established in accordance with the requirements in WAC 173-204-560(3). Sediment cleanup objectives are also used to identify and assess the hazard of sites under WAC 173-204-510 and 173-204-520.

154 cont.

(45) "Sediment quality standard" means chemical concentration criteria, biological effects criteria, other toxic, radioactive, biological, or deleterious substances criteria, and nonanthropogenically affected sediment quality criteria which are used to identify sediments that have no adverse effects on biological resources per procedures in WAC 173-204-320 through 173-204-340.

However, in the proposed amendments, the SCO appears to be used in place of the SQS in many places. Our understanding is that SQS should be used in place of sediment cleanup objectives in these instances, as indicated in the examples below (with emphasis added).

WAC 173-204-562(2) (lines 2408-2411): **Marine sediment - Chemical criteria.** The chemical concentration criteria in Table IV establish the *sediment cleanup objectives* and cleanup screening levels chemical criteria for marine sediment. The criteria of this section shall apply to marine sediments for toxicity to the benthic community.

WAC 173-204-562(2)(a) (lines 2412-2415): The *sediment cleanup objectives* of this section establish a no adverse effects level, including no acute or chronic adverse effects, to the benthic community. Chemical concentrations at or below the *sediment cleanup objectives* correspond to sediment quality that results in no adverse effects to the benthic community.

WAC 173-204-562(d) (lines 2435-2437): The *sediment cleanup objective* chemical criteria is exceeded when the sediment chemical concentration for one or more chemicals is above the *sediment cleanup objective* in Table IV.

WAC 173-204-562(3)(a) (lines 2510-2512): The *sediment cleanup objective* biological criteria for a sampling station is exceeded when one of the biological test results is above the sediment cleanup objective as described in Table V.

Table V: Marine *sediment cleanup objectives*, cleanup screening levels, and performance standards for each biological test.

WAC 173-204-563 Sediment cleanup levels based on protection of the benthic community in freshwater sediment. (1) **Applicability.** This section defines *sediment cleanup objectives* and cleanup screening levels for contaminants based on protection of the benthic community in freshwater sediment.

WAC 173-204-563(2) (lines 2617-2620): **Freshwater sediment - Chemical criteria.** The chemical concentration criteria in Table VII establish the *sediment cleanup objectives* and cleanup screening levels chemical criteria for freshwater sediment.

154 cont.

WAC 173-204-563(2)(a) (lines 2621-2622): The *sediment cleanup objectives* of this section establish a no adverse effects level, including no acute or chronic adverse effects, on the benthic community.

WAC 173-204-563(2)(d) (lines 2635-2637): The *sediment cleanup objective* chemical criteria is exceeded when the sediment chemical concentration for a single chemical is above the sediment cleanup objective in Table VII.

WAC 173-204-563(3) (lines 2692 – 2694) **Freshwater sediment - Biological criteria.** The biological effects criteria in Table VIII establish the *sediment cleanup objectives* and cleanup screening levels biological criteria for freshwater sediment.

WAC 173-204-563(3)(a) The *sediment cleanup objective* biological criteria for a sampling station is exceeded when one of the biological test results is above the *sediment cleanup objective* as described in Table VIII.

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155 ♦ **Beneficial uses** – The definition provided for "beneficial uses" (line 242) should be revised to match the current WQS. Boeing requests the following revision to WAC 173-204-200 (lines 242-246):

(7) "Beneficial uses" means uses designated ~~of~~to waters of the state by WAC 173-201A which include uses for aquatic life, recreation, water supply, and miscellaneous uses including harvesting, commerce and ~~agricultural, industrial~~, navigation~~al~~, boating, and aesthetics~~use for domestic, stock watering, industrial, commercial, agricultural, irrigation, mining, fish and wildlife maintenance and enhancement, recreation, generation of electric power, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state~~.

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156 ♦ **NPDES terminology** - To avoid confusion, the terms "point" and "non-point" source should be deleted because they are generally used in the context of NPDES permits and the definitions are not provided to clarify the intent of the SMS, nor is the intent always clear when referring to these terms. Most storm water discharges are commercial, industrial, or municipal point sources subject to NPDES permits.

Therefore, the following edits are essential to clarify intent and applicability where the term "nonpoint source" is used in the proposed SMS amendments.

WAC 173-204-100(5) (lines 28- 34): Part IV, Sediment source control standards of this chapter shall be used as a basis for controlling the effects of ~~point and nonpoint source~~ discharges to sediments through the National Pollutant Discharge Elimination System (NPDES) state and federal permit program, state ~~water quality management~~ waste discharge permit programs, issuance of administrative orders or other means determined appropriate by the department. The source control

156 cont. standards establish discharge sediment monitoring requirements and criteria for establishment and maintenance of sediment impact zones.

WAC 173-204-200(44) (lines 425-429): "Sediment impact zone" means an area where the applicable sediment quality standards of WAC 173-204-320 through 173-204-340 are exceeded due to ongoing permitted or otherwise authorized wastewater, storm water, or ~~nonpoint source~~ other discharges and authorized by the department within a federal or state wastewater or storm water discharge permit, or other formal department authorization.

WAC 173-204-400(2) (lines 744-748): Permits and other authorizations of wastewater, storm water, ~~and nonpoint source~~ or other discharges to surface waters of the state of Washington under authority of chapter 90.48 RCW shall be conditioned so that the discharge receives all known, available and reasonable methods of prevention, control, and treatment, and/or best management practices prior to discharge, as required by chapters 90.48, 90.52, and 90.54 RCW.

WAC 173-204-410(6)(c) (lines 861-865): Any person with a new or existing permitted storm water ~~or nonpoint source~~ discharge, which fully uses all known, available and reasonable methods of prevention, control, and treatment, and/or best management practices as stipulated by the department at the time of the person's application for a sediment impact zone, shall be required to meet the standards of WAC 173-204-400 through 173-204-420;

WAC 173-204-500(4)(c) (lines 1500-1507): Restoration time frame. T~~he department expects that the sediment component of sites and sediment cleanup units with limited contamination will be restored within a single construction season using active cleanup actions such as dredging or capping. However, t~~he department recognizes longer restoration time frames may be necessary at sites with more extensive or widespread contamination, including sites with ubiquitous chemicals from numerous regulated and unregulated ~~point and nonpoint source~~ discharges. At such sites, the department expects cleanup actions will include a combination of active and passive cleanup actions and will achieve restoration as soon as practicable following completion of the active cleanup actions.

WAC 173-204-590(2)(d) (lines 3034-3035): Best management practices shall be used for activities related to regulated ~~resulting in diffuse, nonpoint~~ discharges within the sediment recovery zone; . . .

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157 **18. The EIS is overly simplistic (Ecology 2012c).**

There should be a clearer connection between the qualitative discussion of impacts in Chapter 5 and the scoring of each alternative that is conducted later in the chapter.

157 Qualitative discussions of impacts in Tables 5-1 through 5-4 often include both benefits and adverse impacts for the same alternative, but there is no discussion of the relative magnitude of either, leaving the reader with no clear sense of the net impact to a given resource.

158 **19. The Draft Sediment Clean Users Manual (II) should have a formal review process because it is an important guidance document.**

With the release of the *Draft Sediment Cleanup Users Manual II* (Ecology 2012a), Ecology has put forth an important guidance document. Ecology has stated (at its August 28, 2012, public meeting in Seattle) that this document is intended to be the only guidance to accompany the SMS rule. This document includes important details about many of the key concepts included in the proposed SMS amendments, including how sediment cleanup units and site boundaries should be established, how regional background should be derived and applied, and how human and ecological risks should be evaluated. Therefore, Boeing requests that this document have a formal review process, similar to the current process for the fish consumption rates technical support document (Ecology 2012d).

Conclusion

Boeing recognizes the effort the Agency put forth in preparing for the draft rule language including the Sediment Management workgroups and technical workshops. Boeing agrees with Ecology's goal to avoid "high-cost/low-value" scenarios when implementing the Sediment Management Rule. Therefore, Boeing requests that the SMS final rule language fully incorporate the above comments.

Boeing remains committed to working with Ecology and other stakeholders on these significant issues. Please do not hesitate to contact me or Will Ernst at (425) 891-7724 on this important matter.

Sincerely,

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Attachments: References

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BOISE

VIA E-Mail: ruleupdate@ecy.wa.gov

October 26, 2012

Ms. Adrienne Dorrah
Washington Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Re: Boise White Paper, LLC comments on proposed amendments to Chapter 1730204 WAC, Sediment Management Standards (SMS)

Dear Ms. Dorrah:

Boise White Paper, LLC (Boise) is located on the Columbia River at Wallula, Washington. Our mill depends on the river for the water needed in our papermaking process. Boise relies on all natural resources – air, water, energy, and trees – and has a responsibility to use them wisely. One of our company's core values is to manage our businesses to sustain environmental resources for future generations. We appreciate the opportunity to make comments on proposed amendments to Chapter 173-204 WAC, Sediment Management Standards (SMS).

159 Boise supports the Department of Ecology's recent decision to separate this rulemaking from revisions to Washington's water quality criteria and potetila numeric default fish consumption rates. We believe that the process outlined by Director Strudevant in his letter of July 16, 2012, is a more deliberative and inclusive process. We will continue to work with Ecology and our trade associations to assist in the development of sound scientific and economically achievable standards.

160 Our comments related to the current SMS proposal are as follows:

- Ecology should base the sediment cleanup objective in WAC 173-204-560(3) on regional background concentrations of specific chemicals defined in the existing WAC standards. This is important in the recognition that non-point sources, such as atmospheric deposition and storm water, contribute significantly to background concentrations and are recognized to contribute >90% of sediment deposition. /It appears that the proposed draft
161 eliminates consideration of ongoing sources of recontamination, practicability of clean-up, and cost in selection of cleanup level, all of which should be addressed.

162 • Boise supports Ecology's apparent intent to promulgate the SMS revision under the authority of Model Toxics Control Act which provides provisions in Part V to set sediment cleanup standards and not sediment quality standards used for source control. / If
163

163 cont. Ecology intends to use the sediment cleanup standards as source compliance control tools, then separate rulemaking, including cost benefit analysis should be intitiated. Source Control cost for analytical testing alone is estimated from $481,000 to almost $3 milion in the *Preliminary Cost Burdensome Alternative Analysis, August 2012,* for the Puget Sound alone./Please clarify the application of this rule to point source compliance

164 and permit holders.

165

- The National Council for Air and Stream Improvement, Inc. (NCASI) provides technical support to the paper industry on environmental issues. An important part of their mission is to ensure that regulatory decision making is based on sound science. In this capacity, NCASI has reviewed the August 15, 2012 proposed amendments to the Draft Sediment Management Standards (SMS) rule (Chapter 173-204 WAC), and their technical comments are attached. Boise is in agreement with these comments. They can be summarized as follows:

  1. Ecology must not include consumption of salmon as part of any fish consumption rate (FCR) used in any risk assessment associated with site-specific sediment cleanups (see comment specific to Section 173-204-561(2)(b)(i)(D) in the attachment).

166

  2. Ecology must not arbitrarily expand the definition of what constitutes a bioaccumulative chemical beyond the criteria already codified in WAC 173-333-320(2)(b) (see comment specific to Section 173-204-564(2)(iii)(B) in the attachment).

167

- Several sections of the draft rule allow Ecology to create cleanup targets that are more stringent based on site-specific information. However the same sections of the draft rule exclude development of less stringent targets. If modifications are allowed based on sound scientific information, then they should allow adjustment in either direction. To that end, we support Ecology utilizing site specific, regional information for setting sediment clean-up standards, including consideration of migratory fish.

Please do not hesitate to contact me if you have any questions concerning these comments.

Sincerely,

Paul Butkus
Environmental Manager

Attachment

NATIONAL COUNCIL FOR AIR AND STREAM IMPROVEMENT, INC.
West Coast Regional Center
***Mailing address*: PO Box 458, Corvallis OR 97339**
***Street address*: 720 SW Fourth Street, Corvallis OR 97333**
Phone: (541)752-8801 Fax: (541)752-8806

Dr. Jeff Louch
Principal Scientist
JLouch@ncasi.org

October 25, 2102

Toxics Cleanup Program
Ms. Adrienne Dorrah
PO Box 47600
Olympia, Washington 98504-7600

Dear Ms. Dorrah:

The National Council for Air and Stream Improvement, Inc. (NCASI) is an independent, non-profit membership organization that provides technical support to the forest products industry on environmental issues. An important part of our mission is to ensure that regulatory decision making is based on sound science. In this capacity, NCASI has reviewed the August 15, 2012, proposed amendments to the Draft Sediment Management Standards (SMS) rule (Chapter 173-204 WAC).

Based on this review, it is clear that Ecology has put significant thought and effort into making the SMS rule simpler and more effective. Shifting from a narrative standard to chemical-specific numeric criteria as the means of addressing potential impact(s) of freshwater sediments on benthic organisms and incorporation of the concept of regional background are clear examples of this, and NCASI fully supports both additions to the rule. However, NCASI has some concerns about specific aspects of this proposal. These concerns are detailed in the attachment, and can be summarized as follows:

1. It would be scientifically indefensible to include salmon in any fish consumption rate (FCR) used in risk assessments associated with site-specific sediment cleanups.
   (see comment specific to Section 173-204-561(2)(b)(i)(D) in the attachment)

2. Ecology should not arbitrarily expand the definition of what constitutes a bioaccumulative chemical beyond the criteria already codified in WAC 173-333-320(2)(b).
   (see comment specific to Section 173-204-564(2)(iii)(B) in the attachment)

Please do not hesitate to contact me if you have any questions concerning these comments.

Sincerely,

JEFF LOUCH

Jeff Louch
Principal Scientist

Attachment

ec: Steve Stratton, NCASI
Paul Wiegand, NCASI
Christian McCabe, Northwest Pulpa & Paper Association

COMMENTS ON SPECIFIC SECTIONS OF WASHINGTON STATE DEPARTMENT OF ECOLOGY'S AUGUST 15, 2012, PROPOSED AMMENDMENTS TO THE DRAFT SEDIMENT MANAGEMENT STANDARDS (SMS) RULE (WAC 173-204)

Section 173-204-561(2)(b)(i)(D)

It is inappropriate to include salmon in any fish consumption rate (FCR) used in risk assessments associated with site-specific sediment cleanups.

Section 173-204-561(2)(b)(i)(D) states that the size of a site relative to an organism's (fish or shellfish) home range will be taken into account as part of the default human health risk assessment, but does not explain the relevance of this adjustment or how it will be implemented arithmetically.

As a consequence of Ecology's silence, NCASI can only assume that the goal of this language is to allow some accounting for the fact that the contaminant dose to a human being (or any higher trophic level organism) received from consuming a single organism (or single species) cannot be assumed to be totally dependent on the concentrations of contaminant(s) at any one site. Put another way, the contaminant body burden of an individual organism cannot be assumed to be dependent solely on the concentrations at any one sediment site.

Obviously, the extent to which contaminants at any one site impact the body burden in individuals of a specific species will increase as the geographic range of the species decreases. For truly sessile benthic species, it might even be logical to assume that 100% of the contaminant body burden is obtained from a single site. However, this is an assumption, and it becomes more tenuous as the home range of a species increases and/or the size of the sediment site decreases. It also becomes more tenuous as the prey base for a species expands.

Ultimately, any attempt to correct a site-specific exposure assessment to account for contaminants originating outside the geographic scope of a contaminated site is subject to significant uncertainty, and NCASI recognizes that using some metric characterizing the relative size of the site vs. an organism's (or species') home range may be the only transparent means of effecting such a correction. Assumming that this is, in fact, Ecology's intent, NCASI fully supports the language proposed for Section 173-204-561(2)(b)(i)(D). However, the most defensible means of addressing this issue is through study of contaminant uptake by the relevant species. Certainly, when these kinds of data are available they should be used.

As a specific example, results from studies examining the accumulation of bioaccumulative chemicals in salmon have consistently shown that >90% of the body burden present in adult salmon is acquired in the open ocean, and not in estuaries or freshwater[1]. A recently released Ecology Technical Issue Paper[2] effectively summarizes these data.

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[1] Note that this statement is fully consistent with the understanding that <u>some</u> contaminant uptake occurs in estuaries and freshwater.

[2] Salmon Life History and Contaminant Body Burdens. In *Supplemental Information to Support the Fish Consumption Rates Technical Support Document.* https://fortress.wa.gov/ecy/publications/publications/1209058part1.pdf

Thus, in the case of adult salmon specifically, attempting to account for the fraction of the ultimate body burden associated with a specific site through use of some correction factor based on geographic size or time spent at or near the site is both unnecessary and unjustified. Instead, Ecology should accept the results obtained by multiple researchers who have studied this issue. These results show that, when considering the impact of estuarine or freshwater sediments in general, a multiplicative factor of 0.1 would be conservative; that is, assuming that 10% of the contaminant body burden in returning adult salmon is derived from exposure to sediments actually overstates the impact of all estuarine and freshwater sediments in the home range of any specific salmon run. This means that the contribution of any one contaminated sediment site to the overall body burden found in adult salmon is truly *de minimis*. Because of this, salmon should not be included in the FCR used in any risk assessment associated with site-specific sediment cleanups.

173-204-564(2)(iii)(B)

Ecology is proposing to arbitrarily expand the definition of what constitutes a bioaccumulative chemical.

Overall, the language in Section 173-204-564 suggests that detection of any bioaccumulative chemical in any sediment will trigger a risk assessment to determine if the specific contaminant poses some risk to higher trophic level species, and Section 173-204-564(2)(iii)(A) requires that detection of any chemical currently listed as a persistent, bioaccumulative, or toxic (PBT) chemical on Ecology's PBT list (WAC 173-333-310) be subject to such a risk assessment. As defined by Ecology's PBT rule, a chemical is considered bioaccumulative if it has a bioconcentration factor (BCF) or bioaccumulation factor (BAF) greater than 1000, or a pK_{ow} ($\log K_{ow}$) greater than 5 ($K_{ow} > 100,000$).

Section 173-204-564(2)(iii)(B) proposes to expand the scope of this to include chemicals with a $pK_{ow} > 3.5$ ($K_{ow} > 3162$), but offers no justification for why this is necessary or useful. This proposed change to the criteria defining what constitutes a bioaccumulative chemical is significant for many reasons. First, although there is some subjectivity in setting the threshold for defining what constitutes a bioaccumulative chemical, setting the threshold at a pK_{ow} of 3.5 is inconsisent with the scientific consensus (this specific issue was debated extensively during development of Ecology's PBT rule, and the result was setting the pK_{ow} threshold at 5). Second, because the proposed modification to the definition does not mandate the existence of a measured pK_{ow}, it opens the window to allowing a chemical to be defined as bioaccumulative based on a predicted (i.e., modeled) pK_{ow}. Finally, and most importantly, because pK_{ow} is simply a physico-chemical parameter not reflecting any limitations to uptake by organisms and/or metabolism by organisms, basing the definition solely on pK_{ow} would allow a chemical to be defined as bioaccumulative without any evidence that the chemical actually does bioaccumulate (as the proposed alternate definition does not require a specific threshold for a BCF or BAF). Thus, this section has the potential to allow decisions about sediment cleanup(s) to be driven by the presence of chemical(s) that may in fact not bioaccumulate. It is encumbant upon Ecology to provide some justification for making this proposal. Absent this the proposal is totally arbitrary.

Considering the deliberative consensus-driven process leading to adoption of the criteria given in Ecology's PBT rule, these should remain the only criteria defining a bioaccumulative chemical. Thus, Ecology should delete Section 173-204-564(2)(iii)(B) from the proposed rule.

BP Cherry Point Refinery
4519 Grandview Road
Blaine, Washington 98230
Telephone 360 371-1500

October 29, 2012

Adrienne Dorrah
Washington State Department of Ecology
Toxics Cleanup Program
PO Box 47600
Olympia, WA 98504
Email: RuleUpdate@ecy.wa.gov

Subject: Comments on Proposed Sediment Management Standard (SMS) Rule Revisions for managing contaminated sediments in Washington State

Dear Ms Dorrah:

BP is providing comments on the proposed Sediment Management Standards (SMS) rule revisions, Chapter 173-204 Washington Administrative Code (WAC), released for public comment on August 15, 2012. We appreciate the level of effort Ecology has put into this process and the opportunity to comment on the proposed revisions. We look forward to a final revised SMS rule that provides a clear, efficient, and achievable process for implementing sediment cleanup actions within our waterways.

Though the goal of the new rule-making is to clarify the rule, add a process for human health evaluations, and to facilitate getting to cleanup faster, we are concerned that the effects of these changes may be to lengthen and complicate investigations and delay actions. Some of our key issues include:

1) Two-Tier Screening Process for Selecting a Sediment Cleanup Level

We support the concept of a two-tiered evaluation for the protection of both ecological and human health. The lower end of the range (sediment cleanup objective) is a worthy goal but one that may take years to reach or may never be attainable. The upper end of the range (cleanup screening level) needs to be implementable and practicably achievable, and should consider cost and technical practicability. It should represent the limit of technical feasibility (the best we can do). By putting forth a larger range in which to select a site-specific cleanup standard, it ensures an achievable endpoint in the near term, provides incentive for early cleanup actions, and allows for progression toward the Sediment Cleanup Objective (SCO) over the longer term. In summary, we recommend the following changes to the Cleanup Screening Level (CSL) (WAC 173-204-560 and -561):

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168 • **Fish Consumption Rates and Cancer Risk Thresholds**. Human Health (HH) seafood consumption criteria will be based on tribal subsistence-level fish consumption rates of fish and shellfish and will likely be below background (WAC 173-204-561). Using these rates, achieving a total site risk of 10^{-5} for individual cancer risks may be impractical regardless of the remedial action taken for many HH contaminants. The human health risk endpoints should incorporate other risk scenarios (such as the Model Toxics Control Act (MTCA) scenario, recreational scenario, number of meals per week) especially for certain chemicals, or at least allow some flexibility for alternate chemical- or site-specific evaluations.

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169 • **Non-Cancer Risk Thresholds.** The draft rule revisions recommend a Hazard Quotient (HQ) of 1 for non-cancer risks. This effectively eliminates the usefulness of a tiered approach, because the SCO is the same risk level (WAC 173-204-561). We recommend a CSL that has a HQ >1 or incorporates a range of risk levels and scenarios, otherwise there is no difference between the CSL and the Sediment Cleanup Objective for non-cancer risks. Effectively, the two-tiered screening process would collapse to a single screening value.

170 • **Selecting a Cleanup Standard.** We appreciate the efforts to streamline the SMS cleanup selection process, but the proposed rule changes have made the process less flexible (WAC 173-204-560). The proposed rule change to "*the sediment cleanup level may be adjusted upward from the SCO based on whether it is technically possible and whether it will have adverse environmental impacts*" does not acknowledge the complexities and uncertainties of working in a water environment. The net environmental benefit of the cleanup should be considered. We strongly encourage Ecology to modify the language and incorporate technical practicability and net environmental benefit into the selection process. The original selection criteria of cost, technical feasibility and net environmental benefit seemed more supportive of a sustainable process that allowed for site-specific evaluation based on risk reduction and best available technologies.

171 • **Human Health Contaminants**. The rule is unclear here leading the reader to believe that the list of 47 SMS chemicals, derived for the protection of benthic toxicity, also applies to human health. The human health criteria only apply to a subset of bioaccumulative contaminants and the SMS rule revisions should clarify this. This is consistent with MTCA, which allows for selection of key indicator hazardous substances when defining cleanup requirements. Perhaps the rule could pre-select a list of 4 or 5 contaminants that are of primary concern in Washington state and should be the focus of evaluation. Additional contaminants could be added on a site-specific basis.

172 **2) Natural and Regional Background Determination**

Ecology should assume the responsibility of determining background concentrations for many of the larger embayments in Puget Sound in order to ensure consistency between projects, sites, and site units. However, the determination process, including sampling locations and any filtering of the datasets, should be transparent, collaborative, and peer-reviewed. Regional background should include contributions from non-point sources and diffuse sources, even if situated in an urban setting. Without these contributions, it will be difficult if not impossible for sites to reach finality and liability closure.

173 In addition, background values should be applied on an area-weighted basis. They are being derived to ensure the protection of human health (direct contact and seafood consumption) and should match the exposure area of concern. Exposure areas are typically much larger than areas considered for benthic toxicity (these are point concentrations). The SMS rule should clarify that HH values are not applied on a point-basis.

174 **3) Final Cleanup under the SMS, Compliance Monitoring, and Site Delisting**

• Setting the sediment cleanup objective to natural background is major change in the SMS rule revision. There is no clear understanding how a sediment cleanup objective can be met over time when the SCO is natural background, and there are no mechanisms in place to get a final remedy without meeting the SCO. The SMS rule should contain mechanisms to allow for achievable cleanup action.
175 We also believe that Institutional Controls (ICs), when combined with active remedies, should be acceptable for meeting cleanup standards derived for the protection of human health.

176 • WAC 173-204-500 (5)(a)(i)(A) of the proposed rule says "*sediment cleanup objectives… goal is expected to be achieved through a combination of cleanup actions and source control*". It was pointed out to Ecology during SMS rule revision meetings that this may

176 cont. have the effect of making cleanup efforts take more than 30 years, which is counter to the goal of the revised rule making. The SCO may never be achievable at specific sites, especially in urban environments with diffuse non-point sources. The rule and guidance needs to include a workable solution that also is protective of human health. Please add "institutional controls" to the statement so that it reads "sediment cleanup objectives…goal is expected to be achieved through a combination of cleanup actions, source control, and institutional controls."

177

- WAC 173-204-500 (4)(b) We are encouraged by the proposed rule revisions regarding recontamination after remediation which state that further cleanup will not be the responsibility of the entity that conducted the initial cleanup if recontamination is from another source. This type of revision will encourage faster cleanups. However, demonstrating that the recontamination is from other sources may be burdensome to prove with confidence. The process of determining source, extent, and persistence of recontamination if observed (plus any real effects it may have on the community) could prove to be a lengthy and costly endeavor.

  Remediated sediments could also rebound and equilibrate with surrounding sediments that do not have an identifiable source, especially when the cleanup standard is set close to natural background. Managing this uncertainty could require years of data collection and analysis, and has the potential to undo efforts towards faster site cleanups. The burden-of-proof to ensure that any recontamination observed in surface sediment after remediation has been completed could be significant and not in a potentially responsible party's (PRP) control. How will recontamination of a site by anthropogenic background outside of the control of the PRP be handled in cleanup decisions? Consideration of urban background and equilibration to ambient concentrations would be helpful; incremental concentrations above the SCO should not be defined as recontamination.

178

- WAC 173-204-530 (6)(a)(i) & (ii) states that for site delisting "*all cleanup actions, including confirmational monitoring and all other actions required in the cleanup action plan…. have been completed and all sediment cleanup standard(s) have been achieved; or the listing of the site was erroneous.*" If the cleanup standard is close to background levels, this achievement may be extremely difficult. In particular, many contaminants have urban signatures that may be transient or persistent in nature and difficult to manage. How will compliance monitoring be used to determine achievement of the cleanup level, and is Ecology planning to develop statistical methodology for these determinations?

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4) Coordination with Other Programs and Source Controls

WAC 173-204-500 (4)(a)(iii) the proposed rule states that a cleanup may include "use of source control measures to minimize future contamination".

179 Does Ecology anticipate changing other environmental regulations to bring them into support and compliance with the new rules?

How might it affect or interact with other compliance regulations?

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180 Will the new rules impact NPDES permitting and compliance? If not, how can PRPs know their sites will not be re-contaminated by other point source dischargers?

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181 If natural background is the goal for each embayment, how will pollutant loadings for surface runoff and point source dischargers be set to support that?

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182 What about other compliance regulations?

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5) Other Miscellaneous Issues

183 • WAC 173-204-560 (4): the rule should discuss the concept of spatially-weighted average concentrations (SWACs) that are determined over the exposure area of interest. This is particularly important for human health and some ecological endpoints.

184 • WAC 173-204-560 (4) Sediment Cleanup Standards: the old rule stating "*the cleanup level will be selected within the allowable range between the SQS and CSL and be as close as practicable to the cleanup objective*" should be left as written.

185 • WAC 173-204-500 (4)(c): the proposed rule requires that "*the sediment component of sites and sediment cleanup units with limited contamination will be restored within a single construction season using active cleanup actions such as dredging or capping. However, the department recognizes that longer restoration time frames may be necessary at sites with more extensive or widespread contamination, including sites with ubiquitous chemicals from numerous point and non-point sources.*" This is a design issue and should be removed from the rule. Because of our limited 3.5 month in-water work windows in Puget Sound, it may be difficult to implement cleanup work in one work season. In addition, this statement favors faster cleanups instead of better, more protective cleanups that minimize short-term risks.

• WAC 173-204-570 (3)(e): the old rule stated that the minimum cleanup level, or the CSL, was the maximum chemical concentration allowed at the cleanup site by year ten after completion of the active cleanup action. This text has been deleted and replaced with the cleanup standard (likely the SCO or natural background) which must be met within ten years from the START of construction. If not met, then a sediment recovery zone will be applied for an initial duration of up to 10 years.

186 First, if natural recovery is part of a selected remedy, then the restoration time frame should be 10 years AFTER active construction. Remediation activities such as dredging and capping will likely disrupt the natural recovery processes during the construction phase. Recovery time will be needed after construction is complete before monitored natural recovery (MNR) will be optimized for effectiveness./Second, it is unclear from the

187 rule revisions if a sediment recovery zone will be applied to a smaller site or site unit with a single PRP, or if it is intended to be applied over a broad bay-wide scale to monitor low levels of contamination over time.

188 • WAC 173-204-560, Table IV and Table VII: What is the purpose of listing numerical criteria when site-specific evaluations are needed? Perhaps to be used in screening assessment (cluster analysis) to determine if a site is a site? Or perhaps delineate a smaller site unit within a larger site?/What is the point of allowing toxicity test overrides of

189 the chemistry results (we assume this is still allowable), if the cleanup drivers will be human health?

190 • WAC 173-204-500 (5)(b)(i), WAC 173-204-570 (4), WAC 173-204-580 (3) Selection of Cleanup Actions: the remedy should be permanent to the maximum extent practicable. However, the bias towards dredging should be removed from the evaluation when selecting a remedy. The selection of a remedy should balance short-term impacts, long-term benefits, cost, and technical practicability based on site-specific goals and conditions. There is no preferred technology for the remediation of contaminated sediment.

191 • The cost-benefit analysis prepared by Ecology for SEPA compliance evaluated the potential effects of rule changes on sediment cleanup projects in Washington state. However this evaluation only compared differences between the SCO and CSL cleanup levels. The evaluation should include a baseline scenario before the HH criteria are added to the SMS. The analysis should compare the cost burden of incorporating HH criteria into the rule revision to the existing SMS rule and numeric benthic toxicity criteria.

192 Lastly, the rule as proposed may put a burdensome level of cost and complexity into the risk evaluation of small sites. How can we also incorporate a more streamlined process for small sites?

We appreciate the level of effort Ecology has put into the rule revisions and efforts to streamline the process. Please do not hesitate to call or contact me at 360-371-1869 or Lesli.higginson@bp.com for additional clarification with these comments.

Sincerely,

Lesli M. Higginson
Senior Environmental Engineer
BP Cherry Point Refinery

cc: Elizabeth Daly, BP Cherry Point
Jeff Chalfant, BP Cherry Point
Anne Fitzpatrick, AECOM

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

Name of Commenter:	Larry Dunn (LEKT)
Version of Document Reviewed:	___ Review Version (Reader Friendly) ___ Official Version
Date:	10/19/2012

	Page Number	Line Number	Comment
193			The **sediment cleanup objective** should be clarified in the definitions and the cleanup standards as risk based or natural background, the **cleanup level** should be PQL based. . "*Analytical detection limits have never been an acceptable basis for setting standards since they are not related to actual environmental impacts. The environmental impact of a pollutant is based on a scientific determination, not a measuring technique which is subject to change. Setting the criteria at levels that reflect adequate protection tends to be a forcing mechanism to improve analytical detection methods. As the methods improve, limits closer to the actual criteria necessary to protect aquatic life and human health become measurable".(* National Toxics Rule preamble 40 CFR) Including the PQL as a standard for the cleanup objective is inappropriate.
194			On the subject of PQL the proposed PQL standard from the SMS issue paper dated 5/2/12 should not be instituted it is clearly a pragmatic approach to an issue that the state perceives as unfair to labs. Setting the median value of the middle four lab attained values as the standard clearly will lead to a situation where labs are penalized for improving detection limits and PQLs. This results in a standard that will likely never be improved, thus restricting cleanups to existing analytical detection limits. Ecology generally only requires three labs to choose from in analysis and that requirement is met by the three lowest PQL labs, which is appropriate with in the concept of the National Toxics Rule and the base concept of environmental improvement through cleanup. Therefore only the 3 lowest PQL labs should be used. The PQL issue further lead to a proposed use of this pragmatic method to try to address a PQL value for dioxins. The use of Tef scaling units to modify PQLs for each of 17 congeners and adding the results together to set the PQL for that suite of chemicals is inappropriate outside of the scientific use of TEQ methodology, outside the MTCA rule in how it is to be applied and the results unprotective of human health.
195	.	1551-1554	If a risk based concentration is below natural background then natural background should be the sediment cleanup objective PQL should not be considered for this value which by definition is an ultimate goal.
196		2190-2227	Sediment cleanup levels are designated as being established by the SCO and may be adjusted upward based upon site factors. Natural background and or the PQL. This is redundant if the SCO is identified with identical language as it is in the SMS (1551-1554), in the case of dioxins and PCBs both the SCO and SCL will be the same number by defaulting to the PQL. The SCO should be left with the goal of protection of human health and the environment and the PQL should be part of the SCL or the remediation standard.
197		2284-2287	This line should be re written leaving out the reference to "known or suspected contaminant sources" the bold survey clearly established that our current knowledge of sediment transport in Puget Sound and Washington waters is inadequate to make such predictions, therefore regional background should exclude elevated levels of contaminants period. Statistical analyses should be limited to appropriate methods which remove outliers.
198		2362	D) This is may be workable for bivalves but is not workable for crab and fin fish, the range of the fish is purely subjective and immeasurable as related to the impacts of a cleanup site. Further there is currently no method to assess how much of a contaminant that a fish or crab acquires at a site at any given time much less over its lifetime. The only measurable level is the current level in the sample at the time of collection. This modifier should be removed from the rule as unworkable.
199		2346	RME should be 100% from the site as any of the proposed modifiers are totally subjective, based upon the nature of finfish and crab two of the most consumed resources from Puget Sound. This combined with the uncertainty of dispersion of contaminants in the marine environment makes any number less than 100% inappropriate.
200		2355-2357	A and B are appropriate parameters C,D, and E are not, being totally subjective for most species that are being assessed.
201			A fish consumption default rate should be included in the SMS rule, the scientifically defendable work has been done by the Department of Ecology and should be included. A the lack of an appropriate default fish consumption rate will result in lengthy, contentious cleanups in all cases, an issue that I do not believe was the intent of the rule changes.

From: Kissinger.Lon@epamail.epa.gov
To: Asher, Chance (ECY); Hankins, Martha (ECY); McCormack, Craig (ECY); Bradley, Dave (ECY); Kmet, Peter (ECY)
Cc: Hiltner.Allison@epamail.epa.gov; Sanga.Ravi@epamail.epa.gov; Peterson.Piper@epamail.epa.gov; keeley.karen@epa.gov; Harney.Nancy@epamail.epa.gov; Brincefield.Timothy@epamail.epa.gov; Hoffman.Erika@epamail.epa.gov; Fleming.Sheila@epamail.epa.gov; Bailey.Marcia@epamail.epa.gov; Stifelman.Marc@epamail.epa.gov; Nwosu.Julius@epamail.epa.gov; Shephard.Burt@epamail.epa.gov; Szelag.Matthew@epamail.epa.gov; Chung.Angela@epamail.epa.gov; Dagseth.Renee@epamail.epa.gov
Subject: Lon"s Comments on Ecology"s draft sediment management standards
Date: Monday, October 29, 2012 4:24:44 PM
Attachments: Draft SMS Rule Amendments Comment Form Lon Kissinger.docx

Hi,

Attached are my comments on Ecology's proposed sediment management rule amendments.

Please note that though I have reviewed the draft SMS revisions as an EPA Region 10 employee, my comments represent my personal opinions about the rule and my personal take on how EPA regional and national considerations impact the rule. I have not attempted to circulate my comments to other EPA staff members to obtain a consensus EPA regional opinion, and it is possible that other EPA staff might have opinions that differ from my own.

I have circulated the rule and my comments to other EPA Region 10 staff to elicit their opinions on the freshwater ecological standards, public participation provisions, and sites regulated under joint MTCA/CERCLA authority.

Some general observations are as follows:

202 I think Ecology should consider developing an issues paper to set sediment cleanup standards for PCBs, cPAHs, arsenic, and polychlorinated dibenzo furans that consider human health. In comparing human health risk and background as the basis for cleanup standards, it is likely that the standards for these major sediment site contaminants will be based on background. Having default standards for these contaminants would considerably simplify evaluating cleanups.

203 & 204 Detailed material on important topics (e.g. determination of background and comparison of background and site concentrations, assessment of compliance with CSLs) is not provided in the rule. Ecology has revised its sediment cleanup users manual to incorporate some guidance. It is my opinion that Ecology should have put out the rule and available guidance together for joint consideration. If complete guidance is not available, at a minimum, Ecology should outline the contents of guidance and provide a time line for developing guidance. NOTE: I WILL BE PROVIDING COMMENTS ON ECOLOGY'S CURRENT SEDIMENT HHRA GUIDANCE UNDER SEPARATE COVER.

205 The reliance on the three station approach used for benthic invertebrate SMS evaluation does not translate well to evaluation of human health risks which is based on the areas receptors traverse.

206 Use of site area to fish home range ratios and sustainability considerations are not appropriate for assessment of human health risks as they can substantially underestimate risk.

207 The suggested contents of the RI and FS reports do not provide all the information that is really needed for site evaluation, comparison of cleanup alternatives, and selection of a cleanup action.

Thank you for the opportunity to comment.

(See attached file: Draft SMS Rule Amendments Comment Form Lon Kissinger.docx)

Regards,

Lon Kissinger
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Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

Name of Commenter:	Lon Kissinger
Version of Document Reviewed:	**X** Review Version (Reader Friendly) ___ Official Version
Date:	

	Page Number	Line Number	Comment
208	15	24	A point based approach is appropriate for protection of benthic invertebrates, but may not be appropriate for standards to protect human health, which will likely be determined on more of an area basis.
209	24	199	There should be evaluation of the sensitivity of analytical methods with regards to detection of low sediment bioaccumulative contaminant concentrations associated with human health concerns
210	26	228	Acute also has meanings associated with short term exposure and toxic effects for humans.
211	28	268	Chronic also has implications for human exposure.
212	31	325	Do you want to identify risk levels or hazard quotients here?
213	32	358	Doesn't seem to be a distinction between levels associated with minor vs. no adverse effects. Please clarify.
214	34	400	Where would intertidal sediments exposed during low tide fit in here. The language: "…on the bed or bottom of a body of water…" doesn't seem consistent with the need to address intertidal sediments.
215	35	406	Sediment cleanup level and sediment cleanup objective: Add language identifying that the sediment cleanup level is a concentration to actually be achieved?
216	35	421	Sediment cleanups to protect human health will tend to address contaminant concentrations on an area basis. Clarify this in the definition (e.g. "The site areas, point locations, or sediment cleanup unit where those sediment cleanup levels must be attained.)
217	36	430	What about human health?
218	40	516	What tests can be done to determine that sediments don't pose a human health threat? Modify this section to reflect that tests generally are to confirm that

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218 cont.			sediments don't pose a threat to benthic invertebrates only.
219	43	574	What about human health criteria?
220	43	576	Again, what about human health criteria and the suitability of PQLs?
221	45	Table 1	Consider adding references to literature describing the derivation of each of the SQS values.
222	48	633	Consider making the general statement that sediment human health criteria will consider exposure to sediment contaminants either by direct contact with sediment or indirect exposure to sediment contaminants via consumption of aquatic organisms that have acquired contaminants from sediments. One might also bring in the concept of reasonable maximum exposure and risk levels of concern.
223	48	642	Some consideration should be given to providing documentation on derivation of non-anthropogenic background (e.g. procedures or data sources). If this is to be provided in guidance, there should be some discussion of guidance documents to be used.
224	51	670	The Puget Sound Protocols should be evaluated for reporting limit sensitivity relative to sediment contaminant levels of concern for human health, particularly bioaccumulative contaminants.
	56	767	Specifically shall not cause significant human health risks.
225	68	987	. To what extent has bioaccumulation modeling been considered to evaluate the impact of contaminants on tissue levels in aquatic organisms consumed by humans with consequent health risks?
226	87	Table II	The values here really should be expanded on to consider human health. Chemical mixtures of concern to human health should also be considered (e.g. cPAHs, polychlorinated dibenzodioxins and furans, etc.)
227	97	1532	Bring in the concept of area of compliance, which is particularly important for human health considerations.

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228	98	1554	Reference procedures, data or guidance for assessing natural background and comparing background with the sediment cleanup objective.
229	98	1557	Reference procedures, data or guidance for assessing regional background and comparing background with the CSL.
230	101	1598	This section is problematic with regards to identifying sediment that is of potential concern for human health. For human health, the focus should be on the exposure area (e.g. all sub and intertidal sediments for bioaccumulative contaminants where exposure is via seafood consumption, sediment areas a receptor could encounter for direct contact).
231	102	1620	The choice of statistic for comparison of site concentration with a risk based standard is at odds with standard risk assessment practices employed by Ecology under MTCA and EPA under CERCLA. Reasonable Maximum Exposure utilizes the 95% UCL on the mean. Three observations would generally be considered inadequate for computing a 95% UCL.
232	103	1638	The fact that three stations exceed a human health risk level may be meaningless if the concentration over a broader AREA is less than a level of human health concern because of unacceptable risk or hazard.
233	105	1693	The concept of relevant exposure area and chemical concentrations should be brought forward here.
234	105	1697	"…is **not** met." ?
235	106	1079	Again, station clusters are not an appropriate methodology for identifying sites of concern from a human health perspective. Identification of a sediment cleanup site from a human health perspective should involve identification of receptors, exposure pathways, exposure areas, and risk based concentrations of concern associated with these exposure areas. The relevant statistic for comparison of site conditions to cleanup standards should be the 95% UCL on the mean.
236	108	1079	SEE comment on Page 106, Line 1709
237	117	1916	Add the human and ecological receptors present, current and potential future

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237 cont.			uses of the site.
238	119	1937	This brief list seems incomplete. The contents of a conceptual site model should be refined and may supplant some of the outline provided below. A CSM definition should be provided at the beginning of the rule. The RI workplan should establish what is known and not known about: 1) Current and potential ecological receptors that may be exposed to site contaminants 2) Exposure pathways and areas over which contaminant exposure could occur 3) Contaminant levels of concern associated with specific pathways and areas (these levels of concern potentially being modified by considerations of background) 4) Location of levels of contamination of concern as well as sources of contaminants 5) Movement of sediments, surface water, and contaminants within the system. 6) The relevance of bioaccumulation to ecological and human contaminant exposure. 7) Identification of natural and regional background appropriate for putting risk based levels of contaminants in context. Ultimately the work plan should identify data gaps that need to be filled.
239	119	1954	It may be challenging to develop a time line for a more complicated sediment site (e.g. Bellingham Bay, Commencement Bay, the Lower Duwamish Waterway)
240	121	1979	Assessment of risks to human health was struck from the list of items to be included in the RI Report and should be restored. There also is not an explicit reference to risks to ecological receptors. This also should be included. Also missing from the RI report is selection of appropriate background data and how site concentrations differ from background.
241	126	2055	It seems that a critical step in evaluation of remedies would be how they would address risks to human health and the environment. Community acceptance of

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241 cont.			the feasibility study is also important. Please return this to the rule language.
242	135	2275	Procedures for selecting or developing regional background data need to be provided as well as the statistic that is to be used to characterize background.
243	137	2308	Page 137, Line 2308: Might identify issues to consider: Site fidelity of organisms, species and preparation consumption preferences of potentially exposed populations, propensity of organisms to accumulate site contaminants, availability of background data.
244	139	2351	A general feature of MTCA has been to standardize the risk assessment process so as to avoid intense, site specific exposure parameter selection exercises that utilize limited Ecology resources. Standardization of tribal seafood consumption rates surely fall into this category. In this reviewer's opinion, sufficient data exist to establish default tribal seafood consumption rates for human health sediment quality criteria.
245	139	2358 & 2362	Generally determining reasonable maximum exposure is not dependent on the number of individuals that are exposed. As a corollary, it is not customary to evaluate sustainability on a site specific basis. If a single individual could have a reasonable maximum exposure FCR as determined using a relevant fish consumption study, then that FCR should be used. Consideration of seafood consumption risks should be based on assessment of fish consumption from larger water bodies containing the site of interest. This will insure that individuals can safely (to the maximum degree practicable) obtain fish from any point within the larger water body. This reviewer STRONGLY objects to use of site specific sustainability analyses and ratios of fish home range to site area as methods for adjusting exposure, as these will almost certainly underestimate exposure. For example, it is possible that habitat could attract species to an area with higher sediment contaminant concentrations leading to higher tissue body burdens that are not consistent with site area to home range ratios.
246	140	2387	What will the process be for developing cleanup levels where: 1) Multiple carcinogens are present and the background concentration of a single carcinogen exceeds 1 in 100,000? 2) Multiple non-carcinogens with the same mode of action are present and

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246 cont.			the background concentration of a single carcinogen causes the HI to exceed 1?
247	174	2890	Determination as to whether or not a cleanup action protects human health will not be possible if the feasibility study report contents do not include an analysis of the human and environmental health protectiveness of each potential remedy. The minimum requirements of the cleanup action should be cross referenced with the contents of the RI and feasibility study reports.
248	177	1944	Considerer specifying: 1) Implementation of source control, potentially considered at line 2946 2) Background, potentially considered at line 2946 and which also may have been considered in developing cleanup standards.
249	178	2968	Again, the contents of the RI and FS study reports need to be reviewed.
250	188	3147	Where are data quality objectives for sampling identified and where is there an analysis of how the proposed samples satisfy data quality objectives?
			.

From:	Tori P Hansen
To:	ECY RE TCP Rule Updates
Subject:	Suggestions: Water Sediment Cleanup
Date:	Wednesday, August 22, 2012 5:52:25 PM

251 1. Acknowledge that since 1779, over 70% of Washington's Tidelands are owned in legal title to private citizens, the primary stewards for the majority of our state's beaches and shorelines.

252 2. Provide ongoing information & solutions to All tideland property owners - Citizens Stewards who are inherently responsible for the health and safety of most all WA tidelands

253 3. Allow Tide owning Citizens, constant access to shore restoration information, scientific essential BMP's, stewardship strategies, citizen tidal toolboxes and funding options to restore, preserve, enhance and protect WA's most valuable natural resources- shorelines, shellfish and nearshore ecosystems!

Please pass along my suggestions throughout.

Tori Hansen
Sent from my iPhone

City of Seattle
Seattle Public Utilities

October 26, 2012
(*via email to* RuleUpdate@ecy.wa.gov)

Chance Asher
Toxics Cleanup Program
Washington State Department of Ecology

RE: City of Seattle Comments on the Draft Sediment Management Standards Rule Proposed Amendments

Dear Chance:

This letter transmits City of Seattle comments on the August 15, 2012 Draft Sediment Management Standards Rule (SMS; Chapter 173-204 WAC) Proposed Amendments. As you know, the City participated in the Sediment Work Group and Sediment Cleanup Advisory Committee, which were assembled by the Department of Ecology to assist them and enlist feedback and suggestions from the regulated community and stakeholders on the issues and options under consideration. The City thanks Ecology for the opportunity to participate in development of the proposed amendments to the SMS. The proposed revisions and where they appear to lead are an ambitious undertaking that will significantly reshape the SMS and the way sediment cleanup gets done in the State over the next few decades. Although the City does have questions and concerns about the proposed amendments, we commend the Ecology team for their work on the amendments and efforts to involve the regulated community and stakeholders.

On January 12, 2012, the City submitted to Ecology sixty-three comments on the November 2011 draft of the proposed SMS rule amendments. In addition to comments questioning how the proposed new framework will work at an actual site and suggesting clarification to parts of the rule, we suggested changes to Ecology's proposed approach to managing liability for recontamination of cleanup sites. Although some of our January 12 comments are addressed in the current draft of the SMS Rule and significant rewriting occurred, a number of our comments were not addressed including our comments about managing liability and recontamination.

The City's comments on the proposed amendments are attached to this letter. Some of the comments that were included in our January 12 submittal, including our suggestions regarding managing liability and recontamination, are submitted again within the context of this more formal process. One of our new comments addresses the City's general interest in the opportunity for meaningful input on Ecology's development of written guidance for implementing portions of the rule and Regional Background characterization activities that we understand Ecology is pursuing.

Overall, many uncertainties remain about how the framework will be implemented at a real site. Many of our comments on the proposed new framework suggest improvements are needed to clarify and expedite the sediment cleanup process. Details need to be resolved regarding how to establish Regional Background so it actually helps expedite cleanups in the near-term, implement source control,

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and manage liability at Sediment Cleanup Units. Streamlining the human health and ecological risk assessment steps could substantially accelerate decision making while ensuring protectiveness. It also seems much more difficult to establish an effective site-specific cleanup level given the revised factors that need to be considered including technical possibility and adverse environmental impacts and other cleanup action process requirements. We also comment on the ten year restoration time frame restrictions and sediment recovery zone requirements, which don't, as written, seem to help in expediting sediment cleanups. Finally, implementation of the framework that Ecology has established, even with the changes the City recommends, will require intense technical work and challenging policy decision-making to be useful.

254 Given the substantial changes that were made subsequent to the last meeting of the Sediment Cleanup Advisory Committee, our significant comments and suggestions on the proposed amendment, and the other comments Ecology is likely to receive from other members of the regulated community and stakeholders, we request that revised draft rule language be released for review and comment before the rule revision process proceeds any further.

Overall, the City supports Ecology's continued efforts to improve the SMS and looks forward to responses to our comments. If you have any questions about our comments, please contact me at 206-733-9179 (pete.rude@seattle.gov).

Sincerely,

Peter D. Rude, Ph.D., L.G.
Strategic Advisor
Seattle Public Utilities

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
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Name of Commenter:	Pete Rude and David Schuchardt, City of Seattle, Seattle Public Utilities (submitted *via* email to RuleUpdate@ecy.wa.gov October 26, 2012)
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255	General Comment #1		The City of Seattle requests that Ecology provide the regulated community and stakeholders with the opportunity for meaningful involvement in the development of guidance associated with the proposed amended rule. This suggestion includes involvement in developing the approach for characterizing Regional Background for specific areas.
256	General Comment #2		The City of Seattle continues to be concerned that the new framework in the amended rule, particularly the significant changes made since the Sediment Cleanup Advisory Committee involvement ended, is not workable. It is not clear that the framework will adequately address the issues that are unique to sediment cleanup including ubiquitous low-level background contamination in urban bays, multiple party liability, and recontamination.
257	General Comment #3		Given the substantial changes that were made subsequent to the last meeting of the Sediment Cleanup Advisory Committee, our significant comments and suggestions on the proposed amendment, and the other comments Ecology is likely to receive from other members of the regulated community and stakeholders, we request that revised draft rule language be released for review and comment before the rule revision process proceeds any further.
258	33	369	Suggest clarifying that the POC applies to "surface sediments" as defined in line 451; also that the POC may apply at discrete locations or as an area-based average (surface-weighted average concentration) depending on the exposure pathway used for setting the cleanup level.
259	34	389	Given Ecology's near-term goal of expediting sediment site or site unit cleanup, the methods used to establish Regional Background need to be selected carefully. Establishing Regional Background at too low (stringent) of a level such that it differs little from natural background will not help expedite cleanups and instead will facilitate continued stagnation. We suggest that Ecology keep this firmly in mind as they interpret the definition of Regional Background and continue their efforts to establish Regional Background at the site(s) they are evaluating.
260	49-50	655-656	Low salinity sediment quality standards (WAC 173-204-330) seem to have been dropped from this draft. Should it be included?
261	xcv	1494-1499	Recontamination of sediment at remediated sites or sediment cleanup units may also occur from disturbance, redistribution, and re-deposition of contaminated sediment from adjacent areas within a water body. It would be helpful to state that potential occurrence in this context.
262	xcv	1494-1499	Proposed section -500(4)(b) places an unfair burden on PLPs who have <u>not</u> created a "hot spot" of contamination. It is unfair because the PLP that settles its liability for the hot spot (or sediment cleanup unit) will be released from liability if that unit becomes recontaminated by sources outside the settling PLP's control. <u>The other PLPs would continue to be liable even if *they also have no control* over the sources of the recontamination</u>. The release of liability for <u>future</u> contamination is a paradigm shift from joint and several liability based on status

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262 cont.			(owners or operators) to liability that appears to be based on fault, but actually shifts the burden from some PLPs that cannot control the recontamination to other PLPs that also cannot control the recontamination. A hypothetical example illustrating the problem was included in our January 12, 2012 comments. We suggest that section -500(4)(b) be revised to indicate that it is the department's expectation that an additional cleanup in the sediment cleanup unit is not expected unless the sources of the recontamination are controllable. Sources that are currently ubiquitous and not controllable may become controllable over time through product bans, advances in treatment technology, and other actions. Based on the above, we suggest a proposed revised subsection -500(4)(b): ALTERNATE APPROACH: b) Recontamination. Recontamination of sediment at remediated sites or sediment cleanup units may occur via point and/or non-point sources and numerous pathways including stormwater discharges, atmospheric deposition, and the dispersal of contaminants from other contaminated sediments in the bay or watershed. In many cases, such sources of sediment recontamination are ubiquitous and/or uncontrollable within the current regulatory framework. It is the department's expectation that further cleanup of this recontamination will not be required unless the recontamination leads to sediment contaminant levels above a department-identified threshold indicating unacceptable and controllable recontamination. In situations where this threshold is exceeded, at the department's discretion, additional action may be required. Liability for any such additional cleanup activities required by the department would remain joint and several as described (reference the existing MTCA language on this). In addition, identifying a threshold for site cleanup unit recontamination that requires additional action and performing the technical work required to establish that a PLP has controlled their sources (or is still a significant source of recontamination) are complex, time-consuming, and costly. But, assuming such technical work is successful, our suggested revisions to this subsection would provide a liability and decision framework that is more fair, consistent with existing liability principles, and still maintains an incentive for PLPs to move forward on sediment cleanup.
263	xcviii	1569	Stating that the cleanup action will usually include source control measures

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263 cont.			implies that the source control measures are subject to the SMS/MTCA RI/FS and decision making process, and that a CAP would specify which source control measures are required as part of the action. Yet there is no regulation or guidance regarding how to evaluate source control alternatives. Suggest rewording to state that "…cleanup actions will usually be accompanied by source control measures." Suggest somewhere in the regulation, expectations are described for source control as a separate set of activities outside the RI/FS process.
264	ciii	1638	This definition will result in vast areas of Puget Sound and other waterways as being "station clusters of potential concern." Even in the areas used to statistically define "regional background" there will likely be clusters of three or more individual stations with chemical concentrations above the statistically-derived regional background value. This definition also does not specify how multiple chemicals are treated.
265a	cxxxi	2196	The concept of being "technically possible" regardless of cost [WAC 173-204-200(49); line 457 on page 37 of proposed amendment] will be a difficult threshold to use to justify upward adjustments to cleanup levels and provides little flexibility. This could lead to feasibility study requirements to evaluate absurdly large, long-term, expensive, and comprehensive alternatives. It is a valid goal to "harmonize" the SMS and MTCA to the extent it makes sense, but the fundamental differences between upland and sediment cleanups make it difficult to match up the two regulations in every way. The City recommends that the rule allow for consideration of cost at the cleanup level identification point in the framework as is established in the current SMS.
	cxxxi	2196-2201	What is Ecology's expectation on when in the RI/FS process technical possibility and adverse environmental impacts will be evaluated in the context of establishing the site-specific cleanup level? As written, it is not clear where that evaluation takes place.
266	cxxxix	2344	At the 10^{-5} and 10^{-6} risk levels, seafood tissue concentrations can be strongly affected by water concentrations of chemicals, and further lowering sediment concentrations may have little effect on tissue concentrations or risk. It may not be possible to define sediment cleanup levels corresponding to these risks, since water alone contributes risks above 10^{-5} or 10^{-6} via the seafood pathway. Consider streamlined screening approaches to allow rapid default to background-based approaches, and avoiding unnecessary risk assessment efforts.
267	cxlii	2396-2397	The title of this section mentions low salinity sediment but the section only covers marine sediment. Doesn't something need to be said about low salinity sediment within this section even if it is a brief narrative statement?
268	clxix	2792	Suggest first occurrence of the word "not" should be deleted.
269	cxxxviii and clxix	2324 and 2785	WAC 173-204-561 and -564 set forth heavy process-laden requirements for expensive and time-consuming risk assessment procedures that are unlikely to affect project outcomes. For bioaccumulative chemicals, consider streamlined screening approaches to allow rapid default to background-based approaches, and

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269 cont.			avoiding unnecessary risk assessment efforts. For non-bioaccumulative chemicals, consider the extensive efforts already accomplished at other sites with full-blown HHRA, ERA, and food-web models, that show most of these chemicals are not of concern for human health or higher trophic level ecological receptors. Absent such streamlining, expect study phases for all projects to extend ten years or longer.
270	clxxv	2906-2908	Having a minimum requirement for sediment cleanup actions stating that "Cleanup actions shall not rely primarily on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action" significantly limits the range of cleanup alternatives that can be developed and unnecessarily restricts the use of monitored natural recovery. We suggest this restriction on the use of monitored natural recovery not be included the amended rule.
271	clxxvi	2927	1) Source control measures will have equal importance regardless of the remedy – for example, incomplete source control will equally affect sediment quality in a "dredged to clean" area and an ENR area. 2) Including source control measures implies that the source control measures are subject to the SMS/MTCA RI/FS and decision making process, and that a CAP would specify which source control measures are required as part of the action. Yet there is no regulation or guidance regarding how to evaluate source control alternatives. 3) Ranking source control measures higher than sediment remediation measures suggests an alternative with "heavy" source control and MNR may rank higher than an alternative with "light" source control and dredging. 4) SMS is not the appropriate regulatory mechanism to define source control actions. 5) Suggest eliminating line 2927, and somewhere in the regulation, expectations should be described for source control as a separate set of activities outside the RI/FS process.
272	clxxvi	2928	Beneficial re-use is not a permanence criterion and should be eliminated. Materials dredged pursuant to cleanups will not be suitable for beneficial re-use, absent treatment. All treatment technologies will result in some residual concentrations of contaminants remaining on the treated sediments. Beneficial re-use, even of treated sediment fractions (e.g., "clean" gravel fractions) would likely introduce residual contaminants back into the environment, and have greater risks than landfill disposal. If an ex-situ treatment/beneficial reuse alternative is evaluated in an FS, these considerations should be evaluated in the FS, but there should not be a default hierarchy of preference for beneficial reuse.

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273	clxxviii	2957-2962	Requiring a restoration time frame of ten years after the "start" of the cleanup action poses several problems: 1. What if the cleanup action itself takes more than ten years? 2. What if it is a large site with several cleanup actions over a period greater than ten years? 3. If source control is not in place at a portion of the site, does the ten-year requirement create incentive for delay of start of cleanup in portions of the site where source control is in place? 4. What if some of the cleanup actions are conducted under Federal authority? In addition, establishing a sediment recovery zone in accordance with WAC 173-204-590 is an unproven process that could easily slow down the progress of cleanup. It is the City's understanding that very few if any sediment recovery zones have ever been established to date and linking such zones to the restoration time frame as is proposed seems to provide little incentive for PLPs to pursue cleanup and run counter to the goal of expediting sediment cleanups.
			END OF COMMENTS

Confederated Tribes and Bands
of the Yakama Nation

Established by the
Treaty of June 9, 1855

October 29, 2012

Ted Sturdevant
Director
Washington State Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

Re: Sediment Management Standards

Dear Mr. Sturdevant,

Thank you for the opportunity to provide comments on Washington State's Sediment Management Standards (SMS). Attached are Yakama Nation's comments regarding the SMS rule update./Additionally, we are incorporating by reference comments from the
274 Center of Indian Law and Policy written by Catherine O'neill's regarding the SMS.

If you have any questions regarding the comments please direct them to McClure Tosch. Mr. Tosch can be reached at 509-865-5121 ext. 6413 or tosm@yakamafish-nsn.gov.

Sincerely,

Phil Rigdon, DNR Deputy Director
Yakama Nation

Attachment: Yakama Nation's Technical Comments on The SMS

Post Office Box 151, Fort Road, Toppenish, WA 98948 (509) 865-5121

COMMENTS FROM THE YAKAMA NATION REGARDING REVISED SEDIMENT MANAGEMENT STANDARDS PROPOSED BY WASHINGTON DEPARMENT OF ECOLOGY

The State of Washington is currently in the process of revising Sediment Management Standards [SMS (WAC 173-204)], which are the state's regulations for identifying and cleaning up contaminated marine and freshwater sediments. The Yakama Nation has participated in the Sediment Cleanup Advisory Committee, public meetings, and communicated directly with Ecology staff. Based on our review of the draft revisions, meeting materials and communication with Ecology, we have identified the concerns itemized below. Additionally, we support and incorporate by reference the comments submitted on this matter by Catherine O'Neill at the Center for Indian Law and Policy (October 2012).

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275 1. **Default Fish Consumption Rate:** When Ecology decided to drop the fish consumption rate from the SMS in mid-July, it was ignoring its responsibility to protect the health of the people of Washington State. As expressed in our previous correspondence, Yakama Nation is very concerned with the inadequacy of the state's current fish consumption rate. The disparity between Washington's rule and the actual consumption rates of Yakama people subject them to undue health risks. Ecology must address this issue now and adopt a default fish consumption rate that is protective of all people, not just a percentage of them.

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276 2. **Fish Diet Fraction:** The Fish Diet Fraction (FDF) is the portion of a person's diet that "is obtained from the site or the general vicinity of the site." Theoretically, a person's FDF varies from 0-1, but Ecology should assume for the Yakama Nation a FDF of 1. Our tribal members have been gathering fish from the Columbia River Basin since time immemorial, and the state should not adjust standards based on an assumption that some fraction of consumed fish was harvested from waters outside the reach of this rulemaking.

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277 3. **Site Use Factor:** The Site Use Factor (SUF) refers to the percentage of time that a fish/shellfish is in contact with contaminants at the site based on the species' life history and home range. This seems to be a barely-disguised attempt to exclude salmonids and other migratory staple food fish from the rulemaking process, and thereby justify establishing inadequate, unprotective cleanup standards because Ecology assumes that anadromous or migratory species take on little to none of their contaminant body burden at a particular site. These species must be included in a Fish Consumption Rate, without exception, for the following reasons:

   a. Salmon and lamprey are a crucial part of Yakama tribal members' diet and culture. The right to these fish was reserved in the Treaty of 1855 and has been upheld in numerous court decisions. Under the U. S. Constitution, Yakama's treaty with the United States is the supreme law of the land (O'Neill 2011). If salmon are excluded from SUF, Washington will be ignoring contaminant issues that affect Yakama Nation's way of life and our rights to clean, healthy fish.

   b. Salmon are encountering and acquiring contaminants at all stages of their life histories, particularly in fresh and estuarine waters that are under Washington State Jurisdiction (O'Neill, 2011). While we recognize that salmon acquire contaminants in the ocean, science shows that juvenile salmon also pick up contaminants during freshwater rearing, on their journey through the Columbia River basin to the Pacific Ocean (LCREP 2007), and in the Columbia River estuary. In fact, some studies suggest that the more time a juvenile salmon spends in the estuary, the higher its probability of injury or mortality (Loge et al.

277 cont. 2005). Washington can't ignore its responsibilities to ensure these fish are safe for everyone to eat.

c. Washington State has made a commitment to salmon recovery, as expressed and confirmed by Governor Gregoire. Excluding salmon as part of the fish consumption rate is inconsistent with that commitment. Without setting appropriate water quality and cleanup standards, the salmon will not have the toxic free environment they require for recovery.

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278 4. **Natural Background:** We understand that certain elements and compounds that are considered contaminants may occur naturally in the environment. However, Ecology's definition of Natural Background includes widespread, persistent substances like PCBs even though these are synthesized compounds that continue to damage our people and our resources. A Natural Background should only include substances that are naturally occurring without anthropogenic influences.

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279 5. **Regional Background:** Ecology's new term to describe a geographic area with contamination primarily attributable to diffuse non-point sources has the potential to ruin cleanup and restoration efforts across the state. A "regional background" could allow existing widespread contamination to persist in perpetuity with no chance of remedy. For example, DDT reduction in the Yakima River is primarily attributable to BMPs implemented to reduce sediment loading from agricultural areas where DDT has sorbed to soil particles. If a "regional background" standard had been set for this area, it is likely that DDT would have been deemed "wide spread and diffuse" for purposes of defining the problem. Ecology should remove this term from the rule language.

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280 6. **Two-Tier Cleanup Approach:** Ecology's two-tier cleanup approach selects a cleanup standard somewhere between the Sediment Cleanup Objective (SCO) and Sediment Cleanup Level (SCL) that is not as protective as it should be. The SCO is the least protective standard from among Natural Background, Risk Based Concentration, and Practical Quantitation Limit alternatives. Additionally the SCL will allow widespread pollution that is only causing "minor" adverse effects to the environment to become the new baseline. The proposed approach allows for inadequate site cleanups that completely miss the mark. Instead, a cleanup standard should a achieve a natural level that does not contain any contamination from anthropogenic activity. The selection clean up standard should be revised and the SCL should be completely removed from the SMS.

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281 7. **Freshwater Sediment Standards:** Having default Freshwater Sediment Management standards is imperative to ensure site assessments and cleanups are conducted effectively and efficiently. However, default standards must be set at a level that is protective of the resources. Yakama Nation still has concerns with the methods and data used to derive the Freshwater Sediment Standards. Ecology should invest sufficient resources to understand what protective Freshwater Sediment Standards should be for the east side of the state.

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282 8. **Coordination with Tribes as Co-Managers:** Yakama Nation is a co-manager of the fishery and aquatic resources at all usual and accustomed areas in Washington and elsewhere. The August 2007 ruling in the *U.S. v. Washington* "culverts" sub-proceeding supports the principle that the Treaty promised the Yakama Nation the reserved right to *take* fish, not merely the right *to* fish. The state of Washington thus has an obligation to work with us to preserve and protect the habitat needed by these resources to provide the benefits retained by the Yakama Nation in its Treaty of 1855 with the federal government. Washington has a responsibility to adopt standards that adequately protect

282 cont. these shared resources or risk forcing the tribe to consider other ways to protect its owner interest in those resources. The proposed rule should include clear language clarifying the state's commitment to work with Yakama Nation Columbia River Basin sediment cleanup.

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The Confederated Tribes of the Colville Reservation
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(509) 634-2421 FAX: (509) 634-2422

October 29, 2012

Ted Sturdevant, Director
Washington State Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

RE: Sediment Management Standards Rule Revisions, Chapter 173-204 WAC

Dear Mr. Sturdevant:

Thank you for the opportunity to comment on the proposed Sediment Management Rule, please accept this letter and the attached technical comments on behalf of the Confederated Tribes of the Colville Reservation ("Tribe"). Attached, you will find formal technical comments. However, in addition to the technical comments, there are four conceptual issues that the Tribe wishes to highlight in regards to the process of the rule making, as well as an underlying suggestion for moving forward.

283 First, the Tribe is deeply concerned about moving forward with the rule making without resolution of outstanding technical issues. As recently as Friday October 24, 2012 the Tribe and the Department of Ecology were engaging in discussions about technical issues such as biological toxicity criteria and statistical treatment of toxicity data. For several years, the Tribe and others have raised significant technical issues with the proposed rule, and urged the Department of Ecology to utilize fundamentally different assumptions and criteria in formulating the sediment management standards. These technical issues have not been resolved, nor has the Department of Ecology been able to scientifically justify rejection of the suggestions from the Tribe and its consulting experts. The Department of Ecology an obligation to ensure that this rule is promulgated using the best available science. There are simply too many unresolved technical issues for the Tribe to support the rule without the significant changes presented in the attached technical comments.

284 Second, the Tribe believes the EIS is fundamentally flawed, and must be reissued subject to public comment. The purpose of the EIS is to provide impartial discussion of significant environmental impacts and inform decision makers and the public of reasonable alternatives, including mitigation measures, that would avoid or minimize adverse impacts or enhance environmental quality. As a matter of process, the Tribe believes that these purposes can only be achieved by publishing an EIS after submission of public comments on the proposed rule. The comments offered by the Tribe and others offer significant information regarding the SMS Floating Percentile Method, derivation of cleanup levels, and data analysis, that should be used for purposes of assessing environmental impacts and developing alternatives. By promulgating the EIS before completion of the comment period the Department of Ecology inappropriately limited the range of alternatives considered and potentially minimized assessment of environmental impacts, since there was no possibility that an alternative based on comments and technical feedback would be analyzed in the EIS and the analysis of existing alternatives fails to consider contrary scientific and technical comments offered by the Tribe.

285 Third, and perhaps most importantly, the proposed rule raises significant environmental justice issues. The Columbia River and Lake Roosevelt are the heart of the Colville Tribe. The River provides

285 subsistence, recreation, revenue, and is the homeland of tribal members, and both the past and the future of the
cont. Tribe are inextricably linked with the Upper Columbia River. Due to its size and character, biological toxicity data from the Upper Columbia River site dominates the state-wide dataset considered for predominately metals contaminated sediment sites. Sediment quality of the UCR/Lake Roosevelt site is disproportionately impacted by smelter-sourced metals. The smelter sourced metals contamination in UCR is itself heavily influenced by the pervasive presence of slag, which exerts a confounding effect on predicting sediment toxicity as a function of metal concentration – the statistical essence of deriving cleanup levels via the SMS Floating Percentile Method. As a direct consequence, SMS sediment cleanup levels for slag metals are demonstrably underprotective of human health and the environment and will have a significant and disproportionate adverse impact on Colville Tribal members. As stated in the Tribe's comments, because the SMS depends upon data that is disproportionately affected by slag metals predominantly found in the UCR site, cleanup under the draft SMS would be driven towards a deminimus level that would not adequately protect aquatic organisms or higher trophic levels.

Finally, as a matter of comity and regulatory expediency, the order of magnitude difference between the Department of Ecology's proposed sediment quality values and the Tribe's sediment quality values is unacceptable. The proposed rule undermines the Tribe's standards, and creates a situation where regulated entities may seek to use the State's standards to assert that the Tribe's standards are too low and should therefore be disregarded. We know from past experience, that these types of significant discrepancies are detrimental to both the Tribe's and the State's regulatory efforts. The final rule should provide for consistent regulation, and give full effect to the Tribe's sediment quality standards.

At a minimum, the following changes must be made to the proposed rule. First, Tables 7 and 8 must be modified in accordance with the Tribe's recommended standards, or in lieu of adopting the Tribe's recommended standards, Tables 7 and 8 should be modified to exclude Cu, Pb, Zn. /Second, regional
286 background must be appropriately determined./Third, the Tribe's sediment management standards must be
287 clearly recognized in the rule, not just the guidance, as ARARS. Without these fundamental changes, the Tribe's interest will be significantly harmed, and not only will the Tribe be unable to support adoption of the rule, it may unfortunately, be forced to actively oppose it. This would be an extremely disappointing outcome, but I have every reason to believe we can work together to successfully address the Tribe's concerns. We look forward to meeting with you for a government-to-government consultation on this issue in November.

Sincerely,

Gary Passmore, Director
Environmental Trust Department

Cc: John Sirois
Chaitna Sinha
Don Hurst

REVIEW AND EVALUATION OF:

WASHINGTON STATE DEPARTMENT OF ECOLOGY

DRAFT SEDIMENT MANAGEMENT STANDARDS RULE PROPOSED AMENDMENTS

Document Version 1.3

Date: October 29, 2012

Confederated Tribes of the Colville Reservation

DRAFT SEDIMENT MANAGEMENT STANDARDS RULE PROPOSED AMENDMENTS

Washington State Department of Ecology
Sediment Management Standards Rule
Review/Comment Form
Reviewer Name: Confederated Tribes of the Colville Reservation
Sections of Document Reviewed: SMS Rule Chapter 173-204 WAC
Document Version/Date: October 29, 2012

1.0 Introduction

The Confederated Tribes of the Colville Reservation (CTCR) have reviewed and evaluated the Draft Sediment Management Standards (SMS) Rule Proposed Amendments described in Chapter 173-204 WAC (Review Version Dated August 15, 2012). The results of this evaluation demonstrate that there are many serious technical flaws in the proposed SMS Rule Amendments. Accordingly, the CTCR strongly recommend that the Draft SMS Rule Amendments not be promulgated by Washington State Department of Ecology (Department) at this time. Specific issues that need to be addressed before the Draft SMS Rule Amendments can be adopted include:

288 • The proposed freshwater benthic criteria are not protective of benthic-invertebrate communities;

289 • The proposed adjustments to the default scenario for evaluating human health risks will not be protective of Tribal or subsistence resources users;

290 • The proposed ecological bioaccumulation narrative is not comprehendible and cannot be effectively implemented;

291 • The draft SMS Rule Amendments ignore Tribal Standards and Regulations;

292 • The draft SMS Rule Amendments fail to define regional background levels of contaminants and fail to provide a consistent basis for determining natural background levels of contaminants;

293 • The draft SMS Rule Amendments fail to define required quantitation limits for contaminants and default to potentially inappropriate practical quantitation limits;

294 • The draft SMS Rule Amendments fail to provide a basis for meaningful consultation with Tribal governments or the public regarding upward adjustment of sediment cleanup levels; and,

295 • The draft SMS Rule Amendments fail to provide a basis for establishing sediment cleanup levels below the sediment cleanup objectives.

Each of these issues is described in more detail in the following sections of this document. In addition, the recommended steps for resolving each issue are described in the following sections of this document.

2.0 Technical Basis for CTCR Recommendations to Ecology

The following sections of this document describe each of the issues identified by CTCR and provide specific recommendations for resolving the issues in a manner that would support timely promulgation of Draft SMS Rule Amendments.

296 ***Issue # 1A:*** Proposed Freshwater Benthic Criteria Are Not Protective of Benthic Invertebrate Communities and Are Not Consistent with Ecology's Narrative Intent for the Proposed Freshwater Benthic Criteria (Issue 1).

Rationale: Section WAC 173-204-563 of the Proposed SMS Rule Amendments describes two types of sediment cleanup levels based on protection of the benthic community in freshwater sediment, including:

- Sediment cleanup objectives (SCO); and,
- Cleanup screening levels (CSL).

According to Section WAC 173-204-563(2a), the SCOs establish no adverse effect levels, including no acute or chronic effects, on the benthic community. By comparison, the CSLs establish minor adverse effects levels, including minor acute or chronic effects, on the benthic community. The numerical criteria established for the SCOs and CSLs, as presented in Table VII of the Draft SMS Rule Amendments, were developed using a Floating Percentile Model applied to matching sediment chemistry and toxicity data compiled for sites located in Washington and Oregon. While the concept of establishing numerical criteria that define the concentrations of COPCs that represent no and minor adverse effects on the benthic community is reasonable and appropriate, the numerical criteria presented in Table VII of the Draft SMS Rule Amendments are neither reasonable nor appropriate because they do not satisfy the narrative intent of the sediment cleanup levels. That is, the numerical criteria presented in Table VII do not adequately define the concentrations of COPCs that correspond to no or minor adverse effects levels, as required under Section WAC 173-204-563 of the Proposed SMS Rule Amendments.

Proposed Resolution: The freshwater benthic criteria need to be revised to ensure that they represent values that are consistent with the narrative intent of the SQVs (i.e., no adverse effects for the SCOs and minor adverse effects for the CSLs, as stated in WAC 173-204-563). To assist the Department, the CTCR recommend that the numerical sediment quality standards listed in Table 1 be adopted as SCOs and CSLs (see Table 1 Recommended sediment cleanup objectives and cleanup screening levels for sediment quality standards in freshwater ecosystems in Washington State).

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297 ***Issue # 1B:*** Methods Used to Designate Sediment Samples as Toxic or Not Toxic Are Not Appropriate.

Rationale: The Floating Percentile Model (FPM) that was used to derive the numerical criteria presented in Table VII of Section WAC 173-204-563 relies on matching sediment chemistry and sediment toxicity data from sites located in Washington and Oregon. The first step in the application of the FPM is determination of whether adverse biological effects are observed in each sample (called a "hit" if toxicity is observed and called "no hit" if toxicity is not observed; WDOE 2011). Table VIII of Section WAC 173-204-563 describes the procedures that were applied by the Department to determine if individual sediment samples used in the FPM were toxic (i.e., hit) or not toxic (i.e., no hit). These procedures are inappropriate for the designation of sediment samples as toxic or not toxic for several reasons, including:

- The procedures described for normalizing the response data for amphipods, *Hyalella azteca*, and midge, *Chironomus dilutus*, are incorrect for the mortality endpoint. Toxicity test results should be control normalized by dividing the response observed for a test sediment sample by the average response for the control treatment(s). In contrast, Ecology has control normalized the toxicity data for the mortality endpoint by subtracting the response for the control treatment from the response for a test sediment sample. This approach to control normalization biases the designation of sediment samples as toxic or not toxic in a way that results in fewer samples being designated as toxic to benthic invertebrates (see Figure 1). Ecology did correctly control normalize the weight data for both species, however.
- The adverse effects levels presented in Table VIII for interpreting the results of sediment toxicity tests are not consistent with the narrative intent of the SCOs (see Table 2). Specifically, no adverse effects are reported (i.e., sediment samples are designated as not toxic) when:

  - Midge survival (10-d toxicity test) <20% decrease compared to control;
  - Midge growth (10-d toxicity test) <20% decrease compared to control;
  - Amphipod survival (10-d toxicity test) <15% decrease compared to control; and,
  - Amphipod growth (28-d toxicity test) <25% decrease compared to control.

  The biological criteria for no adverse effects levels proposed by Ecology in Table VIII are much larger than appropriate for no adverse effects levels (Ingersoll *et al.* 2005). For the uninitiated, it can be difficult to determine if the biological criteria proposed in Table VIII are reasonable. For this reason, CTCR have expressed these criteria in terms that are easier to comprehend. In Washington State, the Department of Social and Health and Services (WDSHS) uses a Body Mass Index (BMI) as one tool for assessing human health. The BMI is a tool that compares height and weight to determine if an individual is underweight, a healthy weight, or over weight, based on the following scale:

  - BMI < 18.5 – Underweight;
  - 18.5 < BMI < 24.9 – Normal weight;
  - 25 < BMI < 29.9 – Overweight; and,
  - BMI > 30 – Obese.

297 cont. The BMI for a six foot tall human weighing 160 pounds is 21.7. This is the middle of the normal weight range for a six-foot person. In the Proposed SMS Rule Amendment (Table VIII), Ecology has indicated that growth rates of 75% (for amphipods) or 80% (for midge) of the control treatment represent no adverse effect levels. If these same biological criteria were applied to a human scenario, a six foot tall human weighing 120 or 128 pounds would be expected to exhibit no adverse effects. However, WDSHS would classify that individual as underweight based in BMI's of 16.3 or 17.4, respectively. According to WDSHS (2004) individuals with BMIs < 19 are at a high risk of:

- Anemia and nutrient deficiencies;
- Bone loss and osteoporosis;
- Heart irregularities and blood vessel diseases;
- Infertility;
- Increased vulnerability to infection and disease; and,
- Delayed wound healing.

Individuals with the affliction, anorexia nervosa, are often diagnosed based on a BMI of < 17.5. As this example demonstrates, a 20% or 25% reduction in growth would not represent no adverse effects in humans according to the criteria that are being used in Washington State (WSDSH 2004).

Tables 3 and 4 present the results of toxic/not toxic designations for sediment samples from the Upper Columbia River using the reference envelope approach (i.e., the recommended approach) and the approach that was used by Ecology (i.e., identified as the SMS SCO; WDOE 2011). A comparison of the number of samples designated as toxic using the two approaches for four toxicity test endpoints is presented in Table 5. Ecology has not demonstrated that such a magnitude of effect on growth represents no adverse effect in benthic invertebrates. Moreover, the analyses presented in Tables 3, 4, and 5 demonstrate that application of such criteria only rarely identify toxic samples. Therefore, the biological criteria established for the SCOs need to be revised.

- The adverse effects levels presented in Table VIII for interpreting the results of sediment toxicity tests are not consistent with the narrative intent of the CSLs. Specifically minor adverse effects are reported (i.e., sediment samples are designated as not toxic) when:

    - Midge survival (10-d toxicity test) <30% decrease compared to control;
    - Midge growth (10-d toxicity test) <30% decrease compared to control;
    - Amphipod survival (10-d toxicity test) <25% decrease compared to control; and,
    - Amphipod growth (28-d toxicity test) <40% decrease compared to control.

  The biological criteria for minor adverse effects levels proposed by Ecology in Table VIII are much larger than appropriate for minor adverse effects levels (Ingersoll *et al.* 2005). Using the same example for a six foot tall human, a BMI of 13.0 would be calculated for an individual that weighed 40% less than the 160 pound individual (i.e., the individual would weigh 96 pounds). Such a difference between a 160 pound individual and a 96 pound individual would be classified as a "minor adverse effect" using the biological criteria presented in Table VIII for

297 cont. amphipods. However, this example demonstrates that a 30% or 40% reduction in growth would not represent minor adverse effects in humans (i.e., a BMI of 13.0 would be indicative of a grossly underweight human using the biological criteria that are used in Washington State).

- Tables 3 and 4 present the results of toxic/not toxic designations for sediment samples from the Upper Columbia River using the reference envelope approach (i.e., the recommended approach) and the approach that was used by Ecology (i.e., identified as the SMS CSL; WDOE 2011). A comparison of the number of samples designated as toxic using the two approaches for four toxicity test endpoints is presented in Table 5. The case study for the Upper Columbia River demonstrates that application of the biological criteria for CSLs results in designation of even highly contaminated sediment samples as not toxic. The biological criteria presented in Table VIII are also much less protective than those used to develop the National Sediment Inventory (USEPA 2004).

Proposed Resolution: The Department should revise the proposed SMS Rule Amendment to indicate that the acceptability of freshwater toxicity tests will be evaluated using the test acceptability criteria established by ASTM (2012) and USEPA (2000) for control samples. In addition, Table VIII should be revised to describe the correct procedures for control normalizing toxicity test data. Finally, the adverse effect levels presented in Table VIII should be revised to reflect values that correspond to no adverse effects levels and minor adverse effect levels for benthic invertebrate communities. To assist the Department, the CTCR have developed recommended biological criteria that should be included in Table VIII (see Table 6: Recommended methods for designating sediments as toxic or not toxic (i.e., "hit" or "no hit") to benthic invertebrates; Figure 2 provides a visual illustration of the application of the reference envelope approach to designating sediment samples as toxic or not toxic).

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298 ***Issue # 1C:*** The Results of Short-Term Toxicity Tests Do Not Provide a Basis for Directly Establishing Numerical Criteria Consistent With the Narrative Intent of the Sediment Cleanup Levels.

Rationale: Section WAC 173-204-563 of the Proposed SMS Rule Amendments indicates that the numerical criteria presented in Table VII (i.e., the sediment cleanup levels) were developed using matching sediment chemistry and sediment toxicity data. The five toxicity test endpoints that were used in the FPM included:

- Amphipod 10-d mortality;
- Amphipod 28-d mortality;
- Amphipod 28-d growth;
- Midge 10-d mortality; and,
- Midge 10-d growth.

The data compiled for these five endpoints were used directly to derive the numerical SCOs and CSLs. While such data (if properly interpreted to identify hits and no hits; see Issue 1B above) are likely to provide some of the information needed to derive numerical criteria for managing contaminated sediments, they do not provide all of the information needed to establish sediment cleanup levels that are protective of the benthic

298 cont. community in freshwater ecosystems. Some of the key limitations of the data used by the Department to establish the numerical SCOs and CSLs include:

- The biomass of benthic invertebrates was not considered in the derivation of numerical criteria. Biomass is calculated as the product of survival and growth (weight; i.e., Biomass = Survival x Weight, where survival and weight are expressed as percentages on a control-normalized basis). Biomass is an important endpoint because one of the ecosystem services that the benthic community provides is food for fish and wildlife species. Therefore, the amount of food available for fish and wildlife is reduced when the biomass of benthic invertebrates decreases. Because biomass integrates the survival and growth endpoints, it frequently provides a more sensitive indicator of effects on the benthic community than does either survival or growth (MacDonald *et al.* 2010; 2011; 2012). To illustrate the relative sensitivities of the biomass and survival endpoints, matching sediment toxicity data for midge and amphipods for the Upper Columbia River site are presented in Figure 3 and 4 (MacDonald *et al.* 2012). Biomass is a more sensitive endpoint than survival for any sample plotted below the line of unity on these figures. Failure to consider the biomass endpoint indicates that the numerical SCOs and CSLs are likely to be underprotective of the benthic community.

- The reproduction of benthic invertebrates was not considered in the derivation of numerical criteria. For both of the species used by the Department in the derivation of freshwater SCOs and CSLs, standard methods are available to evaluate reproduction (See ASTM 2012; USEPA 2000). Reproduction is an important endpoint because the results of studies conducted on many invertebrates indicate that adverse effects on reproduction can occur at concentrations of COPCs substantially lower than those that adversely effect either survival or biomass. Figure 5 shows the relationship between PCB concentration and reproduction of amphipods in 42-day toxicity tests conducted with sediment samples from the Anniston PCB Site, Anniston, AL (Ingersoll *et al.* 2012); toxicity thresholds for survival and biomass are also shown. Failure to consider the reproduction endpoint indicates that the numerical SCOs and CSLs are likely to be underprotective of the benthic community. While it is understood that sufficient data to derive numerical criteria directly for the reproduction endpoint for amphipods or midge are likely not available, an application factor can be used to adjust the SCOs and CSLs in a manner to ensure that they protect against adverse effects on the reproduction of benthic invertebrates.

- The results of toxicity tests conducted on more sensitive benthic invertebrate species were not considered in the derivation of numerical criteria. Data collected at the USGS Columbia Environmental Research Center and elsewhere over the past decade indicate that freshwater molluscs, including mussels and snails, can be more sensitive to sediment-associated COPCs than are midge or amphipods (Besser *et al.* 2009). Similarly, sediments contaminated with metals and PAHs associated with coal mining activities were more toxic to mussels than to either amphipods or midge (Wang *et al.* 2012). Therefore, numerical criteria derived using toxicity data for midge and/or amphipods only may not be sufficiently protective of freshwater molluscs or other invertebrates that exhibit similar sensitivities to contaminants. Failure to consider data on the toxicity of contaminated sediments to freshwater molluscs indicates that the numerical

298 cont. SCOs and CSLs are likely to be underprotective of the benthic community. Importantly, there is no reason to believe that SCOs and CSLs presented in Table VII are protective of threatened and endangered species of invertebrates or listed species of invertebrates.

Proposed Resolution: The sediment cleanup objectives and cleanup screening levels must be revised to provide numerical criteria that correspond with no adverse effects levels (for the SCOs) and minor adverse effect levels (for the CSLs). Table 1 presents the SCOs and CSLs that are recommended by CTCR that meet the narrative established by the Department.

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299 ***Issue # 1D:*** The Proposed Sediment Clean Objectives and Cleanup Screening Levels are Not Comparable to Existing Sediment Quality Guidelines with Similar Narrative Intent.

Rationale: According to Section WAC 173-204-563, the SCOs establish no adverse effect levels, including no adverse acute or chronic effects, on the benthic community. If the numerical SCOs truly represented no adverse effects levels, they should be comparable to other sediment quality guidelines that are intended to represent no adverse effects levels. In 2000, MacDonald *et al.* (2000) conducted a review of the literature to identify sediment quality guidelines that represent threshold effect concentrations (TECs; i.e., no adverse effects levels). The sediment quality guidelines that corresponded with this narrative intent were compiled and used to derive consensus-based TECs (Table 7). Comparison of the consensus-based TECs with the SCOs that are proposed by the Department in Table VII of Section WAC 173-204-563 indicates that many of the SCOs are comparable to the TECs (i.e., within a factor of three). However, the following SCOs are substantially higher than the TECs and, hence, do not represent no adverse effect levels for these contaminants (see Table 7):

- Copper;
- Lead;
- Mercury,
- Zinc;
- Total PAHs;
- Sum DDD;
- Sum DDE;
- Sum DDT; and,
- Endrin.

According to Section WAC 173-204-563, the CSLs establish minor adverse effect levels, including no adverse acute or chronic effects, on the benthic community. If the numerical CSLs truly represent no adverse effects levels, they should be comparable to other sediment quality guidelines that are intended to represent minor adverse effects levels. In 2000, MacDonald *et al.* (2000) conducted a review of the literature to identify sediment quality guidelines that represent probable effect concentrations (PECs; i.e., concentrations of COPCs above which adverse effects are likely to be observed). The sediment quality guidelines that corresponded with this narrative intent were compiled and used to derive consensus-based PECs (Table 8). Comparison of the consensus-based PECs with the SCOs that are proposed by the Department in Table VII of Section WAC 173-204-563 indicates that many of the SCOs are comparable to the PECs (i.e., 299 cont. within a factor of three). However, the following CSLs are substantially higher than the PECs and, hence, do not represent minor adverse effect levels for these contaminants (see Table 8):

- Arsenic;
- Copper;
- Lead;
- Zinc;
- Total PCBs;
- Sum DDD; and,
- Sum DDT.

Importantly, many of the proposed SCOs and CSLs are substantially higher than the sediment quality standards that have been established by the Confederated Tribes of the Colville Reservation and the Spokane Tribe of Indians (Table 9). Therefore, neither the proposed SCOs nor the proposed CSLs would provide an adequate basis for protecting benthic invertebrate communities on lands managed by tribal governments.

Proposed Resolution: The sediment cleanup objectives and cleanup screening levels must be revised to provide numerical criteria that correspond with no adverse effects levels (for the SCOs) and minor adverse effect levels (for the CSLs; see Table 1 for CTCR recommended SCOs and CSLs). In addition, precedence of tribal sediment quality standards and other regulations must be explicitly recognized in the Proposed SMS Rule Amendments.

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300 ***Issue # 1E:*** The Proposed Sediment Quality Objectives and Cleanup Screening Levels for Certain Metals Contaminants are Gross Outliers Disproportionately Affected by Slag Influence in Upper Columbia River Sediments.

Rationale: The SCO and CSL chemical criteria for copper, lead, and zinc (and to a lesser extent, arsenic and mercury) derived using the Floating Percentile Method (FPM) are demonstrably high compared to similar chemical criteria derived using other established methods to predict toxicity (See Figure 6). Figure 6 also demonstrates that SCO and CSL chemical criteria for other metals (arsenic, cadmium, chromium, mercury, nickel) derived using FPM do not differ significantly from chemical criteria, such as Threshold Effects Concentrations (TECs) and Probable Effects Concentrations (PECs). Both the CCTR and the Spokane Tribe of Indians (STI) have adopted SQVs based on TECs from MacDonald *et al.* (2000). Comparison of the CTCR and STI sediment quality values with the SQVs proposed by Ecology show reasonable agreement for all metals listed except copper, lead, and zinc (and to a lesser extent, arsenic; Table 9). The degree of difference between Ecology-proposed SCOs/CSLs and sediment quality standards (SQSs) adopted by CTCR and STI is significant. For example, the Ecology SCOs for each of copper, lead, and zinc are at least one full order of magnitude greater than the TEC for each of those same metals, as adopted in the CTCR sediment quality standards. For zinc, the difference between the Ecology SCOs is 26 times greater than the TEC for zinc adopted by the CTCR. This disparity is symptomatic of a contaminant-specific disconnect between FPM generated SCOs/CSLs and the established body of science that associates concentrations of metals in sediment with benthic toxicity.

300 cont. The same metal-specific disconnect between the proposed FPM-derived freshwater SCOs/CSLs in predicting toxicity in Lake Roosevelt sediments compared to PEC-derived SQVs is apparent in Figure 7, which plots the number of false negatives generated by applying the Ecology-proposed SCOs (designated as SQS in Figure 7) to metals in Lake Roosevelt sediment stations identified by bioassay as being toxic (MacDonald *et al.*, 2012). Figure 7 also plots the number of false negatives generated by applying TEC and PEC values to the same Lake Roosevelt dataset. The graphic clearly demonstrates that CSLs generated by both FPM and PEC methods appear to demonstrate similar predictability to generate false negatives for the majority of metals included in the statistical analysis: arsenic, cadmium, chromium, mercury, and zinc. In significant contrast, the FPM generates SCOs/CSLs with significantly lower reliability/predictability of toxicity from copper, lead, and zinc in Lake Roosevelt than SQVs generated by the PEC method.

The reason for the difference in predictability between FPM and TEC/PEC applied to Lake Roosevelt appears to be an artifact of the skewed dataset input to the FPM black box. Organic contaminants are the predominant drivers of toxicity at the vast majority of sediment sites in Washington (Oregon and Idaho) that constitute the final database used to drive the FPM. In contrast, metals are the predominant drivers of toxicity at a comparatively small number of sites, all of which are located east of the Cascades. As is recognized by the authors of the *Development of Benthic SQVs for Freshwater Sediments in Washington, Oregon, and Idaho* (WDOE 2011), only ~ 10% of the stations (65 out of 648) represented in FPM final dataset used to derive SQS and CSL values for metals-influenced freshwater sediments come from sites located east of the Cascades. Of the 65 stations from sites east of the Cascades that met study criteria for inclusion in the final FPM dataset, ~75% (50 out of 65) are from a single site - Lake Roosevelt. When processed through the FPM a relatively small subset of data can cause a relatively large bias, if the subset of data demonstrates a poor relationship between sediment chemistry and benthic toxicity.

Such is the situation regarding copper, lead, and zinc (and to a lesser extent, arsenic) in Lake Roosevelt, as a subset of the total dataset considered in the FPM. Although toxicity is evident in Lake Roosevelt sediments as shown in Figure 8, identification of a consistent dose-response relationship has not been established using the existing data. As concluded in the *Evaluation and Interpretation of the Sediment Chemistry and Sediment Toxicity Data for the Upper Columbia River Site* (MacDonald *et al.* 2012), slag content is an important determinant of sediment toxicity for slag affected sediment samples in Lake Roosevelt sediment. The MESL report also concludes that slag-influenced data from Lake Roosevelt site does <u>not</u> provide a consistently accurate basis to predict the presence and absence of toxicity. Furthermore, the MESL report concludes that sediment chemistry and toxicity data from Lake Roosevelt does <u>not</u> support the development of robust concentration-response relationships applicable throughout the Upper Columbia River region. Much more work is necessary to better understand slag's effect on benthic toxicity, but the existing body of science makes exceedingly clear that slag's influence produces significant variability compared to the same COCs in non-slag bearing sediment, such as sediment data reported from the Spokane River (the only other "metals site" in eastern Washington, Oregon or Idaho input to the FPM).

Lake Roosevelt is the only slag dominated freshwater sediment site in eastern Washington (Oregon or Idaho). Because the number of Lake Roosevelt stations

300 cont. compared to stations at other metals-influenced sites located east of the Cascades is so disparate, the Lake Roosevelt dataset is a profound determinant on statistics generated from the combined dataset from east of the Cascade sites. However, Lake Roosevelt is far from a typical metals site from which to determine SCOs/CSLs based on associations between sediment chemistry and benthic toxicity. Slag is present in depositional environments throughout Lake Roosevelt at concentrations ranging from non-detect to ~90%. Slag grain size demonstrates extreme variability as well, ranging from clay size to coarse sand size fragments. The major COCs in Teck Cominco smelter slag are copper, lead, and zinc (and to a lesser extent, arsenic). The statistical association between copper, lead, and zinc chemistry and benthic toxicity that is well established in other freshwater environments is confounded in Lake Roosevelt due to the influence of slag. While multiple studies (Cox 2002; Paulson 2006; Ryan 2011; MacDonald *et al.* 2012) observe that metals in Lake Roosevelt slag grains leach to pore water, the available data suggests that the bioavailability of copper, lead, and zinc from slag can vary widely from bioavailability of those same metals in more typical fine grained sediment.

In tacit recognition that proposed SCOs/CSLs for metals derived using the FPM are problematic and demonstrate a systematic bias as a function of the final dataset, in Section 173-204-573 (2)(l) of the draft SMS Rule Amendments, the Department states there are freshwater sediment environments where the chemical criteria in Table VII (the SCOs/CSLs) are not predictive of benthic toxicity, such as metals, milling or smelting sites. No criteria is proposed in the Draft SMS Rule Amendments by which Ecology will discern whether a given sediment site is a “metals mining, milling or smelting” site. Indeed, sometimes sediments come to be located at a significant distance from the source of sediment contamination. How Ecology intends to determine provenance from contaminated sediments is not mentioned in the draft SMS Rule Amendments. Presumably, the first indicator would be the mere presence of elevated metals, which would categorically include many, if not most, sediment sites in mining country.

Ironically, it is the Lake Roosevelt site and the “unique” geochemical conditions therein which are largely responsible for Ecology’s position that the unreasonably high SCOs/CSLs for copper, lead, and zinc are not applicable to metals-influenced sites. In these situations, the Department proposes that alternative methods be employed for characterizing benthic toxicity (referenced in the Draft SMS Rule Amendments as a “biological over-ride”), unless Ecology determines that they are adequately predictive. Rather than using either circular logic or the results of individual toxicity tests to counter SCOs/CSLs that are shown to be problematic at mining-related sites (i.e., for copper, lead, and zinc), sediment contamination should be assessed using a “weight of evidence” approach that considers empirical sediment quality guidelines/standards, sediment toxicity tests, and other factors exerting potentially significant effects on toxicity, such as grain size and slag content.

Section 173-204-573 (2)(k) states that at sediment sites that demonstrate levels above the CSL (such as mining, milling or smelting sites), bioassays shall be conducted to evaluate benthic toxicity. This position is particularly egregious with regards to lead and zinc, metals at which the FPM-predicted minor adverse effects level are “unknown but above the CSL.” Applying the synthetically elevated CSLs for copper, lead, and zinc as screening values to determine which sites warrant bioassays to determine sediment cleanup levels is critically flawed because the FPM CSLs are biased high by the influence of slag unique to Lake Roosevelt. Many (if not most) sites east of the

300 cont. Cascades with no slag influenced sediments may not meet screening criteria for additional investigation by way of bioassays because concentrations of copper, lead, or zinc are low compared to the underprotective – CSLs which are so heavily influenced by slag dominated sediments from Lake Roosevelt. Using the synthetically-elevated CSLs for copper, lead, and zinc as defacto default values are neither protective of benthic organisms nor is the regulatory philosophy inherent in using them in that manner consistent with a conservative approach to managing the risk to human health and the environment at contaminated sediment sites.

Both the State of Washington and CTCR are members of the Upper Columbia River Natural Resource Trustee Council. Teck American Incorporated (the American proxy for the responsible party at UCR, Teck Cominco Metals Incorporated – Teck), recently submitted public comments on the Draft Injury Assessment Plan for the Upper Columbia River prepared for the UCR Natural Resource Trustee Council. Teck's public comments delineate the disproportional impact on Tribal members of Ecology's policy and technical decisions inherent in slag outlier numerical criteria proposed in the Draft SMS Rule Amendments:

> *"The … Hazardous Substances Control Act for the Spokane Tribe of Indians and the Confederated Tribes of the Colville Reservation that are … incorporated throughout the Plan establish risk and cleanup standards at concentrations that are far lower than the standard of risk established for federal and state assessments and cleanup. Those standards should not be relied upon in assessing injury absent some technical basis establishing the validity and reasonableness of those standards"*

Since the only metals-based SCQs in CTCR and STI regulations are "far lower" than the SCOs/CSLs of copper, lead, and zinc, the Potentially Responsible Party is clearly foretelling that they consider the SCOs/CSLs for copper, lead and zinc to be valid numerical thresholds for delineating natural resource injury in the Upper Columbia River Site. Not only will that set maximum cleanup values for copper, lead and zinc at levels far above those shown by experts in the field to be toxic to benthic organisms, but our preliminary estimates are that applying SCOs/CSLs to the UCR Site will decrease the extent of injured sediments by ~90% compared to CTCR and STI SQSs. Application of SCOs/CSLs for metals, as proposed in the Draft SMS Rule Amendments will have a disproportionate effect upon the membership of the CTCR and the residents of the Colville Indian Reservation.

Proposed Resolution: The sediment cleanup objectives and cleanup screening levels must be revised to provide numerical criteria that correspond with no adverse effects levels (for the SCOs) and minor adverse effect levels (for the CSLs; see Table 1).

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301 ***Issue #1F:*** The Proposed Cleanup Screening Levels for Certain Contaminants are higher than Toxicity Thresholds Based on Spiked-Sediment Toxicity Tests.

Rationale: According to Section WAC 173-204-563, the CSLs establish minor adverse effect levels, including no adverse acute or chronic effects, on the benthic community. If the numerical CSLs truly represent minor adverse effects levels, they should be substantially lower than the toxicity thresholds that have been established based on the spiked-sediment toxicity tests (i.e., because the CSLs are intended to be used for

301 cont. assessment field-collected sediments that likely contain mixtures of COPCs and the results of spiked-sediment toxicity tests provide toxicity thresholds for individual COPCs in sediments; the results of laboratory studies have demonstrated that toxicity thresholds derived from spiked-sediment toxicity tests are lower when mixtures of COPCs are tested; Swartz *et al.* 1988).

While a comprehensive review of the literature on spiked sediment toxicity testing was not conducted, the literature that was reviewed for copper demonstrated that the results of spiked-sediment toxicity tests indicate toxicity to benthic invertebrates is frequently observed at concentrations of copper below the CSL (i.e., 1200 mg/kg DW). For example, Malueg *et al.* (1986) reported a 48-h LC_{50} (i.e., median lethal concentration, which is the concentration of copper that killed 50% of test organisms during the toxicity test) of 654 to 688 mg/kg DW for the water flea, *Daphnia magna*. For the midge, *Chironomus dilutus*, a 10-d LC_{50} of 857 mg/kg DW was reported for copper (Cairns *et al.* 1984). By comparison, Cairns *et al.* (1984) reported a 48-h LC_{50} of 937 mg/kg DW for the water flea, *D. Magna*, and a 10-d LC_{50} of 964 mg/kg DW for the amphipod, *Gammarus lacustris*. All of these median lethal concentrations for copper are substantially **below** the levels that the Department expects to cause minor adverse effects on the benthic community. Therefore, the CSL for copper is not protective of the benthic community.

Proposed Resolution: The sediment cleanup objectives and cleanup screening levels must be revised to provide numerical criteria that correspond with no adverse effects levels (for the SCOs) and minor adverse effect levels (for the CSLs; see Table 1).

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302 ***Issue # 1G:*** The Sediment Cleanup Objectives and Cleanup Screening Levels Do Not Provide a Reliable Basis for Identifying Sediments Causing No Adverse Effects or Minor Adverse Effects on Benthic Communities.

Rationale: According to Section WAC 173-204-563(2a), the SCOs establish no adverse effect levels, including no acute or chronic effects, on the benthic community. Accordingly, no adverse effects on benthic invertebrates should be observed when the concentrations of COPCs are below the SCOs. To determine if the SCOs provide a reliable basis for classifying sediment samples as not toxic, matching sediment chemistry and toxicity data from the Upper Columbia River and elsewhere in Washington State were compiled. In the resultant database, individual sediment samples were designated as toxic or not toxic using:

- Methods used by the Department (As described in Table VIII of Section WAC 173-204-563); or,
- Methods more commonly applied by sediment quality investigators (i.e., statistical comparison to negative control or reference envelope approach; see Table 10 for an overview of toxicity designation methods by study; Table 11 provides test acceptability criteria based on negative control results – these criteria are typically applied for identifying acceptable reference samples).

In this analysis, the SCOs were considered to provide a reliable basis for designating sediment samples as not toxic if the incidence of toxicity was <20% when the concentrations of all COPCs were below the SCOs (MacDonald *et al.* 2002; 2009; 2012).

302 cont. In the first analysis, the reliability of the SCOs was evaluated using the toxicity designations assigned by the Department. The results of this analysis showed that the incidence of toxicity was generally low (about 6%) for samples from the Upper Columbia River with the concentrations of all COPCs below the SCOs, when the results of 28-d toxicity tests with amphipods (survival or growth) were considered (Table 12). While the incidence of toxicity was also low when midge growth was considered (i.e., IOT of about 6%), toxicity to midge was frequently observed (i.e., about 29% of samples were toxic) when midge survival was considered for samples from the Upper Columbia River. These results indicate that the SCOs do not represent no adverse effects levels in Upper Columbia River sediments. No data from elsewhere in Washington State were available to evaluate the reliability of the SCOs.

In the second analysis, the reliability of the SCOs was evaluated using the toxicity designations assigned by statistical comparison to negative control or using reference envelope approach. The results of this analysis showed that the incidence of toxicity was generally low (about 5 to 13%) for samples from the Upper Columbia River with the concentrations of all COPCs below the SCOs, when the growth or biomass of amphipods in 28-d toxicity tests were considered (Table 13). However, about 40% of the samples with COPC concentrations below the CSOs were toxic to amphipods when 28-d survival was considered. The incidence of toxicity to midge was also elevated in sediment samples from the Upper Columbia River with the concentrations of all COPCs below the SCOs (i.e., about 23% for midge survival, 40% for midge growth, and 70% for midge biomass). For both 10-d and 28-d toxicity tests conducted with sediment samples from elsewhere in Washington State, the incidence of toxicity to amphipods exceeded 20% when the concentrations of all COPCs were below the SCOs (Table 13). These results demonstrate that the SCOs do not provide a reliable basis for establishing the levels of COPCs that represent no adverse effect levels. These results also emphasize the importance of considering the biomass endpoint in assessments of sediment quality conditions.

According to Section WAC 173-204-563(2a), the CSLs establish minor adverse effects levels, including minor acute or chronic effects, on the benthic community. Using the toxicity designations assigned by the Department, the incidence of toxicity to amphipods or midge was low (i.e., 0 to about 10%) when the concentrations of all COPCs were below the CSLs (Table 14). However, a different picture emerges when sediment samples were designated as toxic or not toxic using statistical comparison to negative control or reference envelope approach. More specifically, the results of this analysis showed that the incidence of toxicity was generally low (about 8 to 19%) for samples from the Upper Columbia River with the concentrations of all COPCs below the CSLs, when the growth or biomass of amphipods in 28-d toxicity tests were considered (Table 15). However, about 42% of the samples with COPC concentrations below the CSLs were toxic to amphipods when 28-d survival was considered. The incidence of toxicity to midge was also elevated in sediment samples from the Upper Columbia River with the concentrations of all COPCs below the CSLs (i.e., about 19% for midge survival, 40% for midge growth, and 66% for midge biomass). For both 28-d toxicity tests conducted with sediment samples from elsewhere in Washington State, the incidence of toxicity to amphipods exceeded 20% when the concentrations of all COPCs were below the CSLs (Table 15). These results demonstrate that the CSLs do not provide a reliable basis for establishing the levels of COPCs that represent no adverse effect levels. These results

302 cont. also emphasize the importance of considering the biomass endpoint in assessments of sediment quality conditions.

It is important to note that the proposed SCOs and CSLs were developed using the results of toxicity tests conducted field-collected sediment samples that typically contain complex mixtures of COPCs. To determine if the resultant numerical criteria would provide a reliable basis for classifying sediment samples from the Upper Columbia River or elsewhere in Washington State as toxic and not toxic, a supplemental data analysis was conducted. In this evaluation, the incidence of toxicity to amphipods and midge was determined when the concentrations of individual COPCs were below the SCO or CSL. This analysis was conducted using the toxicity designations that were established by statistical comparison to negative control or using reference envelope approach. The results of this analysis (Tables 16 to 21) indicate that the SCOs for the individual COPCs evaluated cannot be used to reliably classify sediment samples from the Upper Columbia River or elsewhere in Washington State as not-toxic. That is, the incidence of toxicity below the SCOs for individual COPCs exceeds 20% for one or more of the endpoints considered. Therefore, the SCOs do not define the concentrations of COPCs that represent no adverse effect levels.

Proposed Resolution: The sediment cleanup objectives and CSLs must be revised to provide numerical criteria that correspond with no adverse effects levels (for the SCOs) and minor adverse effect levels (for the CSLs). See Table 1 for a listing of the SCOs/CSLs that are recommended by the CTCR.

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303 ***Issue # 2:*** Adjustments to the Default Scenario for Evaluating Human Health Risks Will Not Be Protective of Tribal or Subsistence Resources Users.

Rationale: Section WAC 173-204-561(3b) of the Proposed SMS Rule Amendments describe the process for establishing SCOs based on the protection of human health. In general, the procedures described in that section of the document are reasonable. More specifically, this section of the document indicates that the human health risk-based SCOs shall be calculated using reasonable maximum exposure scenarios for a site and that the reasonable maximum exposure scenario shall be determined using tribal fish and shellfish consumption rates (i.e., Default Scenario). As such tribal fish and shellfish consumption rates are likely to be appropriate for both tribal and non-tribal subsistence users of aquatic resources, SCOs derived using the reasonable maximum exposure scenarios are likely to be protective of virtually all resource users at a site.

While the Default Scenario is likely to be broadly protective of tribal and non-tribal uses for aquatic resources (assuming that the Department selects appropriate tribal fish and shellfish consumption rates, which are yet to be determined), Section WAC 173-204-561(3b) of the Proposed SMS Rule Amendments describe a site-specific override of the Default Scenario. More specifically, this section of the document indicates that the Department ***shall*** consider other information when selecting or approving the exposure parameters used to represent the reasonable maximum exposure scenario including:

- Historic, current, and future tribal use of fish and shellfish from the general vicinity of the site;
- Relevant studies and best available science related to fish consumption rates;

303 cont.

- The portion of an individual's diet that is obtained, or could be obtained from the site;
- The size of the site relative to the fish and shellfish home range; and,
- Other information determined by the Department to be relevant.

Collectively, this additional documentation indicates that the Default Scenario is unlikely to be applied at any given site (i.e., because the Department must consider site-specific exposure information). This is a problem because the Default Scenario provides a basis for providing an acceptable and uniform level of protection to human health at all sediment contaminated sites. Application of this approach will ensure that, over time, individual site cleanups will result in regional reductions in human health risks associated with consumption of fish and shellfish. In contrast, the approach described in WAC 173-204-561(3b) will result in decisions on the management of contaminated sediments that may protect human health at each site (depending on the exposure parameters that are ultimately selected), but will not protect human health on a regional basis. This is because the Department's approach to human health risk assessment assumes that dietary exposure to bioaccumulative contaminants is negligible for all other sources of fish and shellfish. By definition, this assumption is incorrect because both point and non-point sources of bioaccumulative COPCs result in broad contamination of fish and shellfish resources throughout the state (e.g., mercury). Therefore, the total dietary exposure of tribal and other subsistence users to bioaccumulative COPCs in fish and shellfish tissues will almost certainly pose unacceptable risks to human health. This represents a serious environmental justice issue than needs to be resolved before the Proposed SMS Rule Amendments can be promulgated.

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304 Ecology has withdrawn its initial commitment to establish a default Fish Consumption Rate (FCR) within the Draft SMS and instead Ecology proposes that FCRs will be established on a site-by-site basis – a concept in tension with the tenet of a Reasonable Maximum Exposure (RME) default rate scenario. At the same time, several key exposure parameters in the denominator of the equation used to calculate human health risk-based cleanup levels, including Fish Diet Fraction (FDF) and Site Use Factor (SUF), are introduced in the Draft SMS Rule Amendments with default values of 1.0, meaning any site-specific application of these poorly defined variables will have the effect of decreasing the effective FCR and consequently driving human health risk-based cleanup levels towards less protective scenarios.

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305 In general, there is no justification for applying a Fish Diet Fraction (FDF) when most or all of the fish and shellfish in an individual's diet is obtained or has the potential to be obtained in the future from waters affected by a contaminated site - such is the case for tribal fish consumers. While tribes at present obtain most or all of their fish from local sources, it is important to recognize that at the time treaties and executive orders establishing reservations were promulgated, Indian people obtained all of their fish from local waters. Furthermore, tribes' reserved rights under treaties and other legal agreements entitle them to do so in perpetuity. The SMS guidance too narrowly defines the sphere of influence of a contaminated site, referring to fish "from the site or the general vicinity of the site." But clearly, contamination at a site will often have impacts on fish resources beyond the site boundaries. A diet fraction that is selected by reference to Ecology's narrow definition will exclude fish that are adversely affected by contamination at the site, resulting in underprotective sediment cleanup standards.

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306 Similarly, use of the Site Use Factor (SUF) introduced in the SMS may effectively diminish the RME scenario by assigning a value of less than 1.0 to the equation used to derive risk-based cleanup levels as a function of "the percentage of time that a fish/shellfish is in contact with contaminants at the site." Ecology's application of the SUF is generally not supportable where tribes' right and resources are affected. For the case of salmon, Ecology's propensity to assert that the contaminants in a salmon's tissue are due "primarily" to sources other than a contaminated site suggests a predisposition to resolve the science and policy questions at issue in a manner that favors Potentially Liable Parties (PLPs) and disfavors protection of human and ecological health. Additionally, to the extent that scientific uncertainties remain about the source of contaminants in fish tissue at a given site, a conservative predisposition towards a more rather than less protective cleanup level would guide against reducing the FCR.

Proposed Resolution: Eliminate the site-specific override of the default scenario for evaluating human health risk at a site [i.e., as described in WAC 173-204-561(3b)].

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307 ***Issue # 3:*** The Ecological Bioaccumulation Narrative is not Comprehendible and Cannot be Effectively Implemented.

***Rationale*:** Section WAC 173-204-564 of the Proposed SMS Rule Amendments describes the process for establishing sediment cleanup levels based on the protection of higher trophic level species. More specifically, this section of the document indicates that:

> "Sediment cleanup objectives and cleanup screening levels based on protection of higher trophic level species shall not be established at concentrations that do not have the potential for minor adverse effects."

This statement contains a double negative. When the double negative is removed, the statement indicates that SQOs and SCLs levels based on protection of higher trophic level species shall be established at concentrations that have the potential for minor adverse effects. It is unclear why such SQOs and SCLs must be established at levels that result in minor adverse effects on higher trophic level species (i.e., wildlife species). A better approach is to require that the SQOs and SCLs be established at levels that are not associated with adverse effects on wildlife species.

The definitions of minor adverse effects contained in Section WAC 173-204-564 of the Proposed SMS Rule Amendments are also problematic. For threatened and endangered or listed species, minor adverse effects mean "a significant disruption of normal behavior patterns, such as breeding, feeding, or sheltering." It is unclear why SQOs and SCLs must be established at levels that result in a significant disruption of normal behavior patterns, such as breeding, feeding, or sheltering of threatened and endangered or listed species. For other higher trophic level species, minor adverse effects mean "effects that impair the higher trophic level species reproduction, growth, or survival. Again, it is unclear why SQOs and SCLs must be established at levels that result in impairment of the reproduction, growth, or survival of higher trophic level species.

Proposed Resolution: Rewrite the ecological bioaccumulation narrative in clearly understandable language and ensure that the narrative provides a basis for protecting

307 cont. higher trophic level species from adverse effects associated with exposure to bioaccumulative COPCs (i.e., Section WAC 173-204-564).

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308 ***Issue # 4:*** Tribal Standards and Regulations Cannot Be Ignored or Marginalized.

Rationale: Section WAC 173-204-560 of the Proposed SMS Rule Amendments describes the process for establishing SCOs and CSLs for a contaminant in sediment. More specifically, these sections of the document indicate that the risk-based concentration of a contaminant is the lowest of:

- The concentration of the contaminant based on protection of human health, as defined in WAC 173-204-561(2)/WAC 173-204-561(3);
- The concentration or level of biological effects of the contaminant based on benthic toxicity, as defined in WAC 173-204-562 to WAC 173-204-563;
- Requirements in other applicable federal, state, and local laws;
- Natural background; and,
- Practical quantitation limit.

While a number of tribal governments within Washington State have established sediment quality standards and/or regulations relative to the management of contaminated sediments, the Proposed SMS Rule Amendments do not provide for utilizing such tribal sediment quality standards or regulations in the establishment of the risk-based concentrations of contaminants in sediment. This is inappropriate and needs to be rectified before the Proposed SMS Rule Amendments are promulgated.

Proposed Resolution: The SMS two-tier framework needs to be revised to explicitly identify the role of tribal standards and regulations in the establishment of risk-based levels of sediment-associated contaminants (i.e., in addition to other applicable federal, state, and local regulations in Section WAC 173-204-560).

Issue # 5: Regional or Natural Background Levels of Contaminants should not be Determined on a Case-by-Case Basis.

Rationale: Section WAC 173-204-560(5) of the Proposed SMS Rule Amendments of the Proposed SMS Rule Amendments describes the process for establishing sediment cleanup objectives and CSLs for a contaminant in sediment, respectively. More specifically, these sections of the document indicate that the SCOs and CSLs is the highest of:

- The risk-based concentration of the contaminant, based on WAC 173-204-561 to WAC 173-204-564;
- Natural background or Regional background; and,
- Practical quantitation limit.

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309 While it is reasonable and appropriate to consider background levels of contaminants in the establishment of SCOs and/or CSLs, the Proposed SMS Rule Amendments do not provide sufficient information to ensure that natural background or regional background concentrations of contaminants are determined using consistent and scientifically-

309 cont. defensible procedures. As establishment of background levels of COPCs is of fundamental importance to the sediment quality assessment and management process, other jurisdictions have either determined background levels on an *a priori* basis and/or established formal procedures for determining background levels (See Protocol 4 for Contaminated Sites, promulgated under the British Columbia Environmental Management Act).

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310 Under certain circumstances, the contaminant-specific values established for "Regional Background" will define the maximum allowable level for cleanup under the two-tiered framework utilized in the proposed SMS Rule Amendments. ***"That portion of an embayment or watershed outside the areas with contamination attributable to one or more specific sources"*** is cited in the proposed SMS Rule Amendments, as indicative of a geographic area appropriate to determine Regional Background. It is essential that the proper relative scale be employed when considering Regional Background. The context of "watershed" implies freshwater by convention whereas regional background in a context delineated by the boundaries of an "embayment" or "baywide" implies a saltwater hydrologic context. While clarification of both saltwater and freshwater terminology is warranted, the need to define freshwater watershed on a regional scale is most pressing and has the greatest potential for misapplication. In the context of the proposed SMS Rule Amendments, "watershed" is synonymous with a hydrologic drainage basin of regional scale. Watersheds in the United States have been delineated by the U.S. Geologic Survey (USGS) using a national standard hierarchical system based on surface hydrologic features into four levels of successively smaller drainage basins (hydrologic units). Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two to twelve digits based on the six levels of classification. All drainages within Washington State are wholly encompassed within the (first level) Pacific Northwest Water Resource Region (2-digit HUC = 17). For purposes of applying SMS regional background within Washington State, the second level (4-digit HUC) or sub-region classification is most appropriate. Please see comments submitted from CTCR to Ecology dated 1/4/2011 and 4/18/2011 for further discussion of Regional Background and its application within the SMS Rule.

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311 Defining contaminant-specific sediment values representative of Regional Background is a responsibility more appropriately borne by Ecology than by Responsible Parties at a given sediment site. Ecology-derived values for Regional Background should be based on the best regional sediment data sets available at the time of the determination, as well as provide for incorporation into the regional calculation of more and better data sets that may be collected in the future. As an underlying principle for determining regional background, Ecology should develop and apply minimum threshold tests for sediment data extent and quality within an ecologically conservative context to be consistent with policy that provides for a cleanup process that tends to being more rather than less protective. SMS Rule guidance should also have provisions for Responsible Parties to propose alternative contaminant-specific values or geographic scale for consideration by the department.

In contrast to the approach that has been used in other jurisdictions, the Proposed SMS Rule Amendments indicate that the Department will determine the appropriate statistical analyses, number and type of samples, and analytical methods to establish a regional background on a case-by-case basis. This is an ill-considered approach that will lead to inconsistent or inappropriate methods being used to establish background and, ultimately, to unfair application of the SMS Rule.

311 cont. CTCR recommends that Ecology consider samples obtained during the National Uranium Resource Evaluation (NURE) program during 1976-1979 as a reasonable starting point for determining regional background for Upper Columbia Region of Washington. Since the original study, USGS and independent researchers (Church 2007) have applied improved analytical methods to archived subsets of NURE samples that have significantly improved the focus and watershed level applicability of the NURE data set. Assessment of geochemical background from NURE sediment data will provide a strong basis for determining regional background at metals contaminated sediment sites in the Upper Columbia River watershed of northeast Washington.

Particularly relevant to CTCR's concerns for derivation and potential misapplication of Regional Background are several sections of the August, 2012 publication no. 12-09-051, *Preliminary Cost-Benefit and Least Burdensome Alternative Analyses*, a mandatory companion document to the draft SMS, including Section 3.5: *Representative Site (Embayment-Specific Analysis),* Section 3.6: *Freshwater Sediment Standards for Benthic Community Protection,* Section 3.11: *Puget Sound Analysis*, and Appendix A: *Embayment Specific Examples of Cleanup Level Impacts*.

For example, in case studies presented in Appendix A at A.2 and A.3, Ecology calculates Regional Background values for Dioxin at two actual, though unnamed, sites located in the Puget Sound region. Ecology characterizes Site A.2 as an urban marine embayment in Puget Sound, whereas Site A.3 is characterized as rural Puget Sound embayment. Regional Background value for Dioxin calculated by Ecology for the urban marine embayment (14.6 ppt TEQ) is a full order of magnitude higher than Regional Background calculated for the rural embayment (1.17 ppt TEQ), even though both sites are within the same physiographic region. Apparently (the actual calculations are not included in the report), the primary basis for determining different "regional" background values in these two examples is demographics – one site is rural, one is urban – which is reasonable criteria for determining "area background" under Model Toxics Control Act (MTCA), but irrelevant and unacceptable criteria for deriving "regional background" in accordance with the Draft SMS Rule at WAC 173-204-560 (5).

Proposed Resolution: The SMS two-tier framework needs to be revised to include regional background concentrations of listed contaminants and/or detailed guidance for establishing regional or natural background levels of contaminants in sediment. Such procedures for calculating background levels of contaminants in sediment must describe the number and type of samples that need to be collected, the criteria that need to be applied to confirm that a sample qualifies for inclusion in the background calculation, the analytical methods that must be used to generate the required sediment chemistry data, acceptability criteria for use of existing sediment chemistry data, and the statistical analyses that must be conducted to estimate regional or natural background concentrations of contaminants in sediment. These revisions need to be included in Section WAC 173-204-560(5) of the Proposed SMS Rule Amendments.

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312 ***Issue # 6:*** Practical Quantitation Limits Should Not Be Considered in the Development of Sediment Cleanup Objectives or Cleanup Screening Levels.

Rationale: Section WAC 173-204-560(5) of the Proposed SMS Rule Amendments of the Proposed SMS Rule Amendments describes the process for establishing SCOs and

312 cont. CSLs for a contaminant in sediment, respectively. More specifically, these sections of the document indicate that the SCOs and CSLs is the highest of:

- The risk-based concentration of the contaminant, based on WAC 173-204-561 to WAC 173-204-564;
- Natural background or Regional background; and,
- Practical quantitation limit.

While it is reasonable and appropriate to consider the risk-based concentration and background concentration of a contaminant in the establishment of SCOs and CSLs, it is inappropriate and unwise to consider the practical quantitation limit in this process. For all of the contaminants explicitly addressed in the Proposed SMS Rule Amendments, analytical methods have been developed that provide detection limits sufficient to assess risks to human health and the environment. By including a practical quantitation limit override in the Proposed SMS Rule Amendment, the Department is essentially inviting responsible parties to generate sediment chemistry data that do not conform to the requirements for human health risk assessments or ecological risk assessments. Guidance on the detections limits that are required to support sediment quality assessment activities already exists (See MacDonald *et al.* 2008, for example). So, there is no excuse for including practical quantitation limit override in the Proposed SMS Rule Amendment.

Proposed Resolution: The practical quantitation limit override included in the SMS two-tier framework needs to be removed and the Department needs to develop guidance on the detection limits that must be achieved for COPCs that require investigation at sediment contaminated sites within the state.

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313 ***Issue # 7:*** Decisions Regarding the Upward Adjustment of Sediment Cleanup Levels should not be made without Meaningful Consultation with Tribal Governments and the Public.

Rationale: Section WAC 173-204-560 of the Proposed SMS Rule Amendments describe the methods for establishing site-specific sediment cleanup levels. In this section, sediment cleanup levels are defined as the concentrations or levels of biological effects on a contaminant in sediment determined by the Department to be protective of human health and the environment. This section also states that the SCO shall be used to establish the sediment cleanup level, unless an upward adjustment from the SCO is necessary because:

- It is not technically possible to achieve the sediment cleanup level at the applicable point of compliance within the site or sediment cleanup unit; or,
- Meeting the sediment cleanup level will have an adverse impact on the aquatic environment, taking into account the long-term positive effects on natural resources and habitat restoration and enhancement and the short-term adverse impacts on natural resources and habitat caused by cleanup actions.

However, the Proposed SMS Rule Amendments do not indicate who would conduct the evaluation of technical feasibility analysis or harm-benefit analysis. This is important because our experience demonstrates that technical infeasibility and/or cleanup impacts

313 cont. have been used to justify inaction at many other contaminated sites throughout the United States. In most cases, the technical and scientific data provided to support such determinations have been weak, but regulatory agencies have been unable or unwilling to require appropriate justification for inaction. However, inaction or incomplete cleanups at sediment contaminated sites have real implications for individuals and organizations that rely on natural resources, particularly tribal members and other subsistence users. Therefore, it is inappropriate to adjust the sediment cleanup level upwards without appropriate and meaningful consultation with tribal governments.

Proposed Resolution: A procedure for reviewing and approving upward adjustment of the sediment cleanup level that includes meaningful consultation with Tribal governments and the public needs to be developed and described in the Proposed SMS Rule Amendments.

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314 ***Issue # 8:*** The Department Must be Able to Establish Sediment Cleanup Levels Below the Sediment Cleanup Objective.

Rationale: Section WAC 173-204-560(2b) of the Proposed SMS Rule Amendments indicates that the Department may establish sediment cleanup levels more stringent than those established under Section WAC 173-204-560(2a) when, based on a site-specific evaluation, the Department determines that such levels are necessary to protect human health and the environment. Recall that Section WAC 173-204-560(2a) indicates that:

> "the sediment cleanup objective shall be used to establish the sediment cleanup level," notwithstanding the provisions for upward adjustment.

It is reasonable and appropriate to include provisions for establishing a sediment cleanup level that is lower than the SCO in those situations where the SCO would not provide the required level of protection for human health and/or the environment. However, the last sentence in Section WAC 173-204-560(2b) completely eliminates the Department's flexibility for establishing more stringent sediment cleanup levels by indicating that:

> "The sediment cleanup level may not be established below the sediment cleanup objective."

It is inappropriate to include the last sentence in Section WAC 173-204-560(2b) because it eliminated any possibility that the Department could establish SCOs that are more stringent than the SCOs.

Proposed Resolution: Eliminate the last sentence (i.e., the sediment cleanup level may not be established below the sediment cleanup objective) from Section WAC 173-204-560(2b) of the proposed SMS Rule Amendments.

3.0 Conclusions

A review of the Proposed SMS Rule Amendments and supporting documentation was conducted. While we agree that it is reasonable and appropriate to establish sediment management standards for freshwater sediments, it is our conclusion that the numerical sediment quality values (SQVs) that were developed as part of the Proposed SMS Rule Amendments will not provide an adequate basis for managing contaminated sediments in Washington State or elsewhere in the Pacific Northwest. Therefore, it is strongly recommended that the Department explicitly address the critical flaws in the Proposed SMS Rule Amendments. The results of this review indicated that the key issues that need to be addressed before the Proposed SMS Rule Amendments can be promulgated include:

- The freshwater benthic criteria (i.e., the numerical and the biological criteria) need to be revised to ensure that they represent values that are consistent with the narrative intent of the SCOs/CSLs (i.e., no adverse effects for the SCOs and minor adverse effects for the CSLs, as stated in WAC 173-204-563);
- The site-specific override of the default scenario for evaluating human health risk at a site needs to be eliminated (WAC 173-204-56);
- The ecological bioaccumulation narrative needs to be rewritten in clearly understandable language (WAC 173-204-564);
- The SMS two-tier framework needs to explicitly identify tribal standards and regulations, in addition to other federal, state and local laws (WAC 173-204-560);
- Consistent procedures for establishing regional background levels need to be established as part of the Proposed SMS Rule Amendments [WAC 173-204-560(5)];
- The practical quantitation limit override included in the SMS two-tier framework needs to be removed and the Department needs to develop guidance on the detection limits that must be achieved for COPCs that are investigated at sediment contaminated sites within the state;
- A procedure for reviewing and approving upward adjustment of the sediment cleanup level that includes meaningful consultation with Tribal governments and the public needs to be developed; and,
- Effective provisions for establishing sediment cleanup levels below the SCOs must be included in the Proposed SMS Rule Amendments.

The CTCR has recommended numerical criteria (i.e., SCOs and CSLs) that meet the Department's narrative criteria (Table 1). In additional, the CTCR have recommended biological criteria that are consistent with the Department's narrative criteria (Table 2). As such, the CTCR strongly recommends that these alternate criteria be adopted by the Department in Table VII and VIII of the Draft SMS Rule Amendments.

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Via email: RuleUpdate@ecy.wa.gov

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WA Department of Ecology
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RE: Proposed Rule Changes to the SMS Rules

Dear Ms. Dorrah:

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) offers the following comments on the proposed changes to the Sediment Management Standards (SMS) by Washington Department of Ecology (WDOE).

These comments are intended to integrate CTUIR interest in WDOE updating administrative rules that achieve baseline protections against contaminants in soils and water, which in turn affect tribal first foods, including water and fish. For that purpose, the CTUIR submitted comments on the WDOE Draft Fish Consumption Rate Technical Support Document (Document) in January 2012, and again in Version 2 of the Document in October 2012.

315 Many of our broader concerns overlap with those detailed by the Columbia River Intertribal Fish Commission, Northwest Indian Fish Commission and the Center for Indian Law and Policy at Seattle University School of Law. Therefore, those comments are incorporated by reference.

The CTUIR appreciates WDOE's acknowledgment that the current SMS are in need of updating. WDOE's proposed SMS rules affect CTUIR interests in taking fish and related species throughout the Columbia River basin, the Columbia River and its tributaries throughout Eastern Washington. Because WDOE's proposed SMS rules broadly affect the CTUIR's interests, government-to-government consultation is recommended. In preparation for such an upcoming consultation, we would request WDOE provide adequate information concerning the broader and technical concerns identified below. We hope that your information will provide adequate information to make an informed analysis and recommendation to CTUIR policy makers.

316 We understand that this may be an early stage of rulemaking, however, the proposed SMS rules require additional revisions to address the following broad concerns:

- inconsistency with water quality standards that should be a companion to the SMS and consistent with protecting the designated uses of the affected water body;
- lack of baseline numeric standards protective of known fish consumption rates;
- lack of clarity for human health criteria based on minimizing risk to fish consumers,
- absence of cumulative effects analysis;
- treatment of tribal consumption rates as reflected by the Columbia River Intertribal Fish Commission Fish Consumption Rate Study, 1994;
- analysis of the proposed SMS rules on heritage, suppressed (ESA listed) and current fish consumption rates;
- adding feasibility criteria that include tribal, state, federal, non-governmental and non-profit investments into the restoration of resources impacted by sediment contamination, including water quality, habitat restoration, fish restoration for the portions of the Columbia Basin subject to the WDOE proposed SMS rules;
- an explanation of which areas of the Columbia River and Columbia Basin within Washington are not a tribal usual and accustomed fishing site affected by the WDOE proposed SMS rule;

The technical comments are as follows:

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317 1. Section 561- incorporate assumptions and goals that address any state requirement or policy for protecting a certain percentile of the most vulnerable population, or similar criteria, even if it is found with another sister state agency.

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318 2. Section 564 – incorporate a discussion of BCF and BAF (extrapolation from sediment to various trophic levels up the food chain). WAC-173-204-564. Please clarify if you are also considering related comments of the WAC as well as the SMS?

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319 3. Figure 1, human health risk level – explain how these levels compare to know fish consumption rates of CTUIR members, as identified in the Columbia River Intertribal Fish Commission Study;

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320 4. SMS guidelines should include radionuclides. Washington has rivers with radioactive as well as chemical contaminants. Please explain if WDOE will include cancer risks from radionuclides and chemicals and combine to apply to the target risk level. Please clarify the whether the proposed SMS rule includes radionuclides.

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321 5. Lines 18-23. There is a general confusion between ‘no adverse impact’ and ‘minor adverse impact.’ The SMS does not seem to set ‘no-adverse-effect’ or ‘no-significant-levels’ for benthic or human health. For example, the Macdonald standards are frank effect levels that anticipate adverse benthic or fish community impacts. Line 40 refers to minor adverse impacts. Please clarify if those goals are intended to work independently or in relation to each other:

a. Line 312 discusses minor adverse impacts. Minor adverse impacts are defined in this section as “significant human health risk as predicted by exceedance of an appropriate chemical, biological, or other deleterious substance standard.”

   The relation between minor and significant adverse impacts, screening levels, and risk-based targets due to individual and cumulative contaminant risk is not clear.

b. Line 347 - (29) "No adverse effects" has some of the same wording as minor adverse effects, above. Please add clarify and add rationale for the treatment of minor and significant adverse affects.

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322 c. Section (((24))) (45) "Sediment quality standard" means chemical concentration criteria, 430 biological effects criteria, other toxic, radioactive, biological, or deleterious substances criteria, 431 and non-anthropogenically affected sediment quality criteria which are used to identify sediments 432 that have <u>no adverse</u> effects on biological resources per procedures in WAC 173-204-320 433 through 173-204-340.

d. Line 419 concentration or level of biological effects for a contaminant in sediment that is determined by 418 the department to be <u>protective of human health and the environment</u>.

   Please clarify and provide rationale for which sets of criteria subject to “protective of human health and the environment”.

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323 6. Line 62 – Please clarify whether this includes dredging, which can re-suspend sediments, or any activity that could affect capped sediments? Please provide examples of how this would be applied to either allow or prohibit future dredging of the Duwamish waterway or other port areas.

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324 7. Line 87ff – Please incorporate anti-degradation policy language for tribal usual and accustomed fishing sites. Please clarify if tribal lands and reservation boundaries include water bodies, will those areas be equally protected, or will the SMS recognize more stringent tribal standards within reservation lands or usual and accustomed areas./ Please clarify WDOE's consideration of EPA approved Tribal fish consumption rates and
325 related and lower cumulative risk levels.

8. Line 87ff. Please provide rationale for the inclusion or exclusion of non-point sources such as fertilizers in rivers that then flow into a contaminated harbor or bay?

326 9. Please explain how WDOE will apply the proposed SMS rule to shared boundary waters such as the Columbia River for Washington and Oregon.

327 10. Line 127. This line says, "(1) The department shall seek to implement, and as necessary modify this chapter to protect biological resources and human health consistent with WAC 173-204-100(2)." Please explain how subsequent MTCA revisions incorporate new toxicology data or other advancements in best available science.

328 11. Line 134 and elsewhere. Please clarify if the beneficial water uses for fish and swimming are subordinated to other beneficial uses. Beneficial use is defined so broadly (below) that is would allow almost any use even if it degrades existing quality. For example, industrial use of water could be deemed beneficial, yet result in associated sediment degradation that would likely require institutional controls (line 247) preventing someone else's beneficial use.

   a. Line 242: (((4))) (7) "Beneficial uses" means uses of waters of the state which include ((but are not limited to)) use for domestic, stock watering, industrial, commercial, agricultural, irrigation, mining, fish and wildlife maintenance and enhancement, recreation, generation of electric power, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state."

329 12. Line 278. The screening levels should include a provision for cumulative risks to people or biota. As written, individual contaminants could be allowed at 1E-5, the maximum allowed level for individual contaminants. Please clarify that 1E-5 and HI<1 applies to cumulative impacts. Please provide a definition and application of cumulative impacts.

330 13. Line 330. Add clarification that "natural background" or regional levels should not be allowed to gradually increase over time.

331 14. Line 389 includes non-point sources as part of the regional background. Explain how will Ecology manage Yakima River combined point and non-point run-off.

332 15. Clarify if this rule includes microbial agents.

333 16. Line 401. Sediment is defined as occurring from the ordinary high water mark to the “bottom” of a water body (quotation marks added). Please clarify whether this includes the biologically active zone (see surface sediment definition) as well as underlying layers down to bedrock (for rivers) or some other depth for marine areas.

334 17. Please add an approach for multiple permitted discharges into the same water bodies that might cause a cumulative exceedance of risk levels? Clarify how WDOE would regulate or allow any new discharge permits under its anti-degradation policy.

335 18. Line 866. Clarify if a storm water discharges allows a city to have a single CSO permit, and explain how a large and small city must meet the same concentration limits.

336 19. Line 1114. Please identify areas where sediment quality is currently good and clarify how the anti-degradation policy protect those areas.

337 20. Please explain why or why not this rule relates to stream classification, and how WDOE would keep this rule consistent with the protections necessary for cold-water salmon streams that have the most stringent sediment criteria for water quality.

338 21. Clarify if this rule is intended to apply to in-stream mining.

339 22. Line 1233. Please clarify WADOE’s criteria for dredging or capping as a remedy and criteria for removal rather than simply leaving contamination in place and possibly disturbed in the future.

340 23. Line 1350ff. Will PAHs other than the ones listed be treated as total PAH, total organics, or some other metric? The rule discusses congeners, but does it also apply to the combined DDT class, or to mixtures such as oil or diesel?

341 24. Line 1369, Table. The CTUIR believes the maximum criterion for lead should probably be much lower. The state background for lead in soil is around 50 ppm, which is an appropriate target for human health.

342 25. Line 1369, Table. Is a method for PCB congeners specified rather than an Aroclor method?

343 26. Line 1532. Please include cumulative impacts criteria for setting sediment standards for individual compounds, and application for addressing total benthic impact. The same comment is relevant for the section beginning at line 1606, and to the human health criteria at line 1638. Is more guidance needed beyond simply saying that levels will be adjusted downward.

344 27. Line 1956ff. Add government-to-government consultation with affected Tribal Government separate from public notification process.

345 28. Clarify the role human health risk plays in identifying sites that need remediation. Include a rational to address whether an exceedance of numeric maximum concentrations triggers an evaluation and RI/FS. There needs to be more explanation of the relation of individual maximum criteria to cumulative human health impacts with respect to site identification and screening. This would be roughly equivalent to surface water methods, where

345 cont. exceedance of individual concentrations or permitted levels can trigger an action that results in lowering the discharge limits based on total risk and not just individual numeric criteria. Human health is not mentioned until line 2234 (setting cleanup goals). Include criteria for cumulative risk to be used to identify sites needing remediation? One rationale would be that cumulative risks could prevent someone's beneficial use (such as fishing).

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346 29. Line 2217. Clarify in plain language whether 'highest cleanup level' mean the most stringent of the listed effects, or the highest allowable concentrations (least stringent cleanup).

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347 30. Line 2290. Please clarify if this is intended to allow a total watershed approach to source control.

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348 31. Line 2338. Please clarify WDOE's treatment of sites where several contaminants (e.g., several metals plus PCBs) do not exceed individual maxima, but pose cumulative risks. This may be the first mention of cumulative (multi-contaminant) criteria, but it applies only to cleanup criteria and not to site identification.

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32. Line 2350, Default scenario. Obviously the CTUIR is pleased that tribal consumption is the default assumption. However, there is a significant issue with three provisions, as we have mentioned previously and repeat below.

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349 a. Line 2358 "(C) The total fish and shellfish in an individual's diet that is obtained, or has the potential to be obtained, from the general vicinity of the site. This value depends on the ability of the aquatic habitat within the general vicinity of the site to support a department approved fish and shellfish consumption rate under current and future site use conditions."

The default FCR fraction should be 1. Almost sites would have a lower FCR if the carrying capacity were invoked. If a fishing area was used heavily, the average fish take per person would be low, so higher sediment concentrations would be allowed. The FCR fraction should not be used, or that the total abundance should be used to satisfy the whole FCR for a single person before considering how many people use the area. If the FCR is used, the portion of fish that comes from elsewhere should be assumed to be contaminated to some appropriate level such as FDA criteria. Finally, Tribal treaty rights pertain to individual sites no matter how small, as well as broader areas. These rights exist as the right by the tribe, and is not limited to the number of individual member currently able to safely exercise that right. This is especially important when considering the suppressed rates of fish populations and existence of fish advisories.

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350 b. "(D) The size of the site relative to the fish and shellfish home range."

Please provide a rational to this statement. It appears that the application of this concept would eliminate protection of anadromous fish, even in spawning areas. Perhaps some species, such as salmon or lamprey, need a special provision, so that at least their spawning and nursery areas are clean. Likewise, marine nurseries such as eel grass beds should be clear as small fish may be more vulnerable than adults.

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351 c. "(ii) Site-specific scenario. The department may approve an alternate reasonable 2364 maximum exposure scenario for the site in accordance with WAC 173-340-708 and 173-340-702 2365 (14) through (16)."

Please clarify if this section is related to the on in the previous comment.

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352 33. Line 2374. Please clarify and provide example of how the screening levels and the target risk level would be applied.

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353 34. Please provide further guidance on the use of a BCF and BAF method.

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354 35. Please clarify how WDOE considers stream health (such as an Index of Biological Integrity) when evaluating and testing toxicity, and what watershed methods are included.

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355 36. Please clarify the relationship of Table and Table IV. It would be helpful if WDOE added a column for regional background for both the marine and freshwater sediment tables. Otherwise, please provide criteria for the differing cleanup goals between marine and fresh water, and in what instance are the sediment quality values higher than the McDonald values. Perhaps a supporting technical toxicology document would help.

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356 37. Incorporate guidance for determining whether sites that use capping will be required to resample more frequently than sites that actually remove the contaminated sediment.

Thank you for your consideration of our comments. If you have any questions, please contact Barbara Harper with our Department of Science and Engineering at (541) 429-7435 or me at (541) 429-7400.

Sincerely,

/s/

Naomi Stacy
Lead Attorney
Office of Legal Counsel

Dorrah, Adrienne (ECY)

From: Draves, Mary (MF) [MFDraves@dow.com]
Sent: Monday, October 29, 2012 6:32 PM
To: ECY RE TCP Rule Updates
Cc: Draves, Mary (MF)
Subject: Re: Comments on the Proposed Amendments to the Sediment Management Standards Rule, WAC 173-204, August 15, 2012 Review Version
Attachments: SMWG Comments on Proposed Sediment Management Standards Amendments.pdf.pdf.pdf

Follow Up Flag: Follow up
Flag Status: Completed

Ms. Adrienne Dorrah

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357 The Dow Chemical Company ("Dow") is submitting the comments dated October 25, 2012, submitted to you and the Washington Department of Ecology, by the Sediment Management Work Group ("SMWG"), as its own comments. Dow is a member of the SMWG. Dow supports the recommendations that the SMWG has on the State of Washington's proposed rule amendments and so incorporates those comments as its own comments.

Thank you for your consideration of the comments on the SMWG and Dow.

Mary Draves

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October 25, 2012

Ms. Adrienne Dorrah
Toxics Cleanup Program
Washington Department of Ecology
PO Box 47600
Olympia, WA 98504-7600
RuleUpdate@ecy.wa.gov

Re: Sediment Management Work Group's Comments on the Proposed Amendments to the Sediment Management Standards Rule, WAC 173-204, August 15, 2012 Review Version

Dear Ms. Dorrah,

The Sediment Management Work Group ("SMWG")[1] is an ad hoc group of industry and government parties actively involved in the evaluation and management of contaminated sediments on a nationwide basis. The SMWG has long advocated a national policy addressing contaminated sediment issues that is founded on sound science and risk-based evaluation of contaminated sediment management options. The SMWG recognizes that the management of sites involving contaminated sediments frequently involves unique and complex scientific and technical issues, including assessment methodologies and evaluation of risk and risk reduction options. As an active participant in the national discussions on sediment management issues, the SMWG welcomes the opportunity to offer observations and comments on the Proposed Amendments to the Sediment Management Standards Rule, WAC 173-204 ("Proposed Amendments").

Although we are mindful that the State of Washington and many other states have their own contaminated sediment policies and regulations, we believe it is appropriate to consider the substantial, broad-based national scientific and technical experience and lessons learned on this complex environmental issue. This experience includes U.S. EPA's various guidance documents and technical bulletins, two reports of the National Research Council, *Sediment Dredging at Superfund Megasites: Assessing the Effectiveness* (2007) and *A Risk-Management Strategy for PCB-Contaminated Sediments* (2001), the Interstate Technology & Regulatory Council's (ITRC) work on contaminated sediments (e.g., *Incorporating Bioavailability Considerations into the Evaluation of Contaminated Sediment Sites*, 2011), the results of the 4Rs Workshop conducted by the U.S. Army Corps of Engineers and U.S. EPA (summarized in *The Four Rs of*

[1] See Exhibit "A" for a list of its Members.

Environmental Dredging: Resuspension, Release, Residual, and Risk, Bridges, et al. 2008, ERDC/EL TR-08-4), and the collective national experience in addressing contaminated sediment sites. These sources generally and uniformly support the development, evaluation and implementation of all available remedial options and focus on optimizing risk-reduction in a cost-effective manner.

The State of Washington's current review of the Sediment Management Standards offers an excellent opportunity to promulgate revisions to the Sediment Management Standards that expedite cleanups by incorporating scientific, technical and policy advances learned through prior efforts to manage contaminated sediment sites across the country. Many of the key scientific, technical and policy advances are embodied in the *11 Risk Management Principles for Contaminated Sediment Sites* (U.S. EPA 2002)[2] and the *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (U.S. EPA 2005)[3] ("Guidance") as well as in evolving risk-based approaches by many states.[4] The SMWG's review of the Proposed Amendments has identified a number of critical areas where the Proposed Amendments do not comport with the national state-of-the-practice focus on using a risk management framework to develop and evaluate sediment management options based on site-specific conditions. In particular, the Proposed Amendments do not embody a risk management framework for selecting a risk-reduction focused remedy. Moreover, the Proposed Amendments are likely to have the unintended consequence of to making progress at sediment sites in the State of Washington even more difficult to achieve. Thus, the Proposed Amendments should be withdrawn and new amendments drafted that comport with the Sediment Cleanup Advisory Committee's recommendations and state-of-the-practice national policy, which embodies key scientific and technical advances in managing contaminated sediment sites.

The comments below offer more discussion of the significant issues with the Proposed Amendments.

I. <u>The Proposed Amendments Inappropriately Incorporate Bias Against Monitored Natural Recovery and Codify a Presumptive Remedy</u>

The Proposed Amendments are inappropriately biased against monitored natural recovery. Whereas the state-of-the-practice national policy position is that there should be no presumptive remedy[5], the Proposed Amendments codify "active cleanup action" as the presumptive remedy. Please see the following Proposed Amendments for examples of this inappropriate bias.

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[2] United States Environmental Protection Agency. 2002. Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites. OSWER Directive 9285.6-08.

[3] United States Environmental Protection Agency. 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. OSWER 9355.0-85.

[4] For example, please see the ITRC's Contaminated Sediment webpage, which is available at www.itrcweb.org.

[5] "EPA's policy has been and continues to be that there is no presumptive remedy for any contaminated sediment site, regardless of the contaminant or level of risk." (U.S. EPA 2005 at 7-16).

> "Active cleanup actions are preferred over passive cleanup actions." WAC 173-204-500(5)(b)(i).
>
> "Cleanup actions shall not rely primarily on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action." WAC 173-204-570(3)(h).
>
> "The department expects that the sediment component of sites and sediment cleanup units with limited contamination will be restored within a single construction season using active cleanup actions such as dredging or capping." WAC 173-204-500(4)(c).
>
> "Passive cleanup actions, such as monitored natural recovery and institutional controls, may be used in combination with active cleanup actions and source control measures to address sediment contamination." WAC 173-204-500(5)(b)(ii). This provision appears to limit the ability to use MNR as a stand-alone remedy.

This bias against monitored natural recovery is inconsistent with the Proposed Amendments' appropriate acknowledgment that some actions taken to meet the sediment cleanup level could have "an adverse impact on the aquatic environment, taking into account the long-term positive effects on natural resources and habitat restoration and enhancement and the short-term adverse impacts on natural resources and habitat caused by cleanup actions." WAC 173-204-560(2)(a)(i)(B). Monitored natural recovery is much less disruptive of sensitive habitats than removal alternatives[6] as well as being less disruptive of the neighborhoods and communities surrounding the site.[7]

Moreover, the hierarchy of the relative degree of long-term effectiveness in WAC 173-204-570(4) inappropriately characterizes the long-term effectiveness of various remedial alternatives by elevating dredging remedies over capping and monitored natural recovery remedies. Each of the three major approaches (monitored natural recovery, capping, and dredging) are capable of meeting both short-term and long-term effectiveness criteria,[8] and, therefore, there should not be a presumption that removal of contaminated sediment is more

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[6] "MNR typically involves no man-made physical disruption of the existing biological community, which may be an important advantage for some wetlands or sensitive environments where the harm to the ecological community due to sediment disturbance may outweigh the risk reduction of active cleanup." (U.S. EPA 2005 at 4-3).

[7] "Other advantages of MNR may include no construction or infrastructure is needed, and may, therefore, be much less disruptive of communities than active remedies such as dredging or in-situ capping." (U.S. EPA 2005 at 4-4).

[8] "It is important to remember that each of the three major approaches may be capable of reaching acceptable levels of both short-term effectiveness and long-term effectiveness and permanence[.]" (U.S. EPA 2005 at 3-15).

effective or permanent than in-situ alternatives.[9] Instead of a presumptive hierarchy of long-term effectiveness, the effectiveness of in-situ (e.g., monitored natural recovery, capping, in-situ amendments) and ex-situ alternatives (e.g., dredging) should be evaluated based the conditions present at the site or sediment cleanup unit.[10] Thus, what constitutes an acceptable level of effectiveness should always be a site-specific decision.

In summary, rather than focus on presumptive active cleanup actions, new amendments should be drafted that are focused on selecting an alternative that represents an appropriate risk reduction strategy for either the site or an individual sediment cleanup unit. At a minimum, the above quoted provisions on the desirability of active cleanups over passive cleanups and the hierarchy of long-term effectiveness should be deleted from the Proposed Amendments.

II. By Ignoring the Contribution of COCs from Point Sources in Setting the Sediment Cleanup Level, the Use of Regional Background as an Upper Bound to the Sediment Cleanup Level may Unnecessarily Result in "Recontamination" of Sites above the Sediment Cleanup Level due to Discharges from Point Sources

The upper bound for the sediment cleanup level for a particular contaminant of concern (COC), the cleanup screening level, may be based on the regional background concentration of the COC. WAC 173-204-560(4)(b). Using the regional background as a potential upper bound for the sediment cleanup level is problematic because, by definition, it excludes point sources discharges and only accounts for diffuse nonpoint sources, such as atmospheric deposition and storm water. WAC 173-204-200(38). "Regional background is the concentration of a contaminant within a department-defined geographic area that is primarily attributable to atmospheric deposition or diffuse nonpoint sources not attributable to any source." WAC 173-204-560(5). Moreover, regional background is specifically anticipated to be lower than "area background,"[11] which is defined in the Model Toxics Control Act regulations as "the concentrations of hazardous substances that are consistently present in the environment in the vicinity of a site which are the result of human activities unrelated to releases from that site." WAC 173-340-200. Thus, although point sources, both permitted and unpermitted, can contribute COCs to a site or a sediment cleanup unit, under the Proposed Amendments, their influence is not considered in setting the sediment cleanup level.

Setting an upper bound for the sediment cleanup level that is lower than a "background" concentration that includes the influence of permitted and unpermitted point sources or area background and implementing a remedy to achieve that artificially low sediment cleanup level will likely lead to recontamination of the remediated area with concentrations of COCs above the sediment cleanup level. Activities to control point sources may not sufficiently limit discharges

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[9] "There should not be necessarily a presumption that removal of contaminated sediments from a water body will be necessarily more effective or permanent than capping or MNR." (U.S. EPA 2005 at 3-16).

[10] "Project managers should evaluate and compare the effectiveness of in-situ (capping and MNR) and ex-situ (dredging) alternatives under the conditions present at the site." (U.S. EPA 2005 at 3-16).

[11] "Regional background is generally expected to be greater than or equal to natural background, and less than area background as that term is defined in WAC 173-340-200." WAC 173-204-200(38).

of COCs to avoid recontamination above the sediment cleanup level. Moreover, even if activities could sufficiently limit discharges of COCs from point sources, those activities often occur on a different time scale than the sediment cleanup action. Thus, due to challenges in reducing discharges from point sources and the temporal disconnect between point source control activities and sediment cleanup actions, recontamination above the sediment cleanup level is likely to occur.

The Proposed Amendments anticipate recontamination due to ongoing discharges: Recontamination of sediment at remediated sites or sediment cleanup units may occur from ongoing discharges." WAC 173-204-500(4)(b). Although the Proposed Amendments state that "further cleanup of recontamination will not be required by the person(s) conducting the initial cleanup when the person(s) can demonstrate, upon department approval, that the recontamination is caused by a source or a permitted release not under the authority or responsibility of the person(s) conducting the initial cleanup," making this demonstration may be exceedingly difficult, time consuming, and expensive in practice. WAC 173-204-500(4)(b). Moreover, setting an artificially low sediment cleanup level and implementing a cleanup action while anticipating recontamination above the sediment cleanup level due to sources or general "area background" does nothing to reduce risk below that which could have been achieved by setting a sediment cleanup level that considered ongoing sources or area background. Nor is this a cost-effective approach to addressing risks posed by impacted sediment. Approving a remedy, therefore, that is virtually certain to be unsustainable on a long-term basis due to continuing sources and recontamination while driving up the cost of the cleanup would not appear to be a progress contaminated sediment policy.

This concern over sediment cleanup levels, recontamination, and overly expansive remedies that do nothing to further reduce risk is not an academic concern. An example, albeit a federal example, of a proposed plan where the cleanup level was set at natural background while fully anticipating that the site would "unavoidably re-equilibrate to levels above natural background over the longer term" due to "urban pollutant influences" in Elliott Bay recently occurred at the Lockheed West Seattle Superfund Site as described in U.S. EPA's proposed plan and its response to the National Remedy Review Board's comments on the proposed plan. The proposed plan expanded the remediation footprint approximately 10 acres by extending it from the Urban Background boundary to the Study Area boundary. This increase of 10 acres of remediation (from 30 acres to 40 acres) is not expected, however, to result in additional risk reduction because it is fully expected that the site's post-construction surfaces will recontaminate to urban background levels within a couple of years of remediation.

A possible solution to the problem described above with the sediment cleanup levels and recontamination would be to recognize the influence of point sources, both permitted and unpermitted, in setting the upper bound for the sediment cleanup level. This approach would result in using a background concentration higher than regional background, but would still be a "background" concentration similar to MTCA's area background. Thus, to reduce risk to the extent feasible without implementing an overly expansive cleanup action, influences beyond those accounted for in setting regional background should be considered when setting the sediment cleanup level. This could be accomplished either by expanding the definition of

regional background to incorporate those influences or using a different "background" as an upper bound to potential sediment cleanup levels.

III. The Concept of "Technically Possible" is Highly Problematic and Should be Modified

The Proposed Amendments add the concept of "technically possible," which is defined as "capable of being designed, constructed and implemented in a reliable and effective manner, regardless of cost." WAC 173-204-200(49). The term is used in defining how the sediment cleanup level should be set: "The sediment cleanup level shall be adjusted upward as required based on what is technically possible and whether meeting the sediment cleanup objective will have an adverse impact on the aquatic environment, including natural resources and habitat." WAC 173-204-500(5)(a)(i)." The language is reiterated in WAC 173-204-560(2)(a)(i)(A): "The sediment cleanup level may be adjusted upward from the sediment cleanup objective based on the following site specific factors: (A) Whether it is technically possible to achieve the sediment cleanup level at the applicable point of compliance within the site or sediment cleanup unit; … ."

This use of "technically possible" is problematic because it specifically excludes any consideration of cost. This could lead to scenarios where it is technically possible to achieve the sediment cleanup level, but where the remedy is overall not cost-effective. For example, at the Lockheed West Seattle Superfund Site (federal site) U.S. EPA, in its proposed plan, elected an alternative that would achieve natural background rather than urban background. No additional risk reduction, however, was anticipated due to the acknowledged likelihood that the site would recontaminate within a couple of years of construction completion to urban background. The additional cost of achieving natural background, albeit temporarily, as well as incorporating additional dredging rather than capping into the proposed plan raised the cost of the remedy from $18.6 million to $48.1 million. The additional $30 million was not anticipated to buy additional risk reduction as the alternative was not expected to measurably reduce risks to human health via the fish consumption pathway.

Rather than encouraging expedited cleanups, the exclusion of cost considerations in determining what is technically possible will likely impede progress at sediment sites. Allocation at multi-party sites becomes more difficult and time consuming as the anticipated cost of the remedy increases. Parties are also less likely to move forward with projects that unnecessarily consume resources but do not yield greater long-term risk reduction benefits. Thus, to avoid impeding progress at sediment sites, the "regardless of cost" phrase should be deleted from the definition of "technically possible."

IV. Ten Year Time Frame for Site Restoration

The Proposed Amendments significantly and unrealistically shorten the maximum timeframe for meeting sediment cleanup levels. Instead of continuing to use ten years following completion of the cleanup action as the timeframe for meeting sediment cleanup levels, the Proposed Amendments have changed it to ten years from the start of the cleanup action. Given the extended duration of construction for large sediment sites (some requiring 10 to 15 years of construction alone), requiring achievement of sediment cleanup levels within ten years of the

initiation of the cleanup action is unrealistic. Thus, the Proposed Amendments should eliminate the proposed change from ten years following completion to ten years from the start of the cleanup action.

V. Recommended Changes to Definitions

The following definitions should be revised as described below: monitored natural recovery and natural recovery.

The definition of "monitored natural recovery" is too prescriptive and it should be revised to preserve regulatory flexibility to address site-specific needs. Monitored natural recovery is defined as "a form of natural recovery that includes regular monitoring of sediment quality, tissue, and biota to assess the effectiveness of natural recovery to restore sediment quality." WAC 173-204-200(26). This definition is too prescriptive because it appears to require monitoring of sediment quality, tissue, and biota regardless of the site-specific appropriateness of metrics associated with them. Thus, please consider the following revision: "a form of natural recovery that includes regular monitoring of sediment quality, tissue, ~~and~~ **or** biota**, as appropriate, on a site-specific basis,** to assess the effectiveness of natural recovery to restore sediment quality."

The definition of "natural recovery" is too narrow because it focuses on deposition. Natural recovery means:

> "physical, chemical or biological processes that act, without human intervention, to reduce the toxicity or concentration of contaminated sediment. *The most common form of natural recovery is the natural deposition of a layer of clean sediment over an area of contaminated sediment resulting in burial of contaminated sediment below the biologically active zone. The natural process of sediment mixing, and degradation of some contaminants, such as polycyclic aromatic hydrocarbons, can also contribute to natural recovery.*"

To avoid confusion over what processes constitute natural recovery, please consider making it more inclusive by deleting everything after the first sentence (indicated in italics above).

VI. Use of Tissue Analysis in Compliance Monitoring

WAC 173-204-560(6)(b) provides for the use of tissue analysis to "identify and screen chemicals of concern in sediment during remedial investigation/feasibility study and to evaluate compliance with sediment cleanup standards." While tissue analysis can, in some circumstances, provide a more direct measure of risk and risk reduction, it should be used only in circumstances where a site-specific determination has been made that the sediment associated with the specific site or sediment cleanup unit is the significant contributor to tissue concentrations. That is, there must be a site-specific demonstrable connection between sediment concentrations and tissue concentrations. As has been observed at many sites, fish tissue concentrations can be influenced by a number of factors unrelated to the remediated sediments at a particular site. WAC 173-204-560(6)(b) should be revised to incorporate a requirement that such a site-specific determination be made prior to the use of tissue analysis.

VII. Delisting Should be Expanded from Site to Sediment Cleanup Units to Expedite Cleanups

The ability of the Department of Ecology to delist a site should be expanded to include the ability to delist partial sites (i.e., sediment cleanup units). WAC 173-204-530(6). Delisting partial sites would encourage early actions within discrete areas of the site (i.e., sediment cleanup units), which in turn, would accelerate progress in achieving risk reduction goals for the overall site. This would fulfill one of the stated purposes in designating sediment cleanup units, which is "expediting cleanups." WAC 173-204-200(47). Additionally, to further encourage expediting sediment cleanups, consider entering into consent decrees with covenants not to sue for cleanup actions at discrete sediment cleanup units when those actions are considered the final remedy (exclusive of long-term monitoring, if necessary). This could greatly aid in brownfield redevelopment in upland areas adjacent to the completed sediment cleanup units.

***

The SMWG would be pleased to answer any questions about its comments on the Proposed Amendments to the Sediment Management Standards Rule. For further information, please feel free to contact the SMWG's Coordinating Director, Steven C. Nadeau, c/o Honigman Miller Schwartz and Cohn LLP, 2290 First National Building, 660 Woodward Avenue, Detroit, MI 48226, (313) 465-7492, snadeau@honigman.com.

Respectfully submitted,

By: Steven C. Nadeau

Steven C. Nadeau, Coordinating Director
Sediment Management Work Group

c. Ted Sturdevant, Director, Department of Ecology
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Jim Pendowski, Toxics Cleanup Program Manager, Department of Ecology

2012 GENERAL MEMBERS (29)

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Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

Name of Commenter:	Georgia-Pacific LLC
Version of Document Reviewed:	___ Review Version (Reader Friendly) **X** Official Version
Date:	October 19, 2012

	Page Number	Line Number	Comment
	General Comment	N/A	Georgia-Pacific (GP) has been following the development of the SMS rule revisions for several years, and while the proposed amendments contain a number of improvements over the current rule language, other elements of the proposed revisions have the potential to exacerbate, rather than alleviate, some of the practical challenges posed by the current rules.
358	General Comment	N/A	The current draft of the SMS rule demonstrates that Ecology is trying to address many of the technical and policy issues and comments received previously in ways that meet the over-riding goal of making the SMS protective and implementable, including: • A multi-phase approach for sediment recovery over a long timeframe and broad geographic areas; • A regional background approach to allow incorporation of technical feasibility, cost considerations, and net environmental benefits in cleanup decisions; • Provisions for discrete sediment cleanup units and/or sites within larger bay-wide areas of sediment impact; • Consideration of practical incentives to encourage potentially liable parties (PLPs) to take action regarding problems they can control and potential cash-out settlements for larger bay-wide problems; and • Strategic analysis of how the SMS update will be interpreted and implemented by different federal, state and local environmental regulatory programs (e.g., Water Quality Program, NPDES industrial and municipal permits, MTCA, CERCLA, etc.).
359	General Comment	NA	Ecology undertook a great deal of outreach and involvement with knowledgeable professionals and other stakeholders leading up to the proposed SMS amendments, including several advisory committees. From GP's perspective, it appeared that both Ecology and the committee members put a great deal of time and energy into reaching workable solutions to problems that have posed a genuine impediment to moving forward with sediment cleanups. Based on sample rule language distributed in October 2011 and other materials Ecology presented at the last meeting held with advisory committee members in December 2011, the agency appeared to have charted a course for focused rule amendments that would create a workable path through some very thorny MTCA/SMS issues and help in expediting needed sediment cleanups. However, while the proposed rule amendments include some aspects of the pragmatic approach that resulted from the advisory committee process, other portions of the amendments represent very significant changes to the current rule that GP understands were either never discussed, or were discussed and quickly put aside by the advisory committee as unworkable. The changes needed to align these rule amendments with a more practicable approach are fundamental enough that new draft language needs to be proposed.
360	17	65 – 69	The new requirement to establish sediment recovery zones at sites and cleanup units where cleanup levels cannot be met within ten years of the start of the cleanup is highly problematic. GP understands that the final advisory committee made clear to Ecology that including the sediment recovery zone standards of WAC 173-204-590 in the new SMS rule revisions would stymie cleanup, as this element of the existing SMS regulations has proved totally unworkable in the real world because of "technical impracticability" and other similarly difficult criteria that need to be achieved to use this element of the SMS rule. Given that the highly conservative background or practical quantitation limit (PQL)-based sediment cleanup levels for bioaccumulative chemicals such as PCBs, dioxins/furans, and PAHs are anticipated to be exceeded at nearly every sediment cleanup site in part because of uncontrollable, diffuse non-point source inputs of these regional contaminants, the entirety of subsection (4) discussing sediment recovery zones needs to be deleted.
361	26	223 - 227	The proposed language of WAC 173-204-200(1) is problematic because it, combined with the provisions of WAC 173-204-570(3)(h), establishes "active" cleanup as the presumptive remedy at all sites. Please see our comment on the revised language of WAC 173-204-570(3)(h) below. The inadvisable presumptive approach to require "active cleanup" will only further stymie cleanup progress. Thus, the entirety of WAC 173-204-200(1) needs to be deleted. Similar edits need to be made to related parts of the SMS rule.
362	29	283 - 285	The definition of "contaminant" needs to be expanded to explicitly recognize that the bioavailability of sediment contaminants may vary significantly both within and between sites based on site-

Name of Commenter:	Georgia-Pacific LLC
Version of Document Reviewed:	___ Review Version (Reader Friendly) **X** Official Version
Date:	October 19, 2012

	Page Number	Line Number	Comment
362 cont.			specific geochemistry and other factors. Sub-section (15) and other related sections and sub-sections need to be re-written to clarify that site-specific bioavailability considerations should be incorporated into the development of site-specific cleanup levels using approaches developed by the Interstate Technology & Regulatory Council (ITRC) and discussed in other relevant Agency guidance documents. Note that the ITRC's February 2011 Technical/Regulatory Guidance (which Ecology helped co-author): "*Incorporating Bioavailability Considerations into the Evaluation of Contaminated Sediment Sites*" states: "*Overall, this guidance establishes that bioavailability considerations should be incorporated in the exposure assessment process to obtain a clearer understanding of contaminant toxicity and exposure pathways such that remedy selection decisions can be focused and resources efficiently used. By incorporating bioavailability considerations into the early stages of site characterization, the risk assessment process, and remedy selection, a more effective remediation may be accomplished, which may well optimize overall cost. This web-based technical and regulatory guidance can help the user understand the proper application of these tools to assess bioavailability and more effectively protect human health and the environment.*"
363	34	389 - 393	While the general definition of "regional background" in sub-section (38) is workable with revisions (see below), the utility of this approach will be entirely dependent on how regional background is ultimately calculated, which presumably will be described in detail in the Sediment Cleanup User Manual. We understand that Ecology is developing a pilot study to examine this issue in greater detail, but we have significant concerns that the regional background calculation approaches that Ecology is currently considering are all too stringent to be practical. Previous case study applications using approaches similar to what Ecology is now considering do not allow sufficient differentiation between existing or prospective SMS site units and bay-wide contamination problems. This creates gridlock in the processing of the current backlog of sediment sites. Regional background should include contaminants contributed to the region from multiple urban stormwater sources, in order to distinguish those pollution problems from more discrete sediment sites that can be linked to a more specific, and likely historic, past practice. For example, detailed national and regional studies of dioxin sources have concluded that: 1) currently, the largest quantified source of dioxin emissions throughout the U.S. is the uncontrolled burning of household trash (backyard burning; http://www.epa.gov/wastes/nonhaz/municipal/backyard/health.htm); and 2) common non-point source inputs such as those resulting from historical roadside weed control have been identified as important sources of dioxin to regional sediments. The similarity of both soil and sediment dioxin concentrations and congener profiles in urbanized areas of Puget Sound to those found throughout the region provides further evidence that existing sediment dioxin concentrations are the product of a wide range of historical point and non-point source legacy releases, as well as ongoing non-point source inputs. Regional background problems should be addressed under the appropriate regulatory tool (e.g., Phase II municipal permits) and not site-specific MTCA/SMS enforcement. Calculation of regional background should allow for inclusion of certain contaminants if they are due to the influence of multiple urban sources. The concept of regional background should be specifically used to determine discrete SMS sites or site units.
364	36	435 - 442	The proposed revisions significantly and unrealistically shorten the maximum restoration timeframe for a cleanup. Informed by the committee members' collective experience with how long many cleanup projects take to implement, GP understands that the final advisory committee considered and rejected the option of changing the rules from the current requirement that cleanup standards must be met with 10 years following completion of cleanup, to requiring that cleanup standard must be met within 10 years of *initiating* cleanup. However, the August 2012 proposal ignores the committee's recommendation. Thus, the next to last sentence of sub-section (46) needs to be revised to read: "*within ten years after the ~~start~~completion of the cleanup ~~action~~construction*." The last sentence of this sub-section referring to sediment recovery zones needs to be deleted, consistent with the comment above regarding page 17.

Name of Commenter:	Georgia-Pacific LLC
Version of Document Reviewed:	__ Review Version (Reader Friendly) **X** Official Version
Date:	October 19, 2012

	Page Number	Line Number	Comment
365	xcv	1500 - 1507	Given the complexities of permitting and coordinating beneficial reuse opportunities at sediment cleanup sites it is unrealistic for Ecology to expect that sediment cleanup construction within sediment cleanup units (let alone entire sites) can be completed within a single construction season. This sub-section needs to be re-written to more simply state that: "*restoration will be completed as soon as practicable, consistent with the general requirements of WAC 173-204-570*."
366	xcvi	1508 - 1511	Similar to the comment on page 36 above, the entirety of this sub-section either needs to be deleted or the text of sub-section (d) revised to read: "….*within ten years after the ~~start~~completion of the cleanup ~~action~~construction*, …..".
367	cxxxi	2190-2203	Ecology's October 2011 sample rule language specified that, in determining where to set cleanup levels between the sediment cleanup objective ("SCO") and regional background, three factors should be considered: technical feasibility, cost and net environmental benefit. The document distributed in late 2011 to the final advisory committee titled "*Framework for Sediment Cleanup Decisions*" stated at p. 7 "*The current SMS framework allows consideration of cost, technical feasibility and net environmental effects both when setting cleanup standards in a range between the upper and lower bounds and during remedy selection. This has been successful because the system provides needed flexibility…In the revised rule, this paradigm will remain.*" Yet, despite this, the cost criterion has been dropped in the proposed amendments. This change is difficult to understand given that, by Ecology's own admission, the current rule's consideration of cost in setting cleanup standards is one of the parts of the rule that works well because of the flexibility it provides. Furthermore, the inclusion by reference in the proposed rule of WAC 173-340-360's disproportionate cost analysis ("DCA")in selecting cleanup actions does not take the place of cost consideration in setting cleanup standards, because the threshold requirement that cleanup standards must be attained within a reasonable restoration timeframe dictates which potential cleanup actions can be considered in the DCA. In order to preserve the flexibility that Ecology admits is afforded by the current rule, cost should be restored as a criteria for setting site specific cleanup levels under WAC 173-204-560.
368	clxxv	2906 - 2910	The August 2012 proposal appears to have ignored the Committee's advice and includes the requirement in WAC 173-204-570(3)(h) that "*Cleanup actions shall not rely primarily on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action*." The proposed language is problematic because it establishes "active" cleanup as the presumptive remedy at all sites, despite years of collective experience demonstrating that the unique challenges posed by sediment sites often make "active" remedies impracticable. This opinion is not confined to Washington; EPA's current sediment guidance states there is no presumptive remedy for sediment contamination. Consistent with this widely held position, GP understands that the final advisory committee that addressed this issue held the consensus view that there is no presumptive sediment remedy, including a requirement for "active" cleanup, for any contaminated sediment site, regardless of the contaminant or the level of risk. Given the widely differing sediment cleanup situations in Washington State, the sediment cleanup remedy should always be the product of careful site-specific evaluations. With lower and lower cleanup levels for constituents like dioxins and PCBs, leading to very large sites, exchanging the site-specific evaluation for a presumptive remedy can and will lead to impracticably broad mandates for active cleanup – for instance, under the proposed rule language, for a 1,000 acre site an active remedy may have to be implemented on more than 500 acres, regardless of how great or small the exceedances of cleanup levels might be. Because the proposed language is both ignores real-world nature of sediment cleanups and partially discards the MTCA process by mandating an active cleanup in advance of compiling and evaluating all available options and data, GP believes this portion of the proposed amendments is fatally flawed. The inadvisable presumptive approach to require "active cleanup" will only further stymie cleanup progress. Thus, the entirety of WAC 173-204-200(1) needs to be deleted. Similar edits need to be made to related parts of the SMS rule.
369	clxxviii	2957 - 2962	Refer to comments regarding pages 17 and 36. The entirety of sub-section (b) needs to be deleted.
370	clxxxi to clxxxvii	3007 to 3136	Refer to comment regarding page 17. The entirety of WAC 173-204-590 Sediment recovery zones needs to be deleted.

THE GREENBRIER COMPANIES

The Greenbrier Companies, Inc.

One Centerpointe Drive Suite 200
Lake Oswego Oregon 97035
503 684 7000 Fax 503 684 7553

Via E-mail

October 29, 2012

Ms. Adrienne Dorrah
Toxics Cleanup Program
Washington Department of Ecology
PO Box 47600
Olympia, WA 98504-7600
RuleUpdate@ecy.wa.gov

Re: Greenbrier's Comments on the Proposed Amendments to the Sediment Management Standards Rule, WAC 173-204, August 15, 2012 Review Version

Dear Ms. Dorrah,

371 The Greenbrier Companies, Inc. is aware of the State of Washington Department of Ecology's proposed amendments to the Sediment Management Standards ("Proposed Amendments") and the public comment period. Greenbrier shares the concerns of the Sediment Management Work Group, and fully supports the Sediment Management Work Group's comments, which were submitted October 25, 2012 and a copy of which is attached. We also support similar comments made by the Association of Washington Business.

If you have any questions regarding Greenbrier's concerns or support for the Sediment Management Work Group's comments, please contact me.

Sincerely,

David J. Harvey

David J. Harvey
Director, Environmental, Health, & Safety

SMWG Sediment Management Work Group

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Via E-mail & U.S. Mail

October 25, 2012

Ms. Adrienne Dorrah
Toxics Cleanup Program
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PO Box 47600
Olympia, WA 98504-7600
RuleUpdate@ecy.wa.gov

Re: Sediment Management Work Group's Comments on the Proposed Amendments to the Sediment Management Standards Rule, WAC 173-204, August 15, 2012 Review Version

Dear Ms. Dorrah,

The Sediment Management Work Group ("SMWG")[1] is an ad hoc group of industry and government parties actively involved in the evaluation and management of contaminated sediments on a nationwide basis. The SMWG has long advocated a national policy addressing contaminated sediment issues that is founded on sound science and risk-based evaluation of contaminated sediment management options. The SMWG recognizes that the management of sites involving contaminated sediments frequently involves unique and complex scientific and technical issues, including assessment methodologies and evaluation of risk and risk reduction options. As an active participant in the national discussions on sediment management issues, the SMWG welcomes the opportunity to offer observations and comments on the Proposed Amendments to the Sediment Management Standards Rule, WAC 173-204 ("Proposed Amendments").

Although we are mindful that the State of Washington and many other states have their own contaminated sediment policies and regulations, we believe it is appropriate to consider the substantial, broad-based national scientific and technical experience and lessons learned on this complex environmental issue. This experience includes U.S. EPA's various guidance documents and technical bulletins, two reports of the National Research Council, *Sediment Dredging at Superfund Megasites: Assessing the Effectiveness* (2007) and *A Risk-Management Strategy for PCB-Contaminated Sediments* (2001), the Interstate Technology & Regulatory Council's (ITRC) work on contaminated sediments (e.g., *Incorporating Bioavailability Considerations into the Evaluation of Contaminated Sediment Sites*, 2011), the results of the 4Rs Workshop conducted by the U.S. Army Corps of Engineers and U.S. EPA (summarized in *The Four Rs of*

[1] See Exhibit "A" for a list of its Members.

Environmental Dredging: Resuspension, Release, Residual, and Risk, Bridges, et al. 2008, ERDC/EL TR-08-4), and the collective national experience in addressing contaminated sediment sites. These sources generally and uniformly support the development, evaluation and implementation of all available remedial options and focus on optimizing risk-reduction in a cost-effective manner.

The State of Washington's current review of the Sediment Management Standards offers an excellent opportunity to promulgate revisions to the Sediment Management Standards that expedite cleanups by incorporating scientific, technical and policy advances learned through prior efforts to manage contaminated sediment sites across the country. Many of the key scientific, technical and policy advances are embodied in the *11 Risk Management Principles for Contaminated Sediment Sites* (U.S. EPA 2002)[2] and the *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (U.S. EPA 2005)[3] ("Guidance") as well as in evolving risk-based approaches by many states.[4] The SMWG's review of the Proposed Amendments has identified a number of critical areas where the Proposed Amendments do not comport with the national state-of-the-practice focus on using a risk management framework to develop and evaluate sediment management options based on site-specific conditions. In particular, the Proposed Amendments do not embody a risk management framework for selecting a risk-reduction focused remedy. Moreover, the Proposed Amendments are likely to have the unintended consequence of to making progress at sediment sites in the State of Washington even more difficult to achieve. Thus, the Proposed Amendments should be withdrawn and new amendments drafted that comport with the Sediment Cleanup Advisory Committee's recommendations and state-of-the-practice national policy, which embodies key scientific and technical advances in managing contaminated sediment sites.

The comments below offer more discussion of the significant issues with the Proposed Amendments.

I. <u>The Proposed Amendments Inappropriately Incorporate Bias Against Monitored Natural Recovery and Codify a Presumptive Remedy</u>

The Proposed Amendments are inappropriately biased against monitored natural recovery. Whereas the state-of-the-practice national policy position is that there should be no presumptive remedy[5], the Proposed Amendments codify "active cleanup action" as the presumptive remedy. Please see the following Proposed Amendments for examples of this inappropriate bias.

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[2] United States Environmental Protection Agency. 2002. Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites. OSWER Directive 9285.6-08.

[3] United States Environmental Protection Agency. 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. OSWER 9355.0-85.

[4] For example, please see the ITRC's Contaminated Sediment webpage, which is available at www.itrcweb.org.

[5] "EPA's policy has been and continues to be that there is no presumptive remedy for any contaminated sediment site, regardless of the contaminant or level of risk." (U.S. EPA 2005 at 7-16).

> "Active cleanup actions are preferred over passive cleanup actions." WAC 173-204-500(5)(b)(i).
>
> "Cleanup actions shall not rely primarily on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action." WAC 173-204-570(3)(h).
>
> "The department expects that the sediment component of sites and sediment cleanup units with limited contamination will be restored within a single construction season using active cleanup actions such as dredging or capping." WAC 173-204-500(4)(c).
>
> "Passive cleanup actions, such as monitored natural recovery and institutional controls, may be used in combination with active cleanup actions and source control measures to address sediment contamination." WAC 173-204-500(5)(b)(ii). This provision appears to limit the ability to use MNR as a stand-alone remedy.

This bias against monitored natural recovery is inconsistent with the Proposed Amendments' appropriate acknowledgment that some actions taken to meet the sediment cleanup level could have "an adverse impact on the aquatic environment, taking into account the long-term positive effects on natural resources and habitat restoration and enhancement and the short-term adverse impacts on natural resources and habitat caused by cleanup actions." WAC 173-204-560(2)(a)(i)(B). Monitored natural recovery is much less disruptive of sensitive habitats than removal alternatives[6] as well as being less disruptive of the neighborhoods and communities surrounding the site.[7]

Moreover, the hierarchy of the relative degree of long-term effectiveness in WAC 173-204-570(4) inappropriately characterizes the long-term effectiveness of various remedial alternatives by elevating dredging remedies over capping and monitored natural recovery remedies. Each of the three major approaches (monitored natural recovery, capping, and dredging) are capable of meeting both short-term and long-term effectiveness criteria,[8] and, therefore, there should not be a presumption that removal of contaminated sediment is more

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[6] "MNR typically involves no man-made physical disruption of the existing biological community, which may be an important advantage for some wetlands or sensitive environments where the harm to the ecological community due to sediment disturbance may outweigh the risk reduction of active cleanup." (U.S. EPA 2005 at 4-3).

[7] "Other advantages of MNR may include no construction or infrastructure is needed, and may, therefore, be much less disruptive of communities than active remedies such as dredging or in-situ capping." (U.S. EPA 2005 at 4-4).

[8] "It is important to remember that each of the three major approaches may be capable of reaching acceptable levels of both short-term effectiveness and long-term effectiveness and permanence[.]" (U.S. EPA 2005 at 3-15).

effective or permanent than in-situ alternatives.[9] Instead of a presumptive hierarchy of long-term effectiveness, the effectiveness of in-situ (e.g., monitored natural recovery, capping, in-situ amendments) and ex-situ alternatives (e.g., dredging) should be evaluated based the conditions present at the site or sediment cleanup unit.[10] Thus, what constitutes an acceptable level of effectiveness should always be a site-specific decision.

In summary, rather than focus on presumptive active cleanup actions, new amendments should be drafted that are focused on selecting an alternative that represents an appropriate risk reduction strategy for either the site or an individual sediment cleanup unit. At a minimum, the above quoted provisions on the desirability of active cleanups over passive cleanups and the hierarchy of long-term effectiveness should be deleted from the Proposed Amendments.

II. By Ignoring the Contribution of COCs from Point Sources in Setting the Sediment Cleanup Level, the Use of Regional Background as an Upper Bound to the Sediment Cleanup Level may Unnecessarily Result in "Recontamination" of Sites above the Sediment Cleanup Level due to Discharges from Point Sources

The upper bound for the sediment cleanup level for a particular contaminant of concern (COC), the cleanup screening level, may be based on the regional background concentration of the COC. WAC 173-204-560(4)(b). Using the regional background as a potential upper bound for the sediment cleanup level is problematic because, by definition, it excludes point sources discharges and only accounts for diffuse nonpoint sources, such as atmospheric deposition and storm water. WAC 173-204-200(38). "Regional background is the concentration of a contaminant within a department-defined geographic area that is primarily attributable to atmospheric deposition or diffuse nonpoint sources not attributable to any source." WAC 173-204-560(5). Moreover, regional background is specifically anticipated to be lower than "area background,"[11] which is defined in the Model Toxics Control Act regulations as "the concentrations of hazardous substances that are consistently present in the environment in the vicinity of a site which are the result of human activities unrelated to releases from that site." WAC 173-340-200. Thus, although point sources, both permitted and unpermitted, can contribute COCs to a site or a sediment cleanup unit, under the Proposed Amendments, their influence is not considered in setting the sediment cleanup level.

Setting an upper bound for the sediment cleanup level that is lower than a "background" concentration that includes the influence of permitted and unpermitted point sources or area background and implementing a remedy to achieve that artificially low sediment cleanup level will likely lead to recontamination of the remediated area with concentrations of COCs above the sediment cleanup level. Activities to control point sources may not sufficiently limit discharges

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[9] "There should not be necessarily a presumption that removal of contaminated sediments from a water body will be necessarily more effective or permanent than capping or MNR." (U.S. EPA 2005 at 3-16).

[10] "Project managers should evaluate and compare the effectiveness of in-situ (capping and MNR) and ex-situ (dredging) alternatives under the conditions present at the site." (U.S. EPA 2005 at 3-16).

[11] "Regional background is generally expected to be greater than or equal to natural background, and less than area background as that term is defined in WAC 173-340-200." WAC 173-204-200(38).

of COCs to avoid recontamination above the sediment cleanup level. Moreover, even if activities could sufficiently limit discharges of COCs from point sources, those activities often occur on a different time scale than the sediment cleanup action. Thus, due to challenges in reducing discharges from point sources and the temporal disconnect between point source control activities and sediment cleanup actions, recontamination above the sediment cleanup level is likely to occur.

The Proposed Amendments anticipate recontamination due to ongoing discharges: Recontamination of sediment at remediated sites or sediment cleanup units may occur from ongoing discharges." WAC 173-204-500(4)(b). Although the Proposed Amendments state that "further cleanup of recontamination will not be required by the person(s) conducting the initial cleanup when the person(s) can demonstrate, upon department approval, that the recontamination is caused by a source or a permitted release not under the authority or responsibility of the person(s) conducting the initial cleanup," making this demonstration may be exceedingly difficult, time consuming, and expensive in practice. WAC 173-204-500(4)(b). Moreover, setting an artificially low sediment cleanup level and implementing a cleanup action while anticipating recontamination above the sediment cleanup level due to sources or general "area background" does nothing to reduce risk below that which could have been achieved by setting a sediment cleanup level that considered ongoing sources or area background. Nor is this a cost-effective approach to addressing risks posed by impacted sediment. Approving a remedy, therefore, that is virtually certain to be unsustainable on a long-term basis due to continuing sources and recontamination while driving up the cost of the cleanup would not appear to be a progress contaminated sediment policy.

This concern over sediment cleanup levels, recontamination, and overly expansive remedies that do nothing to further reduce risk is not an academic concern. An example, albeit a federal example, of a proposed plan where the cleanup level was set at natural background while fully anticipating that the site would "unavoidably re-equilibrate to levels above natural background over the longer term" due to "urban pollutant influences" in Elliott Bay recently occurred at the Lockheed West Seattle Superfund Site as described in U.S. EPA's proposed plan and its response to the National Remedy Review Board's comments on the proposed plan. The proposed plan expanded the remediation footprint approximately 10 acres by extending it from the Urban Background boundary to the Study Area boundary. This increase of 10 acres of remediation (from 30 acres to 40 acres) is not expected, however, to result in additional risk reduction because it is fully expected that the site's post-construction surfaces will recontaminate to urban background levels within a couple of years of remediation.

A possible solution to the problem described above with the sediment cleanup levels and recontamination would be to recognize the influence of point sources, both permitted and unpermitted, in setting the upper bound for the sediment cleanup level. This approach would result in using a background concentration higher than regional background, but would still be a "background" concentration similar to MTCA's area background. Thus, to reduce risk to the extent feasible without implementing an overly expansive cleanup action, influences beyond those accounted for in setting regional background should be considered when setting the sediment cleanup level. This could be accomplished either by expanding the definition of

regional background to incorporate those influences or using a different "background" as an upper bound to potential sediment cleanup levels.

III. <u>The Concept of "Technically Possible" is Highly Problematic and Should be Modified</u>

The Proposed Amendments add the concept of "technically possible," which is defined as "capable of being designed, constructed and implemented in a reliable and effective manner, regardless of cost." WAC 173-204-200(49). The term is used in defining how the sediment cleanup level should be set: "The sediment cleanup level shall be adjusted upward as required based on what is technically possible and whether meeting the sediment cleanup objective will have an adverse impact on the aquatic environment, including natural resources and habitat." WAC 173-204-500(5)(a)(i)." The language is reiterated in WAC 173-204-560(2)(a)(i)(A): "The sediment cleanup level may be adjusted upward from the sediment cleanup objective based on the following site specific factors: (A) Whether it is technically possible to achieve the sediment cleanup level at the applicable point of compliance within the site or sediment cleanup unit; … ."

This use of "technically possible" is problematic because it specifically excludes any consideration of cost. This could lead to scenarios where it is technically possible to achieve the sediment cleanup level, but where the remedy is overall not cost-effective. For example, at the Lockheed West Seattle Superfund Site (federal site) U.S. EPA, in its proposed plan, elected an alternative that would achieve natural background rather than urban background. No additional risk reduction, however, was anticipated due to the acknowledged likelihood that the site would recontaminate within a couple of years of construction completion to urban background. The additional cost of achieving natural background, albeit temporarily, as well as incorporating additional dredging rather than capping into the proposed plan raised the cost of the remedy from $18.6 million to $48.1 million. The additional $30 million was not anticipated to buy additional risk reduction as the alternative was not expected to measurably reduce risks to human health via the fish consumption pathway.

Rather than encouraging expedited cleanups, the exclusion of cost considerations in determining what is technically possible will likely impede progress at sediment sites. Allocation at multi-party sites becomes more difficult and time consuming as the anticipated cost of the remedy increases. Parties are also less likely to move forward with projects that unnecessarily consume resources but do not yield greater long-term risk reduction benefits. Thus, to avoid impeding progress at sediment sites, the "regardless of cost" phrase should be deleted from the definition of "technically possible."

IV. <u>Ten Year Time Frame for Site Restoration</u>

The Proposed Amendments significantly and unrealistically shorten the maximum timeframe for meeting sediment cleanup levels. Instead of continuing to use ten years following completion of the cleanup action as the timeframe for meeting sediment cleanup levels, the Proposed Amendments have changed it to ten years from the start of the cleanup action. Given the extended duration of construction for large sediment sites (some requiring 10 to 15 years of construction alone), requiring achievement of sediment cleanup levels within ten years of the

initiation of the cleanup action is unrealistic. Thus, the Proposed Amendments should eliminate the proposed change from ten years following completion to ten years from the start of the cleanup action.

V. Recommended Changes to Definitions

The following definitions should be revised as described below: monitored natural recovery and natural recovery.

The definition of "monitored natural recovery" is too prescriptive and it should be revised to preserve regulatory flexibility to address site-specific needs. Monitored natural recovery is defined as "a form of natural recovery that includes regular monitoring of sediment quality, tissue, and biota to assess the effectiveness of natural recovery to restore sediment quality." WAC 173-204-200(26). This definition is too prescriptive because it appears to require monitoring of sediment quality, tissue, and biota regardless of the site-specific appropriateness of metrics associated with them. Thus, please consider the following revision: "a form of natural recovery that includes regular monitoring of sediment quality, tissue, ~~and~~ **or** biota**, as appropriate, on a site-specific basis,** to assess the effectiveness of natural recovery to restore sediment quality."

The definition of "natural recovery" is too narrow because it focuses on deposition. Natural recovery means:

> "physical, chemical or biological processes that act, without human intervention, to reduce the toxicity or concentration of contaminated sediment. *The most common form of natural recovery is the natural deposition of a layer of clean sediment over an area of contaminated sediment resulting in burial of contaminated sediment below the biologically active zone. The natural process of sediment mixing, and degradation of some contaminants, such as polycyclic aromatic hydrocarbons, can also contribute to natural recovery.*"

To avoid confusion over what processes constitute natural recovery, please consider making it more inclusive by deleting everything after the first sentence (indicated in italics above).

VI. Use of Tissue Analysis in Compliance Monitoring

WAC 173-204-560(6)(b) provides for the use of tissue analysis to "identify and screen chemicals of concern in sediment during remedial investigation/feasibility study and to evaluate compliance with sediment cleanup standards." While tissue analysis can, in some circumstances, provide a more direct measure of risk and risk reduction, it should be used only in circumstances where a site-specific determination has been made that the sediment associated with the specific site or sediment cleanup unit is the significant contributor to tissue concentrations. That is, there must be a site-specific demonstrable connection between sediment concentrations and tissue concentrations. As has been observed at many sites, fish tissue concentrations can be influenced by a number of factors unrelated to the remediated sediments at a particular site. WAC 173-204-560(6)(b) should be revised to incorporate a requirement that such a site-specific determination be made prior to the use of tissue analysis.

VII. Delisting Should be Expanded from Site to Sediment Cleanup Units to Expedite Cleanups

The ability of the Department of Ecology to delist a site should be expanded to include the ability to delist partial sites (i.e., sediment cleanup units). WAC 173-204-530(6). Delisting partial sites would encourage early actions within discrete areas of the site (i.e., sediment cleanup units), which in turn, would accelerate progress in achieving risk reduction goals for the overall site. This would fulfill one of the stated purposes in designating sediment cleanup units, which is "expediting cleanups." WAC 173-204-200(47). Additionally, to further encourage expediting sediment cleanups, consider entering into consent decrees with covenants not to sue for cleanup actions at discrete sediment cleanup units when those actions are considered the final remedy (exclusive of long-term monitoring, if necessary). This could greatly aid in brownfield redevelopment in upland areas adjacent to the completed sediment cleanup units.

***

The SMWG would be pleased to answer any questions about its comments on the Proposed Amendments to the Sediment Management Standards Rule. For further information, please feel free to contact the SMWG's Coordinating Director, Steven C. Nadeau, c/o Honigman Miller Schwartz and Cohn LLP, 2290 First National Building, 660 Woodward Avenue, Detroit, MI 48226, (313) 465-7492, snadeau@honigman.com.

Respectfully submitted,

By:

Steven C. Nadeau

Steven C. Nadeau, Coordinating Director
Sediment Management Work Group

c. Ted Sturdevant, Director, Department of Ecology
Polly Zehm, Deputy Director, Department of Ecology
Jim Pendowski, Toxics Cleanup Program Manager, Department of Ecology

2012 GENERAL MEMBERS (29)

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USS

Honeywell

we energies

From: Glenn Hayman
To: ECY RE TCP Rule Updates
Subject: Comment on SMS Rule Update
Date: Tuesday, October 02, 2012 4:33:51 PM

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372 This comment is regarding Figure 1 on page 11, specifically the human health risk boxes on the right. The cleanup screening level (WAC 173-204-561(3)(b) and sediment cleanup standard (173-204-561(2)(a) use effectively identical language and discuss HQ, yet Figure 1 refers to an HI<1 for the upper bound cleanup screening level and an HQ<1 for the sediment cleanup objective. This is confusing. Table F should use HQ for both tiers since the text discusses HQ not HI.
In addition, using HI for the cleanup screening level (less protective) and HQ for the sediment cleanup objective (more protective) is incorrect. As an example, a site with an HI<1 (3 compounds each with HQ=0.33) presents less risk than a site with a site with an HQ<1 (3 compounds each with an HQ=0.99).

Best regards,
Glenn

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King County

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Director's Office
King Street Center
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Seattle, WA 98104-3855

October 24, 2012

Washington State Department of Ecology
Toxics Cleanup Program
c/o Adrienne Dorrah
PO Box 47600
Olympia, WA 98504-7600

Dear Ms. Dorrah:

Thank you for the opportunity to provide comments on a revised draft of the Washington State Department of Ecology's (Ecology) proposed revisions to its Sediment Management Standards (SMS) under the Washington Administrative Code, Chapter 173-204.

The revised SMS standards will have wide reaching effects on the people who live and work in King County by profoundly changing the way sediment cleanups could be carried out in this state. We are grateful to be able to participate in the decision making process through our work on the Sediment Cleanup Advisory Committee and the ability to provide feedback for further consideration, which you will find in the attached comments.

Successful cleanups offer many potential community benefits. They can spur action around the broader efforts to restore and clean up Puget Sound, attract investment in traditionally underserved communities, and preserve critical industrial areas which offer regional economic benefits and livable wage jobs. Conversely, cleanups that are poorly planned or unnecessarily burdensome pose negative impacts to the environment, human health, and the business community.

Attached you will find our detailed comments on this proposed rule. We were especially focused on offering feedback on cleanup methodology, allocation, cost-effectiveness, community impacts, and health and environmental outcomes.

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373 While King County supports the objective of allowing more cleanups of persistent bioaccumulative toxins to move forward, the current proposals generate significant uncertainty and barriers to implementation. Areas of substantial regulatory uncertainty include: cross-program coordination with water quality standards and tissue residues at natural or regional background levels; and probable prescriptive high-cost/low-value sediment remediation choices. We believe Ecology should engage in more collaborative dialogue before finalizing any SMS rule revisions to incorporate solutions into the rule that reduce these substantial implementation challenges.

373 cont. King County is keenly interested in supporting Ecology's effort to develop workable standards that enable agencies to select cleanup approaches that safeguard human and environmental health while protecting the economic and community interests of the people who live and work in the area.

If you would like more details behind the information in this letter or attached comments, or have questions about our conclusions, please contact Jeff Stern, Sediment Management Program Manager in the Wastewater Treatment Division with the Department of Natural Resources and Parks, at 206-263-6447 or email at jeff.stern@kingcounty.gov.

Sincerely,

Christie True
Director

Enclosure

cc: Ted Sturdevant, Director, Washington State Department of Ecology (Ecology)
Jim Pendowski, Program Manager, Toxic Cleanup Program, Ecology
Chance Asher, Toxicologist, Toxics Cleanup Program, Ecology
Carrie Cihak, Director of Policy and Strategic Initiatives, King County Executive Office
Pam Elardo, P.E., Division Director, Wastewater Treatment Division (WTD), Department of Natural Resources and Parks (DNRP)
Greg Bush, Manager, Environmental and Community Services Section (ECS), WTD, DNRP
Jeff Stern, Program Manager, ESC, WTD, DNRP
Mark Isaacson, Division Director, Water and Land Resources Division, DNRP

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

Name of Commenter:	King County Department of Natural Resources and Parks
Version of Document Reviewed:	August 15, 2012 - Official Version

	Lines	Comment
374	Major concern	Our greatest concern with the draft rule revision is the policy change from “cost, technical feasibility, and net environmental benefit” to “technical possibility and adverse environmental impact” in establishing cleanup standards. King County, like many other jurisdictions, has declining revenues and fees in addition to rising public expectations for services. We have a large number of priority environmental projects and programs such as stormwater retrofits, wastewater treatment plant upgrades, CSO controls, along with pump station upgrades, basic maintenance and sediment remediation. These are all projects and programs which we have identified as environmentally valuable and technically possible. However, in the face of limited funds, we are forced to prioritize and one of the most important tools public environmental agencies have is to examine cost relative to the net environmental benefits of competing projects and priorities. Our constituents and ratepayers expect the same thoughtful consideration of costs and net environmental benefits when choosing between competing sediment management alternatives. This is also not consistent with the stated goal of making consistent with MTCA 173-340-360. King County is concerned the net effect will often be to drive selection of cleanups that have more environmental impacts than necessary to achieve cleanup goals while adding decades to the time it will take to complete all the needed sediment cleanups. We respectfully request that the original policy language be retained. This comment relates to edits at lines 1537-47, 2196-97, 2927-38, among others.
375	Major concern	While we understand that one of the goals of this revision is an attempt to reduce the uncertainty by allowing individual cleanups to move forward when there is technical infeasibility in achieving cleanup objectives (especially those based on natural background or low human health risk-based values), the changes proposed create even more uncertainty in other ways. If cleanups based on natural or regional background still lead to tissue concentrations in excess of standards allowed under the water quality program, will these exceedances be considered impairments requiring a TMDL? This is of great concern to local governments, since this uncertainty does not assist in municipal planning and may scare away new business investment. Ecology is not allowed under the Pinto Creek Supreme Court decision to permit any new or increased discharges in impaired water bodies without an existing waste load allocation in an approved total maximum daily load (TMDL). Such a TMDL will be an additional layer after a SMS contamination liability should otherwise be considered closed. This has significant implications to new development and could even require moratoriums if treatment plants can not expand until TMDLs are completed. This is an example of the cross program implementation issues raised by these changes and point out a fundamental flaw in the general approach. Without knowing if such implementation issues can be worked out, it is inappropriate to move ahead with this rule revision since local governments will be left in an untenable position. The County is willing to work with Ecology to develop an alternative approach.
376	Major concern	Please include appropriate exemptions to the SMS standards here in this rule. For instance, wholly artificial water bodies like drainage ditches, irrigation ditches, treatment wetlands, and retention ponds are not waters of the state and the SMS should not apply to any sediment therein. It is also not clear that applying the SMS to any of the MS4 system, even when it meets the definition of a natural water body, is a workable approach.

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	Lines	Comment
377	Major concern	Another concern is the default fish consumption for the human health evaluation (see lines 2350-2366); Section 173-204-561(2)(b). In part (a) of this section, it says "historic, current, and potential future tribal use…general vicinity of the site." The definition of historic is not clearly defined here; can you please provide a definition or context for this terminology? Is this 100-years ago or 20-30 years ago? It seems this could be simplified to within a Usual and Accustomed (U&A) fishing area. Also, what if the "site" has no shellfish (see part c), is it assumed resource switching will occur rather than removing the shellfish component of the diet when determining the fish consumption rate? Finally, it is not clear how part (E, ii) that references WAC 173-340-708 and 173-340-702 (14) through (16) would be used to modify the reasonable maximum exposure assumptions for fish consumption rates. Can you please clarify the intent of this language? It should not be left entirely to guidance. Note that this language effectively applies consumption rates in the range considered in the Technical Support Document to much of the state.
378	Major concern	The implication of the changes to the human health criteria is that almost every site will have calculated acceptable risk levels from fish consumption that will require cleanups to natural background sediment concentrations for several bioaccumulative chemicals. Therefore, sites will remain listed as impaired sites even following cleanup. This makes no sense as the purpose of the cleanup is to restore beneficial uses and remove sites from the impaired lists. It would seem that if the cleanup gets a site to as clean as practicable (as clean as the ongoing inputs to the water body allows or regional background), then it should be acknowledged as successful. The state needs to acknowledge that the MTCA goals designed for upland sites which can be successfully isolated from surrounding sources cannot be accomplished for aquatic sites which collects inputs from broad areas and sources through the air-water-sediment pathway. A workable cleanup law needs to be developed so that sediment cleanups can be completed. It should be acknowledged that after cleanup, the existing Clean Water Act programs are the appropriate vehicle to address residual risks. The currently proposed solution that this rule takes of trying to apply MTCA to solve Clean Water Act issues is not appropriate and creates significant implementation problems.
379	Major concern	While King County understands the intent of applying protection to other components of the aquatic ecosystem, the proposed rule requires clear, deterministic criteria for protection of higher trophic levels if they are included in the rule. In addition, the draft rule language leaves a lot of uncertainty as to the scope and level of effort required for this analysis. For a very small site, this could be cost-prohibitive to conduct such an analysis especially if it is unlikely to change the action required at a site. A guidance document should be developed to provide more information on how this analysis would be conducted.

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380	Major concern	The Sediment Phthalate Work Group (SPWG), which included senior Ecology staff from both the toxics and water programs, made particular recommendations to address the recontamination problem of pervasive pollutants that do not have existing source control options to remain below SMS over time. The document can be found at http://www.ecy.wa.gov/programs/tcp/smu/phthalates/Summary%20of%20Findings%20and%20Recommendations%20FINAL%20092807.pdf. Specifically, the SPWG asked that the next SMS rule revision “add consideration to SMS for addressing pervasive pollutants, such as protocols for making decisions regarding the cleanup trigger for phthalates and similar pollutants. Consider narrative criteria that could be added to SMS based on additional information collected in the Work Group. In doing so, think through MTCA/SMS relationships.” King County requests that this issue be incorporated into the current revision. At a minimum, the original intent to address re-occurring localized benthic effects from these persistent chemicals needs to be incorporated for this rule. Members of the SPWG would be happy to share insight into what the group was thinking and help to develop a workable approach.
	General comments	
381	General	We have a concern regarding the application of human health and higher-trophic level ecological receptor cleanup objective and cleanup screening levels on a point basis. These are based on exposures over an area and therefore all sample points do not need to be at these levels but rather the average sediment concentration needs to target these criteria. This same concern applies when background is the selected value because the risk value is below background (only the average at the site needs to be at background, not all sample points). It is possible to have a few sample points at a site exceed, for example, regional background, while still having the site meeting regional background levels on average.
382	General	Please define all terms in this WAC Chapter within, not by reference to another WAC Chapter. It's cumbersome for the reader to cross reference WAC Chapters for definitions. If definitions in the referenced WAC Chapter(s) change they could become inconsistent with intent of the referencing SMS Chapter.
383	General	The marine criteria for Puget Sound have now been applied to all marine waters. Has the appropriateness of the AETs developed from Puget Sound data been demonstrated for other marine waters?
384	General	There are a number of instances where decisions are left to Ecology’s judgment and therefore provide uncertainty as to the level of effort (cost and time) required to conduct site assessments. We understand some flexibility is appropriate so that site-specific consideration can be made but overall there seems to be a lot of judgment calls by Ecology in the process.
	Specific comments	
385	38	It is not clear why the State would drop authority for cleanups under 90.48. It is an appropriate authority to use for cleanups and has been used in the past under certain situations. Even with a clearer tie to MTCA, it would seem useful to keep this authority as an option. We request that this authority be retained.

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386	68	We support the change in sediment recovery zones (SRZ) to areas that will exceed the CSL. This use of the SRZ makes much more sense and distinguishes its use from areas undergoing MNR.
387	154; 178	Annual review of the SMS chapter seems to be ambitious and the additional work may detract from pursuing additional cleanup actions throughout the year. A 3 to 5 review period, unless otherwise required, is reasonable and frees up staff resources for actual cleanup management.
388	210	It is not appropriate to define what is considered an ARAR under federal CERCLA statute in a state rule. In particular, clarifying the entire charter as an ARAR seems inappropriate. However, it is not clear under what circumstances only a portion of the SMS might apply. Can you please provide clarification to address this issue?
389	220-222	Please define all terms used in a WAC chapter not by reference to another. Also, the phrase "unless the context indicates otherwise" leaves too much open to different interpretations, please provide more specific language here.
390	249	Do not need to limit beneficial reuse to replace another “natural uncontaminated” material. Definition works appropriately without this unnecessary limitation.
391	262	The way this paragraph is written suggests that any endemic species could be considered “critical” to the function, diversity, and integrity of the benthic community. We suspect this was not Ecology’s intent and if that is the case “critical species” should be better defined.
392	286	Deletion of “surface” from this definition is not appropriate unless revise definition to tie to exposure. Revising the definition in such a way is much less clear and will be harder to apply appropriately. Suggest retain “surface” in the definition.
393	288; 294 and 399	It is unclear why reference to “or the applicable criteria in WAC 173-204-560” is needed when discussing requirements of contaminated, control and reference sediments. For all three, the earlier reference to applicable SQS requirements should adequately cover. If necessary to keep, for the latter two, we assume only the values listed in Table IV and Table VII would apply for bioassay sediments and therefore request the language be more specific and reference these tables.

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394	327-29	For monitored natural recovery, why would monitoring of all three media (sediment, tissue and biota) be required to assess the effectiveness of natural recovery? We assume that “biota” means benthic infaunal invertebrates. Depending on the size of the site, other organisms may have a home range larger than the site and therefore would not reflect changes from the site. Recommend adding the language “*…that includes regular monitoring of one or more of the following: sediment quality, tissue, or benthic infaunal invertebrates, as appropriate, …*” Also, if biota refers to the benthic invertebrate community assessments of abundance and richness, please explain why it is necessary if natural recovery processes are not needed to protect the benthic community but rather human health fish consumption pathway.
395	327-29	Add “a remedy that” after means for consistency with other definitions.
396	330-40	This definition is open to subjective decisions concerning what constitutes a “localized activity.” Also, natural concentrations may not be “low” depending on the constituent. Please delete “low” from lines 334, 337, and 339.
397	341-46	In the second sentence add “new” before layer and delete “clean” and add “over time” after burial to clarify the definition.
398	369	Please add “ *and depths*” after locations.
399	373-78 and where def. applies	King County is concerned about using the PQL for regulatory purposes before a common definition has been accepted and implemented by all labs. Also, the text implies that if you can't meet the PQL based on human health and environment risk thresholds, another possibly unapproved method must be used. Text in this section contradicts later sections (see 173-204-562 and -563) where the MDL and PQL must meet values on either Table IV for marine sediments (see Lines 2447-2450) and Table VII for freshwater sediments (see lines 2638-2641) which does not account for any “specified limits of precision, accuracy, representativeness, completeness and comparability during routine laboratory operating conditions…” Please clarify the text in these sections.
400	389-93	How a liable party would determine that storm water or atmospheric deposition is not attributable to a specific source or release could take a virtually limitless amount of sampling and data as it’s impossible to prove a negative conclusion such as this over any substantive watershed area. Please clarify what a “specific source or release” is, how the department will define geographic areas for regional background determinations, and how the public or liable parties will be able to provide input and comment on regional background area determinations. Additionally, King County assumes regional background is intended to be an average or developed by averaging various measurements throughout a region. If Ecology agrees, then it should be defined as the “…the *average* concentration of a contaminant within a department defined area…”

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	Lines	Comment
401	394-399	The definition of reference sediment contradicts those in regional and natural background, both of which account for some regional and anthropogenic influences. The definition of a reference sediment should at a minimum account for global anthropogenic influences. King County recommends that reference sediment samples be allowed from areas with regional background levels of contaminants at or below the SQS to allow for matching grain size and other characteristics to test conditions.
402	400-05	The concept of exposure in this definition is confusing. If material is unexposed, it is not sediment? Suggest deleteing "*to which biota and humans may potentially be exposed*". The concept is better incorporated into the definition of contaminated sediment per earlier comment. The last sentence is of significant concern and a significant expansion of the scope of the SMS into water quality and suspended particulate regulation. The consequences of dredging along with management of pore water and other "hydrologic and natural actions" are already accounted for during sediment remedial investigations/feasibility studies. As such, this expansion of regulatory authority is neither warranted nor necessary.
403	415-24	The definition of sediment cleanup standard is convoluted, since inside of this definition are further definitions of cleanup levels, points of compliance, and mention of "additional regulatory requirements". Recommend the following language: "*Sediment cleanup standard means a department approved chemical concentration or level of biological effects that must be met at a point of compliance with specified institutional controls and other regulatory requirements*." Please add definitions to WAC 173-204-200 from MTCA for point of compliance and institutional controls.
404	435-42 & 1509	Support the change in SRZ definition to allow in areas with ongoing discharges. This is where they will be needed.
405	435-42	It is not appropriate to change the time frame to the start of cleanup. Most active cleanup actions will have some effect on surface sediment concentrations. The recovery timeframe needs to start from completion to allow this effect to be captured in the estimates. The additional time is needed to allow recovery from dredge residuals. Otherwise all recovery periods will be underestimated and not meet their targets.
406	457-8	Many projects are technically possible, but infeasible for a variety of reasons, including cost. No public entity responsible for limited public funds like King County or Ecology can function without regard to cost. Please delete this term globally and retain the old criteria used or tie directly to MTCA definition. See major concern comments above.
407	459-62	Shouldn't this include reference to 173-204-580/590 if listing all applicable sections?
408	535-36 & other	It is not appropriate to keep the reserved clause for confirmation of human health criteria here. Specific criteria should be listed such as demonstrating bioavailability since chemical concentrations alone are not adequate predictors of bioaccumulation.

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409	586-7 & other	The first sentence is confusing since there are also ppb listings in the table. Suggest revising to read "…concentrations in either parts per million, parts per billion, or parts per million carbon "normalized", expressed on a total organic carbon basis."
410	600 & other	Add "benzoflouranthene" before isomers for clarity.
411	613-632 2519-2535 & any other places these terms are used	1. The draft printout has some font problems. The arithmetic comparison symbol associated with p-value appears as a square, so one can't tell if this is still "less than or equal to" as in current law, or if it has been changed. 2. It seems prudent during revision to revisit whether the t-test is appropriate; i.e., for these kinds of tests, are all the assumptions that are required to be met for a t-test – met, e.g. normality and homogeneity of variance? Is a non-parametric test more appropriate? Should median or geometric mean values be used rather than arithmetic means? If mean is used, the type of mean should be stated. 3. Need to state whether the hypothesis test is one-tailed or two-tailed, and the basis for choice. See: Lombardi CM, Hurlbert SH, 2009. Misprescription and misuse of one-tailed tests. Austral Ecology 34, 447-468. at http://www.bio.sdsu.edu/pub/stuart/2009MisprescriptionOneTailed.pdf. These comments are also applicable to any subsequent section regarding statistical tests.
412	622	c) benthic abundance. It's essential that replicates be required for benthic abundance. A single sample is not sufficient due to variability of benthic infauna, particularly in sandy sediments, and could lead to misinterpretation of results. At least 3 replicates should be required.
413	630-32	Ecology has long recognized that the Microtox bioassay has weak predictive ability. (Ecology, 1995: https://fortress.wa.gov/ecy/publications/publications/95318.pdf) Microtox should be dropped from the list of bioassays acceptable for use under the SMS.
414	656	The dual promulgation of SMS under both Water Quality and MTCA authorities makes sections like this especially problematic and confusing. Ecology could consider adding text to the preamble explaining how the current revisions were done on only parts of the SMS to simplify review and adoption under State MTCA authority only.
415	686	Only benthic data sources with station replicates should be included in the station inventory to determine if sites pass or fail applicable sediment standards.
416	956-90	As a matter of policy, all activities requiring a sediment impact zone should be required to demonstrate the necessity, impact minimization, monitoring, and net public benefit of these zones. Finfish rearing facilities and the impacts from them should be held to the same SMS standards as any other sediment impact zone proponent.

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417	1326-28	With promulgated freshwater criteria, why are freshwater SIZ maximum criteria remaining reserved? Please add using the CSL similar to marine sediment.
418	1480-1525	This entire subsection elaborates on Ecology's "expectations". Are expectations legally enforceable by Ecology or citizen lawsuit? As currently written, this portion of the revised WAC reads much more like a guidance document vs. administrative law. King County recommends rewriting to clearly spell out cleanup process requirements with a concluding paragraph allowing for exceptions when circumstances dictate.
419	1494-99	The release of responsibility for cleanup of any recontamination can only work if it is tied very carefully to the appropriate assessment and control of all sources affecting any sediment site unit. Otherwise such a release creates additional liability for those other sources that would potentially not have existed prior to the cleanup. The only workable solution relies on careful implementation and coordination with all nearby sources. King County does not see this regularly happening and the result will leave the responsibility up to those other sources. All sources affecting the site should be dealt with under the cleanup decision.
420	1498	Please clarify that recontamination by non-point (diffuse) sources are included here; i.e., if recontamination is due to non-point source, further cleanup by person conducting the clean up would not be required to take further action.
421	1500-1507	King County has concerns with requiring sediment units to be cleaned up by active cleanup actions. Why would the state limit cleanup options to active remediation technologies when at some sites passive alternatives may have less environmental effects and achieve the same cleanup objectives? This could drive more impacts and much higher costs for no or little environmental or human health benefit. It is more appropriate to allow the remedial investigation and feasibility study to determine the appropriate balance. Also, the last sentence should not use the word restoration as it is not clear what target is to be met.
422	1512-17	Please remove more intensive discharge monitoring from compliance monitoring . Cleanup only moves ahead after a source control evaluation has determined that controls are adequate to meet cleanup standards. Additional discharge sampling is not needed. If cleanup objectives are not ultimately met, then additional actions are triggered and any necessary data will be collected at that time. This only opens the potential for unnecessary sampling to be requested by staff not involved in the water quality permit process.
423	1528	The draft rule states the goal is reducing and ultimately eliminating adverse effects on biological resources and risks to human health from sediment contamination. It is unreasonable to state risks can be eliminated for human health when including cancer risk evaluations. It would be more appropriate to state the goal for human health is to reduce and ultimately achieve acceptable risk levels as defined by WAC 173-340-708. This would clearly show the public that the goal is acceptable risk because eliminating all risk is not possible. This would also correspond better to the cleanup objective being set to natural background when human health risk threshold is below background.

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424	1530-36	It is inappropriate to set sediment cleanup standards based on human health (or background) to individual samples rather than an average for the site. The exposure scenarios for human health do not apply to a single sample location but rather an area. Therefore, the sediment cleanup standard, when based on human health or background (when the risk threshold is below background), should be apply to the site or cleanup unit rather than individual sample locations.
425	1533	Delete “or biological active zone” as the point of compliance should incorporate this.
426	1537-47	It is unclear how technical possibilities are considered in setting a cleanup level if the level may not be adjusted above the cleanup screening level. It is also unclear how “an adverse impact on the aquatic environment” is considered when determining if the cleanup level will be above the cleanup objective. What defines an adverse impact? Can you please clarify here?
427	1562-64	Please clarify what is meant when referencing points of compliance at a different location for protection of human health. Is this sediment depth for intertidal areas where people may dig for clams and therefore be exposed through direct contact with sediments? Besides consideration for sediment depth, human health exposure points of compliance should not be on a sample location basis but an area basis.
428	1571-72	There is no basis to make a blanket statement that active actions are preferred over passive. That is what the alternatives evaluation process is supposed to determine. Please remove this sentence.
429	1573-75	Recommend not limiting use of passive cleanups only with active cleanups. There may be instances where exposure concerns are only for benthic community and more harm would come to the benthic community through active cleanup through habitat destruction then through natural recovery processes, especially if they can be naturally recovered in a few years following adequate source control.
430	1573-75	Suggest that Institutional Controls (ICs) be separated out and structured similar to CERCLA. That would require ICs if the cleanup does not reach the cleanup objective. This could be either placed as 5(b)(iv) or 5(c). Also it is not clear how ICs are anticipated to be used for cleanup units when the region is still above natural background–based cleanup objectives.
431	1590-1592	The last clause in the sentence seems to contradict the purpose stated in the first part of the sentence and effectively prevents closure for cleanup actions. There is still authority to conduct further cleanups for a new or previously unknown problem so the last clause should be deleted.
432	1635-39	The draft rule appears to apply human health risk thresholds or background concentrations to sample locations for determining station clusters of concern. There is no mention of the scale or size of the site in applying these values. Cleanup values based on human health and background should be applied to a site or area and not individual sample locations. A few samples may exceed but the area or site (on average) does not exceed the cleanup values and therefore, it would not be a site of concern. This section also suggests that for some contaminants, such as PCBs and dioxins/furans, all locations with three samples within a cluster above regional background would be a station cluster of concern.

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	Lines	Comment
433	1638 & 1741	Delete "or background". It is not needed in the sentence as already incorporated into the CSL.
434	1655-57	The last sentence of (4) is no longer relevant and should be deleted since a department decision here would be inconsistent with no further action.
435	1682-84 & 1690-92	How can one determine if locations are above the cleanup objectives before the process has been conducted to set the objectives has occurred? At this point, have to default to the SQS which is the original language. Could clarify that if the objectives have been previously set for this region, then also compare to them.
436	1704	Please clarify that the responsibility is to collect the information that the department has available. It is too onerous to require an open search.
437	1721-24	It is not appropriate to have the criteria used to identify a cluster of concern be the same criteria that triggers a cleanup. The scale of the problem may not be broad enough to warrant action or even the more detailed evaluation that occurs once defined as a cluster of concern. For example, a cluster of bioaccumulatives may not be enough to create a tissue problem locally. Recommend at a minimum leave open to department discretion but suggest setting specific higher criteria for warranting cleanup.
438	1859-1871	How does the deletion of voluntary cleanups mesh with MTCA grant eligibility? King County has relied on these grants in the past as they are an important sediment cleanup tool. Please ensure this does not affect this type of grant eligibility.
439	1921-22	Why is Ecology no longer willing to consider cost mitigation factors, such as financial resources of person(s) responsible in scoping the RI/FS study? Some liable parties genuinely don't have the financial resources which could preclude cleanup.
440	1983	Text indicates present and past owners and operators must be listed. Is there a practicable limit for available information that will be considered? How far back in time do the past operations have to be documented? Particularly for small cleanups, this can be onerous. Please clarify only needed if trying to determine source.
441	1997-98	To propose a sediment cleanup unit boundary, regional background would need to have been established for some sites. Please clarify that Ecology would do this. See earlier related comment.
442	2039	What is a "potential source"? Source is used in several places in this rule and should be defined. Depending on the Ecology program various definitions of "source" and modifiers such as "diffuse", historic, on-going, active etc. are used and applied. ALL such terms warrant definitions as they are intended to be applied in the SMS and there is a broad undefined requirement for source control in 173-204-500 and 570.

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443	2116-18	Why was "technical practicability of elimination or reduction of the size and/or degree of chemical contamination and/or level of biological effects within the proposed sediment recovery zone" removed? This concept is appropriate and should be incorporated into 173-204-590.
444	2132-46	Short-term effectiveness, long-term effectiveness, ability to be implemented, cost, addressing community concerns, and the degree to which recycling, reuse, and waste minimization are employed all no longer seem to be considerations in the selection of a preferred remedy. As a matter of policy this seems like a step backwards. All of these factors need to be added back into 173-204-570(3).
445	2172-76	Why were discussions on sample access and assistance from Ecology removed? It does not appear to be incorporated into other appropriate sections. It may be appropriate to include under each section were sampling may be required or in 173-204-600.
446	2269-71	The discussion on requirements for protection of higher trophic levels species are the same for both cleanup objective and cleanup screening level. For human health and benthic invertebrates and background, two levels are presented. There needs to be a similar separation for this group as well.
447	2275-97	This entire section is too discretionary and open ended. The current language provides far too little regulatory certainty. For example, how homogeneous are an area's results required to be? The regulated community needs to understand how regional background will be determined so that this part of the rule can be implemented clearly and fairly. For example if the criteria are set as some percentile of the area, then even in a pristine region, some portions would be classified as contaminated. This draft also has moved the responsibility of defining regional background from Ecology to the implementer. This will be a major obstacle for getting cleanups to move forward since defining background looks to be an expensive burden for the first cleanup in a region and will likely delay cleanups.
448	2277	Ecology needs to define "diffuse nonpoint sources not attributable to any source". All contaminants are tied in some way to a source; although all sources may not be controllable. Ecology should define how much data are required per unit area. How do stormwater and combined sewer overflow sources fit into this definition? We assume these would be part of regional background inputs because it is often difficult to find specific sources to control the inputs from these discharges to the water body. The inputs are often diffuse within the drainage basin. Also what is considered a point source, permitted or unpermitted, current or historic?
449	2283-97	Please clarify that Ecology is responsible for determining regional background with regards to excluding samples from areas within a "depositional zone of a discharge". Also, land use of the drainage basin should be added to the factors evaluated when determining an alternate geographic approach for background.
450	2303-04	Delete "identify and screen chemicals of concern in sediment during the remedial investigation/feasibility study and to". It is not relevant to the section.

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	Lines	Comment
451	2335-39 & 2380-84	The method listed for multiple non-carcinogens is incorrect in stating that all would be summed for determining the hazard index. Only those non-carcinogens that share the same toxic effects should be summed. Individual contaminants with similar toxicological effects may be summed to yield an effect specific hazard index (EPA 1989[1]). The hazard index is an expression of the additivity of non-carcinogenic health effects. An effect-specific hazard index can be calculated by summing hazard quotients for chemicals with similar toxicological effects (e.g., immunotoxicity).
452	2339 & 2345; 2384 & 2390	Delete the phrase "or other methods as determined by the department.". This would effectively allow the department to change risk thresholds without rulemaking.
453	2350	If the default fish consumption scenario is maintained in the rule, then revise "default scenario" to "Default Scenario, Puget Sound". For all other sites the objective remains the reasonable maximum exposure, although this scenario may or may not be a tribal scenario. There are numerous water bodies outside of usual and accustomed tribal fishing areas or with other characteristics which make the described default inapplicable. There are probably more (mostly small) water bodies where the described tribal default does not apply than where it does. There are many considerations to determining an appropriate fish consumption rate and therefore it does not seem appropriate to have a default scenario beyond the definition of RME. For example, is the water body within a Usual and Accustomed Area of a Tribal Population, does the water body support shellfish consumption included in all Puget Sound tribal consumption studies, does the waterway (e.g., many freshwater streams and small lakes) support tribal consumption rates. When "historic" tribal use is considered, what defines historic? Finally, many Puget sound tribal rates are only appropriate for marine waters because of the different seafood types present or the ability of the water body to biologically support such consumption rates.
454	2387-90	When determining the cleanup screening level, why are multiple carcinogen requirements included? If the level is suppose to be different than the cleanup objective, which is based on individual excess cancer risk of 1×10^{-6} and total excess cancer risk (more than one contaminant) of 1×10^{-5}, then why is the cleanup screening level also including total excess cancer risk of 1×10^{-5}? It should only be based on individual excess cancer risks of 1×10^{-5} or you may have no different level than the cleanup objective. Another alternative is to set total excess cancer risk at 1×10^{-4} which would coincide with the use of individual contaminants having individual excess cancer risks of 1×10^{-5}.

[1] EPA. 1989. Risk assessment guidance for Superfund, volume 1: Human health evaluation manual, Part A. EPA/540/1-89/002. Office of Emergency and Remedial Response, US Environmental Protection Agency, Washington, DC

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	Lines	Comment
455	2410-11	The marine criteria for Puget Sound have now been applied to all marine waters. Has the appropriateness of the AETs developed from Puget Sound data been demonstrated for other marine waters? Also, the original intent was to use the growing database to recalculate the AETs. King County recommends this be incorporated into this major revision and periodically thereafter. The concept of the AETs is that more data will develop more appropriate toxicity thresholds for contaminants.
456	2417-19 & 2626-28	The sentence “Chemical concentrations at or below the cleanup screening level but greater than the cleanup objective correspond to sediment quality that results in minor adverse effects to the benthic community” is inconsistent with the next sentence. They cannot both be true. The original intent of the SMS was that >SQS but <CSL had the potential to have minor adverse effects; one sample exceeding chemical criteria was considered to have the potential to have some minor effect. More substantial demonstration of toxicity at the CSL level was considered to demonstrate some minor adverse effects. King County requests this be clarified.
457	2458	The formula for conversion from dry weight- to organic carbon-normalized in this section is unnecessarily complicated and confusing, as well as being prone to mathematical error. A much simpler equation is: <u>ppb OC = (ppb dry weight / ppm total organic carbon) x 1000</u>. This allows the person performing the calculation to use the values as reported by the laboratory without having to convert organic carbon to a percentage first.
458	2541 & 2706 & 516	King County feels that bioassays should remain as “confirmatory” tests that should only be required when one or more chemical criteria have been exceeded. We all know that bioassays are not always good predictors of sediment toxicity and that there can be poor correlation between sediment chemistry and bioassay results (e.g., sometimes a bioassay failure is due to physical affect rather than chemical). Thus line 2542 would read “…designation of marine sediment which fails the chemical criteria…” Thus stations passing chemical criteria need not undergo the expense of biological testing.
459	2599	The objective for each test is given in part as "*p*.=0.05". The dot after the *p* doesn't make sense. As this table falls in the middle of added (underlined) text, and a search in the current legal WAC Chapter 173-204 does not yield key terms in the table, presumption here is that this is a new table, but there's no way to determine the p-value equality/inequality to the current rule. Referring to body of text in the current rule suggests that intent is for this to be the "equal to or less than" symbol.
460	2602 Table IV	No endpoint (abundance) is listed for benthic infauna. Neanthes test "28 day growth" should be changed to "20 day growth".
461	2604 Table IV	Neanthes test "28 day growth" should be changed to "20 day growth".

	Name of Commenter:	King County Department of Natural Resources and Parks
	Version of Document Reviewed:	August 15, 2012 - Official Version
	Lines	Comment
462	2591 Table V	Ecology has required permitees and liable parties to use SEQUAL and now "myEIM" statistical software tools for many years now. These tools test bioassay results for statistical normality and then allow users to apply appropriate parametric or non-parametric tests. This table and the previous preceding biological criteria text beginning on line 2488 need to be rewritten to account for the myEIM statistical tool and non-parametric testing when statistically appropriate.
463	2651 & other places used	This section, as written, double-counts benzo(b)fluoranthene and benzo(k)fluoranthene.
464	2657; 59; 61 & other places used	Why the inclusion of o,p'-DDD, o,p'-DDE and o,p'-DDT in addition to the more common p,p'- isomers of these three chemicals? EPA method 8081B does not list these parameters. In fact it actually says to report only the p,p' parameters. This is, in part, due to co-elution issues with other chlorinated pesticides and PCBs. EPA 8081B also states that the p,p' parameters are much more abundant than the o,p' isomers. Including the o,p' isomers would significantly add to the cost of performing chlorinated pesticide analyses as they most likely would need to be done as part of a second method with limited additional value for overall site characterization. The o,p' isomers should be removed from the DDT, DDE and DDD list.
465	2663 & other places used	Why the inclusion of Aroclor 1268 for freshwater sediments? Aroclor 1268 is not part of the standard EPA 8082A method, nor is it part of EPA's common list of PCB priority pollutants and thus King County currently does not analyze for PCB Aroclor 1268. It appears to only have represented about 10% of all Aroclors produced. PCB 1268 should be removed from the Aroclor list.
466	2665-68	For chemicals with insufficient information to generate a clear CSL, the rule requires freshwater sediment bioassays to evaluate potential benthic toxicity. Please modify the text to state "If test results show concentrations above this cleanup screening level, bioassays *may be* conducted to evaluate potential benthic toxicity." The bioassays should not be required because if other contaminates exceed the cleanup screening level for benthic community, the sediments already indicate potential toxicity. And it's quite possible for a site to just proceed with a cleanup without exhaustive biological testing, particularly when cleanup is required based on these other contaminant exceedances.
467	2668 Table VII	Why the inclusion of Endrin Ketone, which is not an EPA priority pollutant and is not currently analyzed as part of any current monitoring program? Also, is the CSL criterion of "0" a typo?

Name of Commenter:	King County Department of Natural Resources and Parks	
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	Lines	Comment
468	Table VII	In 173-204-563, there are some chemical parameters listed with freshwater sediment standards for benthic community that are in need of further clarification. Why are standards listed for all four butyltin compounds rather than just the highly toxic compound, tri-butyltin? How many of the samples in the dataset were analyzed for butyltins and how does Ecology know that the presence of the other butyltins contributed to the toxicity in the sediments? Please remove the other butlytins. Also, while there may be some cases (Lake Union for example) where there might be an expectation of finding TBT, there are many freshwater streams where the likelihood of finding this chemical is extremely low. Please clarify that all water bodies do not have to routinely analyze for TBT except when considered to be likely present because of known source.
469	2725-26	It is not appropriate to include broad clauses allowing performance standards in rule to be changed without public scrutiny and comment. Clarify specific conditions and criteria that would allow Ecology to approve a different performance standard.
470	2741-45	The CSL for “other toxic substances” is functionally the same criteria as the SQS. This is not really appropriate and inconsistent with the other criteria. There should be a difference between the two criteria for each endpoint.
471	2791-93	“Sediment cleanup objectives and cleanup screening levels based on protection of higher trophic level species shall **not** be established at concentrations that do **not** have the potential for minor adverse effects.” The double negative is confusing, please revise.
472	2797-98	The method for which species to evaluate should follow general EPA guidance on ecological receptor selection process that considers: • Potential for direct or indirect exposure to sediment-associated chemicals • Human and ecological significance • Site use, including historic species which may have been extirpated by wood waste or other benthic substrate alterations • Sensitivity to chemicals at the site • Susceptibility to biomagnification of chemicals (i.e., higher-trophic-level species)
473 & 474	2801-02	What defines a “significant disruption of normal behavior patterns” for listed species? How is significant defined? Is this based on statistically significant difference in laboratory tests? Similar concern with determining “impair reproduction, growth, or survival”. Please clarify the regulatory endpoints. A guidance document on the evaluation of higher trophic level species should be developed (similar to Region 10’s Ecological Risk Assessment Guidance document).
475	2812-13	The state has a process to identify persistent, biaccumulative, or toxic (PBTs) contaminants. It is not appropriate to include chemicals solely because their octanol-water partioning coefficient is >3.5. Item (B) will capture a vast array of other compounds already determined to not belong on the list; please remove.
476	2814-15	How is a performing party supposed to determine if contaminants are suspected to have “minor” adverse effects on higher trophic level species? Please remove.

Name of Commenter:	King County Department of Natural Resources and Parks
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	Lines	Comment
477	2850-72	There are a number of items that have been removed from consideration in determining clean up timeframes and evaluation of cleanup alternatives. See lines 2854, 2862, 2868-2872. These are appropriate and useful in some situations and should be retained. In particular, when most cleanups are attempting to achieve regional or natural background, such timeframes would often appear necessary.
478	2896-2900	Why is it necessary to state some predetermined timeframe? Why not let the evaluation determine what may be appropriate? A better cleanup solution may result with fewer impacts to human health and the environment.
479	2906-08	Monitored natural recovery should be allowed to be considered whenever it is determined to be the best solution during evaluation.
480	2914-15	The meaning of this sentence is unclear and not apparent if this would provide any useful differences for remedy selection.
481	2927-38	The original cleanup action priority list in WAC 173-340-360 is sound and when applied works well. It is unclear why Ecology feels this sediment specific cleanup hierarchy is necessary. The policy choices inherent in this list are incongruent with the policy choices and priorities in WAC 173-340-360. King County feels a different sediment-specific approach will generate substantial unintended consequences and disproportionate costs relative to their environmental benefit. Instead of generating a new list of unique and proscriptive sediment specific cleanup action priorities, King County requests Ecology reference WAC 173-340-360 instead so that sediment cleanups decision priorities will be consistent with other media. The evaluation process will determine the best solutions for each situation.
482	2942-56	This list should include construction impacts and other effects from the cleanup actions themselves. Ecology needs to factor in the impacts of the cleanup actions in the evaluation of alternatives which will include the determination of a reasonable timeframe.
483	3030-31	It is not appropriate to change the time frame to the start of cleanup. Most active cleanup actions will have some effect on surface sediment concentrations. The recovery timeframe needs to start from cleanup completion to allow this effect to be captured in the estimates. The additional time is needed to allow post-cleanup recovery from dredge residuals. Otherwise recovery periods will be underestimated and not meet their targets.
484	3033	Requiring concentrations to be “as close as practicable” to the sediment cleanup standard is a pretty high bar to achieve. It would almost always require cleanup to meet which is contradictory with the purpose of setting a recovery zone. King County recommends deleting this because it is an unnecessary objective. King County suggests rewording the clause to identify purpose but not set a standard that can’t be met.
485	3057-59	Similar to the comment on line 3033, this clause would effectively eliminate any recovery zones since in many cases there is a technically practicable active remediation to a SRZ which is otherwise unwise due to adverse net environmental impacts, disproportionate costs, or one of the other balancing criteria in MTCA remedy selection and deserve consideration as mentioned earlier. Please reword so that there can be appropriate use of these zones to solve problems.

	Name of Commenter:	King County Department of Natural Resources and Parks
	Version of Document Reviewed:	August 15, 2012 - Official Version
	Lines	Comment
486	3064-66	If the limit on a SRZ is 10 years, then this is essentially an MNR application. The assessment for MNR effectiveness would have already been covered in the cleanup decision. So the need for an SRZ has to be for longer than 10 years or wouldn't it wouldn't be needed. Please consider adding a provision that an application for a SRZ has to be evaluated at 10 years to see if on track to meet the original projection for timing to eliminate the SRZ and that the original application for an SRZ cannot exceed 20 years.
487	3064-66	It is unclear if sediment recovery zones may be authorized for longer than 20 years (in 10 year increments) or if the draft rule language is stating that the duration can be extended in 10 year increments indefinitely. When tribal consumption rates are applied to some bioaccumulative contaminants, it is likely the cleanup objective will be natural background. These levels will unlikely be practicably achievable in urban environments because of the many diffuse sources. Therefore, if Ecology intends to limit sediment recovery zones to 20 years and the cleanup objective is not possible to achieve, what will be the outcome for the responsible parties and local governments in the areas? Please clarify.
488	3076-85	The operational terms and conditions for sediment recovery zones are very open-ended and provide no regulatory certainty. This will lead to serious implementation concerns and inconsistencies in the application of the rules. For example, tissue sampling makes little to no sense at the scale of most cleanups unless the site is larger than the target organisms' home range. For most cases, this will not be the case. Trying to track bioaccumulation on-site and how that translates to human health concerns at the site is also rarely possible unless conducted at the regional scale. Many of these conditions would be tied to the discharge permit if that was the ongoing problem.

Draft Sediment Management Standards Chapter 173-204 WAC Amendments Public Comment Form

Name of Commenter:	Kristy J. Hendrickson, Landau Associates, 130 2nd Avenue S, Edmonds, WA 98020
Version of Document Reviewed:	**x** Review Version (Reader Friendly) **_** Official Version
Date:	October 29, 2012

	Page Number	**Line Number**	**Comment**
489	General		Maintaining site-specific flexibility to establish sediment cleanup levels within a range using the existing two-tier framework and to identify and implement site-specific remedies that are protective and practicable is critical to achieving sediment cleanups.
490	General		We support Ecology's decision not to add a default fish consumption rate to the SMS rule. It is more appropriate to include a default fish consumption rate in the Water Quality Standards rule.
491	General		Providing for cleanup of sediment cleanup units prior to cleanup of larger sediment sites should expedite cleanups; however, as was discussed in Sediment Cleanup Advisory Committee meetings, if no significant settlement provisions are included in the rule for persons who conduct early cleanups, early cleanups are much less likely to occur. The expectation that "further cleanup of recontamination will not be required by the person(s) conductiong the initial cleanup" (page xcv, lines 1495 – 1496) does not provide adequate certainty for PLPs to conduct early cleanup. We suggest adding provisions for settlements with PLPs who conduct early cleanups.
492	31	330 - 331	The definition of "natural background" should include PAHs and dioxins in the examples of persistent organic compounds and metals such as mercury that can be found in surficial soils and sediment throughout much of the state. Like PCBs, PAHs, dioxins, and mercury are persistent and are present throughout the state as a result of long-range transport.
493	34	389 - 393	The reference to area background in the definition of "regional background" is unnecessary and potentially confusing and should be deleted.
494	xciii	1457 - 1460	The proposed amendments provide for promulgating Part V of the SMS under MTCA only. We support this change.
495	xcv	1500 - 1502	Restoration time frame should be expected to be a short as practicable using a remedy selected through the remedy selection process in WAC 173-204-570. The sentence stating that sediments with limited contamination will be restored within a single construction season using active cleanup actions should be deleted.
496	cxxxi	2183 - 2189	Although MTCA refers to releases and threatened releases, it is not obvious how the SMS rule might be applicable to a threatened release.
497	cxxxi - cxxxii	2190 - 2208	The wording in WAC 173-204-570 (2) of the October 2011 preliminary draft amendments [section moved to WAC 173-204-560(2) in the August 15, 2012 proposed amendments] for establishing a site sediment cleanup level within the allowable range of concentration should be retained including the factors considered in establishing the sediment cleanup level as close as practicable to the sediment cleanup objective, net environmental effects, technical feasibility, and cost. The current proposed language does not adequately provide for adjustment of the cleanup level to regional background. Considering whether it is technically possible rather than technically practicable, which is the term used in remedy selection, to achieve a sediment cleanup level will lead to cleanup levels that cannot be achieved and maintained using technically feasible remedies selected under this rule.
498	cxxxv	2275 - 2297	Including regional background as a factor in determining the upper cleanup level tier (cleanup screening level) should facilitate protective, cost-effective cleanups, if it can be meaningfully considered in establishing sediment cleanup levels. Regional background should be defined in the same way in this section as it is in WAC 173-204-200(38) to specifically include stormwater as an example. Regional background values should be representative not just of subtidal sediments but also of sediments similar to those at a cleanup site. Ecology should develop a process and funding to establish regional background values in various areas to encourage cleanups. Requiring the first person to conduct remedial action in an area to provide sufficient data to establish regional background will discourage early cleanups.
499	clxii	2690-2691	A definition of "dry weight normalized" should be provided.

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

Name of Commenter:	Kristy J. Hendrickson, Landau Associates, 130 2nd Avenue S, Edmonds, WA 98020
Version of Document Reviewed:	**x** Review Version (Reader Friendly) _ Official Version
Date:	October 29, 2012

	Page Number	Line Number	Comment
500	clxx	2812 - 2813	The criteria for determining if a chemical has the potential to bioaccumulate should be the same as that in WAC 173-333-320(2)(b), if the log of the octanol -water partition coefficient (log Kow) is greater than five.
501	clxxv	2899-2900	The time frame for achieving compliance with sediment cleanup standards should be ten years from the completion of active cleanup actions, consistent with the current rule, rather than from the start of cleanup as is proposed in several places in these draft amendments.
502	clxxv	2906 - 2908	Evaluation of whether a remedy is permanent to the maximum extent practicable is addressed in WAC 173-204-570 (4). That analysis should not be undermined by Ecology expectations in other portions of the rule. The first sentence of section (h) is unnecessary and is inconsistent with the disproportionate cost analysis; it should be deleted.
503	clxxvi	2924 - 2938	The hierarchy provided here should be replaced by a list of factors impacting the long-term effectiveness of sediment remedies that are to be considered in the evaluation of long-term effectiveness. These factors could include the degree of certainty that the alternative will be successful, potential for recontamination from non-site sources, site hydrodynamics, sediment transport, depth of contamination, and depth of bioturbation.
504	clxxviii	2957 - 2960	The time frame for achieving compliance with sediment cleanup standards should be ten years from the completion of active cleanup actions, consistent with the current rule, rather than from the start of cleanup. The same change should be made throughout the proposed amendments.
505	clxxxi	3007	We support maintaining the provision for sediment recovery zones for areas where it is not practicable to achieve sediment cleanup standards within a ten-year restoration time frame. However, the time frame should begin at the completion of active cleanup actions rather than at the start of such actions.
			Draft Sediment Cleanup Users Manual II
506			The draft Sediment Cleanup Users Manual II includes significant details on how the SMS amendments will be implemented that go beyond those included in the proposed SMS amendments and therefore the draft document should go through a formal comment period.

ncasi

NATIONAL COUNCIL FOR AIR AND STREAM IMPROVEMENT, INC.
West Coast Regional Center
***Mailing address*: PO Box 458, Corvallis OR 97339**
***Street address*: 720 SW Fourth Street, Corvallis OR 97333**
Phone: (541)752-8801 Fax: (541)752-8806

Dr. Jeff Louch
Principal Scientist
JLouch@ncasi.org

October 25, 2102

Toxics Cleanup Program
Ms. Adrienne Dorrah
PO Box 47600
Olympia, Washington 98504-7600

Dear Ms. Dorrah:

The National Council for Air and Stream Improvement, Inc. (NCASI) is an independent, non-profit membership organization that provides technical support to the forest products industry on environmental issues. An important part of our mission is to ensure that regulatory decision making is based on sound science. In this capacity, NCASI has reviewed the August 15, 2012, proposed amendments to the Draft Sediment Management Standards (SMS) rule (Chapter 173-204 WAC).

Based on this review, it is clear that Ecology has put significant thought and effort into making the SMS rule simpler and more effective. Shifting from a narrative standard to chemical-specific numeric criteria as the means of addressing potential impact(s) of freshwater sediments on benthic organisms and incorporation of the concept of regional background are clear examples of this, and NCASI fully supports both additions to the rule. However, NCASI has some concerns about specific aspects of this proposal. These concerns are detailed in the attachment, and can be summarized as follows:

507 1. It would be scientifically indefensible to include salmon in any fish consumption rate (FCR) used in risk assessments associated with site-specific sediment cleanups.
(see comment specific to Section 173-204-561(2)(b)(i)(D) in the attachment)

508 2. Ecology should not arbitrarily expand the definition of what constitutes a bioaccumulative chemical beyond the criteria already codified in WAC 173-333-320(2)(b).
(see comment specific to Section 173-204-564(2)(iii)(B) in the attachment)

Please do not hesitate to contact me if you have any questions concerning these comments.

Sincerely,

JEFF LOUCH

Jeff Louch
Principal Scientist

Attachment

ec: Steve Stratton, NCASI
Paul Wiegand, NCASI
Christian McCabe, Northwest Pulpa & Paper Association

COMMENTS ON SPECIFIC SECTIONS OF WASHINGTON STATE DEPARTMENT OF ECOLOGY'S AUGUST 15, 2012, PROPOSED AMMENDMENTS TO THE DRAFT SEDIMENT MANAGEMENT STANDARDS (SMS) RULE (WAC 173-204)

509 **Section 173-204-561(2)(b)(i)(D)**

It is inappropriate to include salmon in any fish consumption rate (FCR) used in risk assessments associated with site-specific sediment cleanups.

Section 173-204-561(2)(b)(i)(D) states that the size of a site relative to an organism's (fish or shellfish) home range will be taken into account as part of the default human health risk assessment, but does not explain the relevance of this adjustment or how it will be implemented arithmetically.

As a consequence of Ecology's silence, NCASI can only assume that the goal of this language is to allow some accounting for the fact that the contaminant dose to a human being (or any higher trophic level organism) received from consuming a single organism (or single species) cannot be assumed to be totally dependent on the concentrations of contaminant(s) at any one site. Put another way, the contaminant body burden of an individual organism cannot be assumed to be dependent solely on the concentrations at any one sediment site.

Obviously, the extent to which contaminants at any one site impact the body burden in individuals of a specific species will increase as the geographic range of the species decreases. For truly sessile benthic species, it might even be logical to assume that 100% of the contaminant body burden is obtained from a single site. However, this is an assumption, and it becomes more tenuous as the home range of a species increases and/or the size of the sediment site decreases. It also becomes more tenuous as the prey base for a species expands.

Ultimately, any attempt to correct a site-specific exposure assessment to account for contaminants originating outside the geographic scope of a contaminated site is subject to significant uncertainty, and NCASI recognizes that using some metric characterizing the relative size of the site vs. an organism's (or species') home range may be the only transparent means of effecting such a correction. Assumming that this is, in fact, Ecology's intent, NCASI fully supports the language proposed for Section 173-204-561(2)(b)(i)(D). However, the most defensible means of addressing this issue is through study of contaminant uptake by the relevant species. Certainly, when these kinds of data are available they should be used.

As a specific example, results from studies examining the accumulation of bioaccumulative chemicals in salmon have consistently shown that >90% of the body burden present in adult salmon is acquired in the open ocean, and not in estuaries or freshwater[1]. A recently released Ecology Technical Issue Paper[2] effectively summarizes these data.

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[1] Note that this statement is fully consistent with the understanding that <u>some</u> contaminant uptake occurs in estuaries and freshwater.

[2] Salmon Life History and Contaminant Body Burdens. In *Supplemental Information to Support the Fish Consumption Rates Technical Support Document.* https://fortress.wa.gov/ecy/publications/publications/1209058part1.pdf

509 cont. Thus, in the case of adult salmon specifically, attempting to account for the fraction of the ultimate body burden associated with a specific site through use of some correction factor based on geographic size or time spent at or near the site is both unnecessary and unjustified. Instead, Ecology should accept the results obtained by multiple researchers who have studied this issue. These results show that, when considering the impact of estuarine or freshwater sediments in general, a multiplicative factor of 0.1 would be conservative; that is, assuming that 10% of the contaminant body burden in returning adult salmon is derived from exposure to sediments actually overstates the impact of all estuarine and freshwater sediments in the home range of any specific salmon run. This means that the contribution of any one contaminated sediment site to the overall body burden found in adult salmon is truly *de minimis.* Because of this, salmon should not be included in the FCR used in any risk assessment associated with site-specific sediment cleanups.

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510 **173-204-564(2)(iii)(B)**

Ecology is proposing to arbitrarily expand the definition of what constitutes a bioaccumulative chemical.

Overall, the language in Section 173-204-564 suggests that detection of any bioaccumulative chemical in any sediment will trigger a risk assessment to determine if the specific contaminant poses some risk to higher trophic level species, and Section 173-204-564(2)(iii)(A) requires that detection of any chemical currently listed as a persistent, bioaccumulative, or toxic (PBT) chemical on Ecology's PBT list (WAC 173-333-310) be subject to such a risk assessment. As defined by Ecology's PBT rule, a chemical is considered bioaccumulative if it has a bioconcentration factor (BCF) or bioaccumulation factor (BAF) greater than 1000, or a pK_{ow} (log K_{ow}) greater than 5 ($K_{ow} > 100,000$).

Section 173-204-564(2)(iii)(B) proposes to expand the scope of this to include chemicals with a $pK_{ow} > 3.5$ ($K_{ow} > 3162$), but offers no justification for why this is necessary or useful. This proposed change to the criteria defining what constitutes a bioaccumulative chemical is significant for many reasons. First, although there is some subjectivity in setting the threshold for defining what constitutes a bioaccumulative chemical, setting the threshold at a pK_{ow} of 3.5 is inconsisent with the scientific consensus (this specific issue was debated extensively during development of Ecology's PBT rule, and the result was setting the pK_{ow} threshold at 5). Second, because the proposed modification to the definition does not mandate the existence of a measured pK_{ow}, it opens the window to allowing a chemical to be defined as bioaccumulative based on a predicted (i.e., modeled) pK_{ow}. Finally, and most importantly, because pK_{ow} is simply a physico-chemical parameter not reflecting any limitations to uptake by organisms and/or metabolism by organisms, basing the definition solely on pK_{ow} would allow a chemical to be defined as bioaccumulative without any evidence that the chemical actually does bioaccumulate (as the proposed alternate definition does not require a specific threshold for a BCF or BAF). Thus, this section has the potential to allow decisions about sediment cleanup(s) to be driven by the presence of chemical(s) that may in fact not bioaccumulate. It is encumbant upon Ecology to provide some justification for making this proposal. Absent this the proposal is totally arbitrary.

Considering the deliberative consensus-driven process leading to adoption of the criteria given in Ecology's PBT rule, these should remain the only criteria defining a bioaccumulative chemical. Thus, Ecology should delete Section 173-204-564(2)(iii)(B) from the proposed rule.

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND NORTHWEST
1101 TAUTOG CIRCLE
SILVERDALE, WA 98315-1101

5090
EV3/SER 792
OCT 22 2012

Department of Ecology
Ms. Adrienne Dorrah
PO Box 47600
Olympia, WA 98504-7600

Dear Ms. Dorrah:

SUBJECT: NAVAL FACILITIES ENGINEERING COMMAND NORTHWEST COMMENTS ON PROPOSED SEDIMENT MANAGEMENT STANDARDS

The Naval Facilities Engineering Command Northwest (NAVFAC NW) appreciates the opportunity to contribute to the revision process for the Sediment Management Standards (SMS), Chapter 173-204 Washington Administrative Code, and recognizes Ecology's efforts to clarify and streamline the rule. According to Ecology's public informational meetings, the goal of the new rule-making is to achieve faster sediment site cleanup. Some of the details of the proposed changes, however, may lengthen and complicate investigations, add cost to investigations and remedial actions, prevent selection of many beneficial remedial technologies, and delay response actions.

This letter includes a summary of some significant issues that NAVFAC NW recommends be addressed during the rule revision process. Clarification and additional specific comments are provided in Enclosure 1.

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511 a. **Remedy Selection:** Cost and net environmental benefit should remain as criteria for remedial action selection. Potentially Responsible Parties (PRPs) want to make commitments that address their liability and achieve a sustainable environmental benefit. Sediment cleanup actions are best selected through consideration of all known, available, and reasonable technologies, and focus on accomplishing site-specific, attainable goals. Establishing a hierarchy of remedial actions independent of site-specific goals and conditions unnecessarily limits the selection process and may not allow for selection of the best remedial action for a site.
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512 b. **Natural Background as the Cleanup Goal:** While restoring the environment to its pre-anthropogenically affected state is a worthy goal, it may not be reasonable, particularly in embayments with long and complex histories of human impact. PRPs in such embayments need a process for selecting attainable cleanup goals. Regional background is a more reasonable, attainable target than natural background in such embayments. The revised rule does not appear to address how an isolated PRP can achieve and maintain natural background levels in a site that is surrounded by impacted and unrestored sediments.

513 c. **Risk Reduction and Site Delisting:** Site delisting and expectations of how a sediment cleanup objective (SCO) can be met (over time), especially if the SCO is natural background, is major change to the SMS rule revision. There are no mechanisms in which to reach remedy completion without meeting the SCO. The SMS rule should contain mechanisms to allow for an achievable final cleanup action. Institutional controls should remain a viable remedy component. Access restrictions should be an acceptable form of risk reduction and should be an available remedy component to meeting cleanup objectives.

514 d. **Compliance Evaluation for Human Health:** Human health criteria and background values should be applied on an area-weighted basis. They are being derived to ensure the protection of human health (direct contact and seafood consumption pathways) and should match the exposure area of concern (usually larger exposure areas). The SMS rule should clarify that these values are NOT applied on a point-basis.

515 e. **Inability to Evaluate Impact of Rule Change:** The new rules refer to technical support information that is not currently established or is currently being changed. For example, regional backgrounds have not been established, and fish consumption rates are being re-worked in parallel but separately from this rule. Determining the effect of the new rule is difficult without knowing what these values will be. We recommend that the rule not be promulgated with dependence on rules or processes that are not yet established, peer reviewed, or transparent.

I recognize the effort that Ecology has put into the development of the rule revision. I also understand that sediment management is inter-related to both environmental cleanup actions and shoreline and surface water compliance efforts. This makes rule revision and implementation difficult.

Our comments are submitted with the intent of supporting your revision process and preventing unintended delays or disruptions to ongoing efforts to reduce risks to human health and the environment.

The technical point of contact for these comments is Ms. Ellen Brown. She can be reached by telephone at 360-396-0070 or by email at Ellen.brown1@navy.mil.

Sincerely,

Dina R. Ginn

Dina R. Ginn, PE
Environmental Restoration Manager

Enclosure: 1. NAVFAC NW Comments to 2012 Sediment Management Standards Revisions

	#	SMS Section	Comment
516	1	WAC 173- 204-560 Lines 2196-2201	We appreciate the efforts to streamline the SMS cleanup standard selection process, but the proposed language change, “may be adjusted upwards from the SCO based on “technically possible… and adverse environmental impacts,” does not acknowledge the complexities and uncertainties of working in a water environment. The net environmental benefit and the cost of the cleanup should be considered. We strongly encourage Ecology to modify the language and incorporate technical practicability and net environmental benefit into the selection process. The original selection criteria of cost, technical feasibility and net environmental benefit seemed more supportive of a sustainable process that allows for site-specific evaluation based on risk and best available technologies. The old rule stating “the cleanup level will be selected within the allowable range between the SQS and CSL and be as close as practicable to the cleanup objective” was acceptable as written.
517	2	WAC 173-204-560 & 561, Lines 2216 – 2230, 1537 - 1559	a. We support the concept of a two-tiered evaluation for both ecological and human health. However, the lower end of the range (sediment cleanup objective [SCO]) likely represents a cleanup level goal that may not be attainable. The upper end of the range (cleanup screening level [CSL]) needs to be implementable and practicably achievable. Establishing a reasonable range from which to set a site-specific cleanup level supports early cleanup actions and effective progression toward the Sediment Cleanup Objective in the long term. We recommend that changes to the CSL consider the following: i. 10-5 Risk. The draft rule revisions indicate that Human Health Seafood Consumption Criteria by default will be based on tribal subsistence-level fish consumption rates. Using these rates, a total site risk of 10^{-5} may be impractical to meet regardless of the remedial action taken for many human health (HH) contaminants. The human health risk range should match the acceptable CERCLA risk range of 10^{-6} to 10^{-4} risk, especially for certain chemicals. The CSL should be set to 10^{-4} risk, or at a minimum allow flexibility for chemical- or site-specific evaluations. Alternatively, a 10-5 risk should be calculated for other endpoints such as recreational consumers, and used as the upper end of the range. ii. Hazard Quotients. The draft rule revisions recommend an HQ of 1 for non-cancer risks. This effectively eliminates the usefulness of a tiered approach, because the SCO is set to the same risk level. We recommend an HQ >1, based on a range of seafood consumption rates that include recreational (occasional) fishing (otherwise there is no difference between the CSL and the Sediment Cleanup Objective).
518			iii. Selected HH Contaminants. We are concerned that the list of SMS chemicals derived for the protection of benthic toxicity will be interpreted to also apply to human health. The SMS rule revisions should acknowledge that the Human health criteria only apply to a subset of bioaccumulative contaminants.
519			b. Line 1537-1559. From Figure 1, it would seem that the sediment cleanup level could be adjusted upward from the numerical criteria listed for the SCO in Table IV based on site specific risk assessment results (e.g. toxicity tests, human health food web modeling) and background considerations. The text in this section, however, states that the SCO can only vary from those values listed on Table IV based on technical feasibility and adverse environmental impacts. This process is not clearly defined or transparent and needs to be

	#	SMS Section	Comment
519 cont.			clarified.
520			c. Because the SCO, as the “default” sediment cleanup level, only considers natural background (defined as concentrations that have not been influenced by localized human activity; Line 330), this essentially eliminates regional background (defined as inclusive of anthropogenic background; Line 389) considerations from the development of the sediment cleanup level and the site remediation process. This will result in sediment cleanup levels being developed that do not account for anthropogenic background concentrations, such as diffuse non-point sources and storm water inputs. This may increase the extent of sediment remediation without consideration for the benefits of the remediation process to the embayment.
521		WAC 173-204-530, Line 1775 – 1791 (listing), and 1793 – 1812 (delisting)	a. Site delisting and expectations of how a sediment cleanup objective (SCO) can be met over time, especially if the SCO is natural background, is major change to the SMS rule revision. There are no mechanisms to reach remedy completion without meeting the SCO. The SMS rule should contain mechanisms to allow for an achievable final cleanup action. We also believe that Institutional Controls (ICs), when combined with active remedies, should be acceptable for meeting cleanup objectives.
522			b. Lines 1795 – 1798, Condition (6)(a)(i) for delisting implies that sites can no longer be delisted until all confirmational monitoring has been completed, all actions in the cleanup action plan have been completed, and all sediment cleanup standards have been achieved. Completing a cleanup action and achieving cleanup standards is not sufficient for delisting. It must be demonstrated that the remedial technology is performing as intended. This is typically done during 5-year reviews. There is concern that a federal site may be delisted under CERCLA, but remain listed under the WAC.
523	3	WAC 173-204-500, Line 1548	Line 1548 says “sediment cleanup objectives can be met through a combination of cleanup action and source control.” This may take an incredibly long-time and may be unachievable especially in urban environments with diffuse non-point sources. The rule and guidance needs to include a workable solution. Please add “Institutional Controls” to the statement. ICs should remain a viable remedy component. Access restrictions should be an acceptable form of risk reduction and should be an available remedy component to support meeting cleanup objectives. This is consistent with MTCA.
524	4	WAC 173-204-500, Line 1494	The proposed rule revisions regarding “recontamination after remediation will not be the responsibility of the entity that conducted the cleanup” support early action and faster cleanups. However, the process of determining the source, extent, and impact of recontamination may be difficult. It may require many years of data collection and analysis. How will recontamination of a site above anthropogenic backgrounds located outside of the control of the PRP be handled in cleanup decisions and site complete determination? How will compliance monitoring be used to determine achievement of the cleanup level?
525	5	WAC 173-204-560, Line 2355	The Navy has several concerns regarding the universal application of tribal subsistence consumption rates as the default maximum exposure scenario. What is meant by “historic” tribal use of fish and shellfish in the general vicinity of the site? Can the consumption rates be adjusted based on food availability? Is the MTCA human health risk scenario also applicable? We recommend that Ecology not promulgate a rule for managing contaminated

	#	SMS Section	Comment
525 cont.			sediments based on tribal consumption when the technical details of applying fish consumption data haven't been resolved.
526	6	WAC 173-204-560, Line 2275	Human health criteria and background values should be applied on an area-weighted basis. They are being derived to ensure the protection of human health (direct contact and seafood consumption pathways) and should match the exposure area of concern (usually larger exposure areas). The SMS rule should clarify that these values are NOT applied on a point-basis. In addition, one of the requirements of a cleanup action is to comply with the cleanup standards specified in 560. Please clarify to the basis for meeting compliance with these values.
527	7	WAC 173-204-200 (27) and (38), Lines 330- 340, and 389 - 393	a. In defining "natural background" the term "localized human activities" is used. This term should be defined. It is somewhat unclear how natural background and regional background are differentiated, and which anthropogenic effects are admissible and which are not.
528			b. In defining regional background, how might background for a particular embayment be determined if it has been anthropogenically affected for many generations? If Ecology assumes the responsibility for determining background levels for many embayments of Puget Sound, then the selection process, including the treatment of data and any outliers should be a transparent and peer-reviewed process. c. Who will be financially and technically responsible for determining natural background and regional background? In what part of the remedial process will this occur? d. What is the projected timeline for establishing natural background and regional background? How will the department handle schedule impacts on remedial process in the embayments where these aren't established yet? e. If a PRP must assume the responsibility of collecting reference data and calculating background values for their sites, how will Ecology ensure consistency between projects?
529	8	WAC 173-204-570, Lines 2920 and 2987	a. We understand that MTCA states "use permanent solutions to the maximum extent practicable", however, ranking and hierarchy described in the proposed rule for long-term effectiveness seems inappropriate. It places a biased preference for dredging and does not allow for balancing the criteria of short-term effects, long-term benefits, and costs. The selection of the remedy and technologies should continue to be evaluated based on net environmental benefit, technical practicability, and costs. The methodology for choosing remedial alternatives ensures that all possibilities are considered, as appropriate for each site. The Proposed SMS's prioritized listing of preferred alternatives is not connected to relevant site conditions or risk, and can thereby work in opposition to findings of the RI/FS. If the proposed SMS hierarchy supplants a balanced discussion about the pros and cons of each technology, creative solutions may be missed. There is no one best technology for the remediation of contaminated sediments.
530			b. Line 2987 states "unless otherwise determined by the department, cleanup actions that achieve compliance with the sediment cleanups

	#	SMS Section	Comment
530 cont			standards at a site or sediment cleanup unit within ten years from the start of the cleanup action shall be presumed to have a reasonable restoration time frame". We believe that the restoration time frame should be ten years AFTER the cleanup action. Also, different time frames may need to be established for biological and HH endpoints, especially for cleanup levels based on background. c. Will sediment recovery zones be applied at larger (bay-wide) scales where there have not been identified point sources but sediment concentrations are still above natural background levels? d. How do you define where and how a technology is technically possible, especially dredging?
906	9	General	The rules as proposed may put a burdensome level of cost and complexity into risk evaluation of small sites.
531	10	WAC 173-204-200, Lines 510, 2193, 2262	Please further clarify the terms cleanup screening level (CSL), sediment cleanup level, sediment cleanup objective (SCO) and sediment cleanup standard (SCS), including providing more detail as to the intent of how these values will be employed in the 2-tier framework and throughout the site remediation process, including site identification, hazard ranking, identification if smaller site units within a larger site, compliance with remediation levels, and site closure. The document does not present a clear and transparent process that specifically details how these values are utilized throughout the site remediation process.
532	11	WAC 173-204-500, Line 1501	The new draft rule requires that "the sediment component of sites and sediment cleanup units with limited contamination will be restored within a single construction season using active cleanup actions such as dredging or capping. However, the department recognizes that longer restoration time frames may be necessary at sites with more extensive or widespread contamination, including sites with ubiquitous chemicals from numerous point and non-point sources." Upon what quantitative basis will this determination be based? How will fish windows, with their narrowly limiting time frames for construction, be incorporated into this decision? This is a design issue and the restriction may conflict with the requirements of Endangered Species Act. Because of the limited 3.5 month in-water work windows in Puget Sound, it may be difficult to implement cleanup work in one work season. In addition, this statement biases the rule toward quicker cleanups instead of better, more protective cleanups that minimize short-term risks. The restriction should be removed from the rule.
533	12	WAC 173-204-500, Line 1482	a. Line 1482, Scale of Cleanups, the proposed rule states that the cleanup may include "use of source control measures to minimize future contamination". How will the new rules also impact NPDES permitting and compliance? If not, how can PRPs know their sites will not be re-contaminated by point source dischargers?
534			b. Does Ecology anticipate changing other environmental regulations to bring them into support and compliance with the new rules? If natural background is the goal for each embayment, how will pollutant loadings for surface runoff and point source dischargers be set to support that? What

	#	SMS Section	Comment
534 cont.			about other compliance regulations?
535			c. How will the rule changes affect upland cleanup standards and site closures?
536	13	General	The cost-benefit analysis regarding the potential effects of rule changes to sediment cleanup projects in Washington State only compares between the SCO and CSL cleanup levels. The evaluation should also include a "no action" or baseline scenario (the existing SMS rule revisions). The analysis should compare the cost burden of incorporating HH criteria into the rule revision.
537	14	General	We would like to see the cost impacts of the rule changes evaluated in compliance with SEPA. We believe an accurate cost evaluation cannot be completed until unknowns (such as fish consumption, regional and natural background, and connections to other regulations that implementation of these rules are dependent upon) have been fully identified and resolved.
538	15	WAC 173-204-562, Line 2591-2600	The revisions in Table V confuse the assessment because, while all of the other SCOs are consistent with the sediment quality standards of Section 320, determination of statistically significant differences in larval survival and development is at a probability level of 0.1 ($p=0.1$). This results in a slightly higher likelihood that larval effects will be determined under the revised rule. The Department of Ecology *Review of Sediment Management Standards – Bioassay Protocols* (1995) specifies $p=0.05$. This discrepancy between sediment quality standards and previous department recommendations should be explained.
539	16	WAC 173-204-540, Lines 1881-1889	The determination of Applicable or Relevant and Appropriate Requirements (ARARs) is an important part of the CERCLA process. ARARs are identified and agreed as applicable or relevant and appropriate on a site-specific basis. The proposed rule change should not state the Rule in its entirety will be an ARAR for federal cleanups.
540	17	WAC 173-204-200, Lines 327-329	The proposed definition of Monitored Natural Attenuation spells out what kind of monitoring will occur (sediment quality, tissue, <u>and</u> biota). Please change "and" to "or", to allow project teams to determine which types of monitoring would be best for the needs of the site.

NIPPON PAPER INDUSTRIES USA

October 29, 2012

Adrienne Dorrah
Washington Department of Ecology
Toxics Cleanup Program
PO Box 47600
Olympia, WA 98504-7600

RE: Draft Sediment Management Standards, Chapter 173-204

Nippon Paper Industries USA appreciates the opportunity to comment on the proposed changes to the SMS standard. A great deal of effort has gone into the development of the initial proposals, especially the work of the stakeholders and professional community. Nippon strongly encourages Ecology to go back and re-consider the advice of the stakeholders and professionals as you will see enumerated in the attached comments.

541 Nippon endorses the comments submitted by Georgia-Pacific dated October 25, 2012 and attached hereto.

542 Nippon endorses the comments submitted by the National Council For Air And Stream Improvement (NCASI) dated October 25, 2012 and attached hereto.

Sincerely,

Paul F. Perlwitz
Environmental Manager

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Georgia-Pacific

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October 25, 2012

Washington Department of Ecology
Toxics Cleanup Program
Adrienne Dorrah
PO Box 47600
Olympia, WA 98504-7600

RE: **Draft Sediment Management Standards Chapter 173-204 WAC Amendments**

Ms. Dorrah;

Georgia-Pacific LLC (Georgia-Pacific) appreciates the opportunity to submit the attached comments on the Draft Sediment Management Standards Chapter 173-204 WAC Amendments. Georgia-Pacific and its subsidiaries have more than 200 locations across North America, South America and Europe, ranging from large facilities, such as pulp, paper and tissue operations; to moderately sized facilities, such as gypsum plants, chemical plants, and building products complexes; to small facilities, such as Dixie® product plants, corrugated container plants, warehouses and sales offices, including several operating facilities in Washington.

A copy of our comments were also sent via e-mail to RuleUpdate@ecy.wa.gov. If you have further questions or clarifications regarding these comments, please contact myself or Mike Hassett 404-652-6874.

Sincerely,

Traylor Champion

Traylor Champion
Vice President – Environmental Affairs
Georgia-Pacific LLC

Draft Sediment Management Standards Chapter 173-204 WAC Amendments Public Comment Form

Name of Commenter:	Georgia-Pacific LLC
Version of Document Reviewed:	__ Review Version (Reader Friendly) X Official Version
Date:	October 19, 2012

Page Number	Line Number	Comment
General Comment	N/A	Georgia-Pacific (GP) has been following the development of the SMS rule revisions for several years, and while the proposed amendments contain a number of improvements over the current rule language, other elements of the proposed revisions have the potential to exacerbate, rather than alleviate, some of the practical challenges posed by the current rules.
General Comment	N/A	The current draft of the SMS rule demonstrates that Ecology is trying to address many of the technical and policy issues and comments received previously in ways that meet the over-riding goal of making the SMS protective and implementable, including: • A multi-phase approach for sediment recovery over a long timeframe and broad geographic areas; • A regional background approach to allow incorporation of technical feasibility, cost considerations, and net environmental benefits in cleanup decisions; • Provisions for discrete sediment cleanup units and/or sites within larger bay-wide areas of sediment impact; • Consideration of practical incentives to encourage potentially liable parties (PLPs) to take action regarding problems they can control and potential cash-out settlements for larger bay-wide problems; and • Strategic analysis of how the SMS update will be interpreted and implemented by different federal, state and local environmental regulatory programs (e.g., Water Quality Program, NPDES industrial and municipal permits, MTCA, CERCLA, etc.).
General Comment	NA	Ecology undertook a great deal of outreach and involvement with knowledgeable professionals and other stakeholders leading up to the proposed SMS amendments, including several advisory committees. From GP's perspective, it appeared that both Ecology and the committee members put a great deal of time and energy into reaching workable solutions to problems that have posed a genuine impediment to moving forward with sediment cleanups. Based on sample rule language distributed in October 2011 and other materials Ecology presented at the last meeting held with advisory committee members in December 2011, the agency appeared to have charted a course for focused rule amendments that would create a workable path through some very thorny MTCA/SMS issues and help in expediting needed sediment cleanups. However, while the proposed rule amendments include some aspects of the pragmatic approach that resulted from the advisory committee process, other portions of the amendments represent very significant changes to the current rule that GP understands were either never discussed, or were discussed and quickly put aside by the advisory committee as unworkable. The changes needed to align these rule amendments with a more practicable approach are fundamental enough that new draft language needs to be proposed.
17	65 – 69	The new requirement to establish sediment recovery zones at sites and cleanup units where cleanup levels cannot be met within ten years of the start of the cleanup is highly problematic. GP understands that the final advisory committee made clear to Ecology that including the sediment recovery zone standards of WAC 173-204-590 in the new SMS rule revisions would stymie cleanup, as this element of the existing SMS regulations has proved totally unworkable in the real world because of "technical impracticability" and other similarly difficult criteria that need to be achieved to use this element of the SMS rule. Given that the highly conservative background or practical quantitation limit (PQL)-based sediment cleanup levels for bioaccumulative chemicals such as PCBs, dioxins/furans, and PAHs are anticipated to be exceeded at nearly every sediment cleanup site in part because of uncontrollable, diffuse non-point source inputs of these regional contaminants, the entirety of subsection (4) discussing sediment recovery zones needs to be deleted.
26	223 - 227	The proposed language of WAC 173-204-200(1) is problematic because it, combined with the provisions of WAC 173-204-570(3)(h), establishes "active" cleanup as the presumptive remedy at all sites. Please see our comment on the revised language of WAC 173-204-570(3)(h) below. The inadvisable presumptive approach to require "active cleanup" will only further stymie cleanup progress. Thus, the entirety of WAC 173-204-200(1) needs to be deleted. Similar edits need to be made to related parts of the SMS rule.
29	283 - 285	The definition of "contaminant" needs to be expanded to explicitly recognize that the bioavailability of sediment contaminants may vary significantly both within and between sites based on site-

Draft Sediment Management Standards Chapter 173-204 WAC Amendments Public Comment Form

Name of Commenter:		Georgia-Pacific LLC
Version of Document Reviewed:		__ Review Version (Reader Friendly) X Official Version
Date:		October 19, 2012
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		specific geochemistry and other factors. Sub-section (15) and other related sections and sub-sections need to be re-written to clarify that site-specific bioavailability considerations should be incorporated into the development of site-specific cleanup levels using approaches developed by the Interstate Technology & Regulatory Council (ITRC) and discussed in other relevant Agency guidance documents. Note that the ITRC's February 2011 Technical/Regulatory Guidance (which Ecology helped co-author): "*Incorporating Bioavailability Considerations into the Evaluation of Contaminated Sediment Sites*" states: "*Overall, this guidance establishes that bioavailability considerations should be incorporated in the exposure assessment process to obtain a clearer understanding of contaminant toxicity and exposure pathways such that remedy selection decisions can be focused and resources efficiently used. By incorporating bioavailability considerations into the early stages of site characterization, the risk assessment process, and remedy selection, a more effective remediation may be accomplished, which may well optimize overall cost. This web-based technical and regulatory guidance can help the user understand the proper application of these tools to assess bioavailability and more effectively protect human health and the environment.*"
34	389 - 393	While the general definition of "regional background" in sub-section (38) is workable with revisions (see below), the utility of this approach will be entirely dependent on how regional background is ultimately calculated, which presumably will be described in detail in the Sediment Cleanup User Manual. We understand that Ecology is developing a pilot study to examine this issue in greater detail, but we have significant concerns that the regional background calculation approaches that Ecology is currently considering are all too stringent to be practical. Previous case study applications using approaches similar to what Ecology is now considering do not allow sufficient differentiation between existing or prospective SMS site units and bay-wide contamination problems. This creates gridlock in the processing of the current backlog of sediment sites. Regional background should include contaminants contributed to the region from multiple urban stormwater sources, in order to distinguish those pollution problems from more discrete sediment sites that can be linked to a more specific, and likely historic, past practice. For example, detailed national and regional studies of dioxin sources have concluded that: 1) currently, the largest quantified source of dioxin emissions throughout the U.S. is the uncontrolled burning of household trash (backyard burning; http://www.epa.gov/wastes/nonhaz/municipal/backyard/health.htm); and 2) common non-point source inputs such as those resulting from historical roadside weed control have been identified as important sources of dioxin to regional sediments. The similarity of both soil and sediment dioxin concentrations and congener profiles in urbanized areas of Puget Sound to those found throughout the region provides further evidence that existing sediment dioxin concentrations are the product of a wide range of historical point and non-point source legacy releases, as well as ongoing non-point source inputs. Regional background problems should be addressed under the appropriate regulatory tool (e.g., Phase II municipal permits) and not site-specific MTCA/SMS enforcement. Calculation of regional background should allow for inclusion of certain contaminants if they are due to the influence of multiple urban sources. The concept of regional background should be specifically used to determine discrete SMS sites or site units.
36	435 - 442	The proposed revisions significantly and unrealistically shorten the maximum restoration timeframe for a cleanup. Informed by the committee members' collective experience with how long many cleanup projects take to implement, GP understands that the final advisory committee considered and rejected the option of changing the rules from the current requirement that cleanup standards must be met with 10 years following completion of cleanup, to requiring that cleanup standard must be met within 10 years of *initiating* cleanup. However, the August 2012 proposal ignores the committee's recommendation. Thus, the next to last sentence of sub-section (46) needs to be revised to read: "*within ten years after the ~~start~~completion of the cleanup ~~action~~construction.*" The last sentence of this sub-section referring to sediment recovery zones needs to be deleted, consistent with the comment above regarding page 17.

Name of Commenter:		Georgia-Pacific LLC
Version of Document Reviewed:		___ Review Version (Reader Friendly) X Official Version
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Page Number	**Line Number**	**Comment**
xcv	1500 - 1507	Given the complexities of permitting and coordinating beneficial reuse opportunities at sediment cleanup sites it is unrealistic for Ecology to expect that sediment cleanup construction within sediment cleanup units (let alone entire sites) can be completed within a single construction season. This sub-section needs to be re-written to more simply state that: "*restoration will be completed as soon as practicable, consistent with the general requirements of WAC 173-204-570.*"
xcvi	1508 - 1511	Similar to the comment on page 36 above, the entirety of this sub-section either needs to be deleted or the text of sub-section (d) revised to read: "*….within ten years after the ~~start~~completion of the cleanup ~~action~~construction, …..*".
cxxxi	2190-2203	Ecology's October 2011 sample rule language specified that, in determining where to set cleanup levels between the sediment cleanup objective ("SCO") and regional background, three factors should be considered: technical feasibility, cost and net environmental benefit. The document distributed in late 2011 to the final advisory committee titled "*Framework for Sediment Cleanup Decisions*" stated at p. 7 "*The current SMS framework allows consideration of cost, technical feasibility and net environmental effects both when setting cleanup standards in a range between the upper and lower bounds and during remedy selection. This has been successful because the system provides needed flexibility…In the revised rule, this paradigm will remain.*" Yet, despite this, the cost criterion has been dropped in the proposed amendments. This change is difficult to understand given that, by Ecology's own admission, the current rule's consideration of cost in setting cleanup standards is one of the parts of the rule that works well because of the flexibility it provides. Furthermore, the inclusion by reference in the proposed rule of WAC 173-340-360's disproportionate cost analysis ("DCA")in selecting cleanup actions does not take the place of cost consideration in setting cleanup standards, because the threshold requirement that cleanup standards must be attained within a reasonable restoration timeframe dictates which potential cleanup actions can be considered in the DCA. In order to preserve the flexibility that Ecology admits is afforded by the current rule, cost should be restored as a criteria for setting site specific cleanup levels under WAC 173-204-560.
clxxv	2906 - 2910	The August 2012 proposal appears to have ignored the Committee's advice and includes the requirement in WAC 173-204-570(3)(h) that "*Cleanup actions shall not rely primarily on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action.*" The proposed language is problematic because it establishes "active" cleanup as the presumptive remedy at all sites, despite years of collective experience demonstrating that the unique challenges posed by sediment sites often make "active" remedies impracticable. This opinion is not confined to Washington; EPA's current sediment guidance states there is no presumptive remedy for sediment contamination. Consistent with this widely held position, GP understands that the final advisory committee that addressed this issue held the consensus view that there is no presumptive sediment remedy, including a requirement for "active" cleanup, for any contaminated sediment site, regardless of the contaminant or the level of risk. Given the widely differing sediment cleanup situations in Washington State, the sediment cleanup remedy should always be the product of careful site-specific evaluations. With lower and lower cleanup levels for constituents like dioxins and PCBs, leading to very large sites, exchanging the site-specific evaluation for a presumptive remedy can and will lead to impracticably broad mandates for active cleanup – for instance, under the proposed rule language, for a 1,000 acre site an active remedy may have to be implemented on more than 500 acres, regardless of how great or small the exceedances of cleanup levels might be. Because the proposed language is both ignores real-world nature of sediment cleanups and partially discards the MTCA process by mandating an active cleanup in advance of compiling and evaluating all available options and data, GP believes this portion of the proposed amendments is fatally flawed. The inadvisable presumptive approach to require "active cleanup" will only further stymie cleanup progress. Thus, the entirety of WAC 173-204-200(1) needs to be deleted. Similar edits need to be made to related parts of the SMS rule.
clxxviii	2957 - 2962	Refer to comments regarding pages 17 and 36. The entirety of sub-section (b) needs to be deleted.
clxxxi to clxxxvii	3007 to 3136	Refer to comment regarding page 17. The entirety of WAC 173-204-590 Sediment recovery zones needs to be deleted.

ncasi

NATIONAL COUNCIL FOR AIR AND STREAM IMPROVEMENT, INC.
West Coast Regional Center
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Phone: (541)752-8801 Fax: (541)752-8806

Dr. Jeff Louch
Principal Scientist
JLouch@ncasi.org

October 25, 2102

Toxics Cleanup Program
Ms. Adrienne Dorrah
PO Box 47600
Olympia, Washington 98504-7600

Dear Ms. Dorrah:

The National Council for Air and Stream Improvement, Inc. (NCASI) is an independent, non-profit membership organization that provides technical support to the forest products industry on environmental issues. An important part of our mission is to ensure that regulatory decision making is based on sound science. In this capacity, NCASI has reviewed the August 15, 2012, proposed amendments to the Draft Sediment Management Standards (SMS) rule (Chapter 173-204 WAC).

Based on this review, it is clear that Ecology has put significant thought and effort into making the SMS rule simpler and more effective. Shifting from a narrative standard to chemical-specific numeric criteria as the means of addressing potential impact(s) of freshwater sediments on benthic organisms and incorporation of the concept of regional background are clear examples of this, and NCASI fully supports both additions to the rule. However, NCASI has some concerns about specific aspects of this proposal. These concerns are detailed in the attachment, and can be summarized as follows:

1. It would be scientifically indefensible to include salmon in any fish consumption rate (FCR) used in risk assessments associated with site-specific sediment cleanups.
   (see comment specific to Section 173-204-561(2)(b)(i)(D) in the attachment)

2. Ecology should not arbitrarily expand the definition of what constitutes a bioaccumulative chemical beyond the criteria already codified in WAC 173-333-320(2)(b).
   (see comment specific to Section 173-204-564(2)(iii)(B) in the attachment)

Please do not hesitate to contact me if you have any questions concerning these comments.

Sincerely,

JEFF LOUCH

Jeff Louch
Principal Scientist

Attachment

ec: Steve Stratton, NCASI
Paul Wiegand, NCASI
Christian McCabe, Northwest Pulpa & Paper Association

COMMENTS ON SPECIFIC SECTIONS OF WASHINGTON STATE DEPARTMENT OF ECOLOGY'S AUGUST 15, 2012, PROPOSED AMMENDMENTS TO THE DRAFT SEDIMENT MANAGEMENT STANDARDS (SMS) RULE (WAC 173-204)

Section 173-204-561(2)(b)(i)(D)

It is inappropriate to include salmon in any fish consumption rate (FCR) used in risk assessments associated with site-specific sediment cleanups.

Section 173-204-561(2)(b)(i)(D) states that the size of a site relative to an organism's (fish or shellfish) home range will be taken into account as part of the default human health risk assessment, but does not explain the relevance of this adjustment or how it will be implemented arithmetically.

As a consequence of Ecology's silence, NCASI can only assume that the goal of this language is to allow some accounting for the fact that the contaminant dose to a human being (or any higher trophic level organism) received from consuming a single organism (or single species) cannot be assumed to be totally dependent on the concentrations of contaminant(s) at any one site. Put another way, the contaminant body burden of an individual organism cannot be assumed to be dependent solely on the concentrations at any one sediment site.

Obviously, the extent to which contaminants at any one site impact the body burden in individuals of a specific species will increase as the geographic range of the species decreases. For truly sessile benthic species, it might even be logical to assume that 100% of the contaminant body burden is obtained from a single site. However, this is an assumption, and it becomes more tenuous as the home range of a species increases and/or the size of the sediment site decreases. It also becomes more tenuous as the prey base for a species expands.

Ultimately, any attempt to correct a site-specific exposure assessment to account for contaminants originating outside the geographic scope of a contaminated site is subject to significant uncertainty, and NCASI recognizes that using some metric characterizing the relative size of the site vs. an organism's (or species') home range may be the only transparent means of effecting such a correction. Assumming that this is, in fact, Ecology's intent, NCASI fully supports the language proposed for Section 173-204-561(2)(b)(i)(D). However, the most defensible means of addressing this issue is through study of contaminant uptake by the relevant species. Certainly, when these kinds of data are available they should be used.

As a specific example, results from studies examining the accumulation of bioaccumulative chemicals in salmon have consistently shown that >90% of the body burden present in adult salmon is acquired in the open ocean, and not in estuaries or freshwater[1]. A recently released Ecology Technical Issue Paper[2] effectively summarizes these data.

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[1] Note that this statement is fully consistent with the understanding that <u>some</u> contaminant uptake occurs in estuaries and freshwater.

[2] Salmon Life History and Contaminant Body Burdens. In *Supplemental Information to Support the Fish Consumption Rates Technical Support Document.* https://fortress.wa.gov/ecy/publications/publications/1209058part1.pdf

Thus, in the case of adult salmon specifically, attempting to account for the fraction of the ultimate body burden associated with a specific site through use of some correction factor based on geographic size or time spent at or near the site is both unnecessary and unjustified. Instead, Ecology should accept the results obtained by multiple researchers who have studied this issue. These results show that, when considering the impact of estuarine or freshwater sediments in general, a multiplicative factor of 0.1 would be conservative; that is, assuming that 10% of the contaminant body burden in returning adult salmon is derived from exposure to sediments actually overstates the impact of all estuarine and freshwater sediments in the home range of any specific salmon run. This means that the contribution of any one contaminated sediment site to the overall body burden found in adult salmon is truly *de minimis.* Because of this, salmon should not be included in the FCR used in any risk assessment associated with site-specific sediment cleanups.

173-204-564(2)(iii)(B)

Ecology is proposing to arbitrarily expand the definition of what constitutes a bioaccumulative chemical.

Overall, the language in Section 173-204-564 suggests that detection of any bioaccumulative chemical in any sediment will trigger a risk assessment to determine if the specific contaminant poses some risk to higher trophic level species, and Section 173-204-564(2)(iii)(A) requires that detection of any chemical currently listed as a persistent, bioaccumulative, or toxic (PBT) chemical on Ecology's PBT list (WAC 173-333-310) be subject to such a risk assessment. As defined by Ecology's PBT rule, a chemical is considered bioaccumulative if it has a bioconcentration factor (BCF) or bioaccumulation factor (BAF) greater than 1000, or a pK_{ow} (log K_{ow}) greater than 5 ($K_{ow} > 100,000$).

Section 173-204-564(2)(iii)(B) proposes to expand the scope of this to include chemicals with a $pK_{ow} > 3.5$ ($K_{ow} > 3162$), but offers no justification for why this is necessary or useful. This proposed change to the criteria defining what constitutes a bioaccumulative chemical is significant for many reasons. First, although there is some subjectivity in setting the threshold for defining what constitutes a bioaccumulative chemical, setting the threshold at a pK_{ow} of 3.5 is inconsisent with the scientific consensus (this specific issue was debated extensively during development of Ecology's PBT rule, and the result was setting the pK_{ow} threshold at 5). Second, because the proposed modification to the definition does not mandate the existence of a measured pK_{ow}, it opens the window to allowing a chemical to be defined as bioaccumulative based on a predicted (i.e., modeled) pK_{ow}. Finally, and most importantly, because pK_{ow} is simply a physico-chemical parameter not reflecting any limitations to uptake by organisms and/or metabolism by organisms, basing the definition solely on pK_{ow} would allow a chemical to be defined as bioaccumulative without any evidence that the chemical actually does bioaccumulate (as the proposed alternate definition does not require a specific threshold for a BCF or BAF). Thus, this section has the potential to allow decisions about sediment cleanup(s) to be driven by the presence of chemical(s) that may in fact not bioaccumulate. It is encumbant upon Ecology to provide some justification for making this proposal. Absent this the proposal is totally arbitrary.

Considering the deliberative consensus-driven process leading to adoption of the criteria given in Ecology's PBT rule, these should remain the only criteria defining a bioaccumulative chemical. Thus, Ecology should delete Section 173-204-564(2)(iii)(B) from the proposed rule.

Northwest Indian Fisheries Commission

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October 29, 2012

Ted Sturdevant, Director
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ATTN: Toxic Cleanup Program
RE: Comments on proposed amendments to Sediment Management Standards

543 The Northwest Indian Fisheries Commission (NWIFC) submits these comments on the proposed amendments to Washington State Sediment Management Standards (SMS) on behalf of NWIFC member tribes. The tribes retain treaty-reserved fishing rights that have been placed at risk by the state through the promulgation of inadequate standards for toxic discharge and cleanup. The proposed amendments to the SMS appear to have been written from the perspective of assisting Potentially Liable Persons (PLP), whose objective is to reduce their burden for toxic cleanup, instead of the more appropriate perspective of protecting the public health of the citizens of Washington, now and in the future. In order to meet the intent of the Model Toxics Control Act, the Clean Water Act, and other relevant environmental laws, the SMS are in need of a fundamental shift from how to make them easier to meet, towards the protection of public health and a clean and productive environment.

The enclosed comments, along with attachments and referenced materials, represent a consolidated set of comments on the SMS amendments based on input from toxic cleanup, water quality, and legal specialists.[1] /The tribes' comments fall into four major issue categories: 1) failure to include a default fish consumption rate; 2) provisions that serve to whittle down protective standards in ways that pose an unacceptable risk to human health, particularly for tribes; 3) definitions, objectives, and procedures that unacceptably lower cleanup requirements; and 4) inconsistency with other regulatory requirements, such as the Federal Clean Water Act. Tribes also seek standards that not only maintain the status quo, but will support tribal consumption of fish and shellfish at restored and unsuppressed levels.

544 1. The failure to include a Default Fish Consumption Rate in the SMS perpetuates over-exposure to toxic contaminants in tribal communities.

   a. **Reinstate a Default Fish Consumption Rate at or above the range recommended in version 1 of the FCR Technical Support Document.**

[1] NWIFC also supports, and hereby adopts by reference, the comments from the Center for Indian Law and Policy, Seattle University School of Law, on the FCR Technical Support Document Version 2.0 and the proposed SMS amendments.

544 cont. Washington tribes, the NWIFC, and Columbia River Intertribal Fish Commission have submitted comments to Ecology on the 2011 version of the Fish Consumption Rate Technical Support Document, which are hereby incorporated by reference. In comments submitted to the record in January, 2012, the tribes indicated the need for a default fish consumption rate that would be at least as protective as the water quality standard adopted by Oregon of 175 grams per day, covering all affected species including salmon. Tribal comments on the 2011 version of the Technical Support Document indicated that the proposed range of 157-267 grams per day, which was recommended by Ecology's technical staff, represented a "step forward"-- even though it did not fully address the suppression of fish consumption from historical levels. Furthermore, tribes supported the position, put forth by Ecology, that it was important to have a consistent fish consumption rate in the state's SMS and water quality standards for regulatory purposes.

Instead of the step forward, and despite previous commitments, Ecology has taken a leap backwards by retreating from the establishment of a default fish consumption rate in rule. Ecology leaves the FCR and other crucial parameters up for grabs, to be determined at each site. This site specific approach guarantees that actual cleanup will be delayed while PLP's maneuver for lenient interpretations of the FCR and other exposure parameters. Ecology will have the burden of rehashing the science and policy debate at every site, thereby wasting significant taxpayer resources which could be more productively used for clean-up. Additionally, the site-by-site approach puts tribes and small communities at a disadvantage, since they will bear the burden of fighting to secure protective standards for each site that impacts them. The effort is likely to outstrip resources available to the tribes, leaving less protective requirements in place and perpetuating existing environmental injustice to the tribes and other groups who consume large amounts of fish.[2]

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545 **b. In addition to reestablishing a numeric default FCR, the SMS should explicitly enable tribes to submit information and data that support higher fish consumption rates than the previously recommended default range of 157-267 grams per day, and that best available information must be considered in any site-by-site review by the Department of Ecology.**

Ecology originally proposed that a single default FCR be established in all state standards. However, the current proposal reflects a bifurcated, and largely inconsistent approach, which provides that FCRs will be treated differently in SMS as compared to the human health criteria of the surface water quality standards. To help rectify the potential lapses in protection created by this inconsistent approach, Ecology must include clear requirements to consult with tribes and incorporate existing and new information about fish consumption rates as studies are completed and analyzed. The inconsistency between the SMS and proposed Human Health Criteria in the surface water quality standards, and the abandonment of a consistent default FCR, also means that Ecology must consider site-specific rates that are higher than previous default recommendations. Newer studies indicate that current and historical fish consumption rates may exceed the recommended range (157-267 gpd) specified in the Technical Support Document version 1 due to the suppression of harvest. For example, the Lummi Nation recently completed a dietary study that recorded FCR's at 1985 levels (prior to the accelerated

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[2] For additional information on the affects of the proposed RME, see NWIFC Letter to Mike Bussell, Director of the Office of Water, EPA region 10 re: EPA engagement in Washington's development of water quality standards and attending fish consumption rates (September 2012) , hereby incorporated by reference.

545 cont. suppression of salmon and associated listing under the Federal Endangered Species Act). The median rate in the Lummi study at the 1985 level of consumption was 383 grams per day per capita.[3]

The proposed default range of 157-267 gpd from the 2011 Technical Support Document is lower than traditional and historical levels, which were identified in the 2011 document as approximately 600 to 1,000 grams per day. The range is also lower than the 90th to 95th percentile fish consumption rate findings in multiple dietary studies by Washington and Columbia River tribes. Ecology must consider higher FCRs on a site-by-site basis. Recent studies by the Colville Confederated Tribes, Lummi Nation, and dietary studies that are planned or in progress will offer additional scientific data that must be formally considered in a site-by-site analysis of fish consumption rates under the SMS.

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546 2. Reasonable Maximum Exposure parameters must protect the health of tribal fish consumers at historical, current and future levels.

a. **Section 173-204-561(2)(b) must be revised to clearly reference tribal consumption throughout, including future use, and to ensure that high consumption opportunities for all species throughout all tribal treaty fishing areas are maintained.**

The proposed SMS state that cleanup will be set to protect those Washingtonians who are most exposed, given present and future uses of a site and the resources impacted by a site. The proposed SMS protections thus incorporate the concept of Reasonable Maximum Exposure (RME)(WAC 173-204-561(2)(b)(i)). The RME concept in the SMS is correct in recognizing that tribes have relied on fisheries resources here for thousands of years, and that tribal members are likely to be the most exposed to potential contaminants in fisheries resources. In WAC 173-204-561 "Sediment cleanup standards based on protection of human health" the proposed SMS appropriately define RME by instructing staff to determine RME by reference to "historical, current, and future tribal use of fish and shellfish." However, the proposed SMS then provide tools to undermine protection for the actual people represented by this exposure scenario as follows:

i. WAC 173-204-561(2)(b)(ii) does not reference tribes.. The proposed SMS allow Ecology to substitute an "alternate" exposure scenario for the RME, by reference to a process that makes no mention of the word "tribal." Again, this possibility leaves tribes to fight to secure their protection at each site. **Any site throughout any tribal usual and accustomed area must have an RME based on tribal exposure scenarios.**

ii. The standards fail to incorporate provisions that protect future users and high consuming tribal members. Reasonable Maximum Exposure is intended to reflect the 95th percentile of consumers, which are actual exposures of real people under realistic present or future conditions. Tribal dietary studies of fish consumption are neither hypothetical nor unrealistic—they are scientifically-designed, peer-reviewed dietary studies of tribal members who consume primarily locally-harvested fish. Ecology intends to establish exposure parameters based on a mix of high-end and average values. An RME for tribes must include high-end fish consumers, as tribes and their members live here and harvest and consume fish for their entire lives. Moreover, tribal exposure scenarios must include

[3] Freimund, J., M. Lange and C. Dolphin, 2012. Lummi Nation Seafood Consumption Study, Final Report. Lummi Indian Business Council. Bellingham, WA.

546 cont. future, restored conditions of fish consumption at unsuppressed, historical or "heritage" rates, as tribes are legally entitled to by treaty with the United States Federal Government. Large scale restoration programs are in progress throughout the state and tribes are unwilling to write off degraded habitat areas from potential consumption scenarios. **SMS section 173-204-561 must reference future consumption scenarios as well as current.**

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547 iii. The Fish Diet Fraction is used to whittle down the fish consumption rate by setting standards site by site. The proposed SMS and the SMS guidance anticipate that the FCR reflecting a "tribal RME individual" may effectively be reduced by a regulatory concept called the Fish Diet Fraction (FDF). FDF is the portion of a person's diet that "is obtained from the site or the general vicinity of the site." A Fish Diet Fraction is applied to the applicable fish consumption rate; a FDF of 1.0 means no reduction to the FCR. However, Ecology includes provisions to reduce the FCR if the site is small or the habitat will not support sustainable quantities of the species at the determined FCR. As described in the Addendum, the SMS fail to assess the Fish Diet Fraction factor in the context of harvest at multiple sites, exposing tribal members to potential risk. The SMS also fail to address factors that could change the Fish Diet Fraction, such as changes in abundance, seasonal variation, permitting availability, and proximity to the reservation. The standards do not address how to communicate risks to tribal members on how to harvest according to this proscribed Fish Diet Fraction. **In summary, there is no justification for the application of a Fish Diet Fraction less than 1.0 in areas where tribes historically, currently, or potentially harvest fish and shellfish without posing an unacceptable risk of exceeding safe levels of exposure.**

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548 iv. The Site Use Factor (SUF) also reduces protective requirements by establishing rates for individual species' use of individual sites. Site Use Factor is another tool (described further in the Addendum) that is being used to reduce the protective level of SMS requirements. The SUF refers to the percentage of time that a fish/shellfish is in contact with contaminants at the site based on the species' life history and home range. Ecology's proposed standards not only fail to look at consumption in the aggregate of contaminated sites, they attempt to further slice up the required level of site clean-up by separating by species, size of the site, and time of exposure. There is no scientific way to assess how much time a species has spent at a site or how much chemical burden a species has picked up in any specific geographic area, thus a site use factor is subjective and variable. Additionally, bioaccumulation varies species to species, life-stage to life-stage, and within the array of life history strategies of a single species, which may or may not migrate beyond the vicinity of the contaminated site. The Site Use Factor also fails to account for situations where contaminants are dispersed, resuspended, or transported to areas beyond the boundaries of a specific site. **In summary, there is no justification for the application of a Site Use Factor less than 1.0 in areas where tribes historically, currently, or potentially harvest fish and shellfish without posing unacceptable risk of exceeding safe exposure levels. The concept of applying a Site Use Factor using the concept of a fraction of the home range or the estimated duration of contact with a site should be eliminated from the SMS due to its potential to result in unprotective cleanups.**

To rectify the concerns above, we recommend modifying the language of § 561(2)(b) to eliminate those concepts which perpetuate the suppression of fish consumption rates, or set RME's which are

548 cont. not consistent with tribal rates. This may also require modifying § 561(2)(b)(i)(A) & (C) to eliminate the FDF and SUF modifiers.

549 3. The Proposed Two Tier Framework[4] for establishing cleanup standards undermines human health and ecological based standards.

a. Sediment cleanup objectives, definitions, and standards should be structured toward actually cleaning up contaminated aquatic environments.

The proposed Sediment Management Standards include several provisions that serve to reduce the burden of cleanup for PLPs by setting underprotective clean up standards. The two tier framework provides that cleanup standards will fall within the lower and upper bounds of the Sediment Cleanup Objectives (SCOs) and Cleanup Screening Levels (CSLs). SCOs and CSLs are determined by defaulting to the least protective criteria of several standards. This is problematic, because under most circumstances human health or ecological standards will not apply. Instead, cleanup standards will be derived from: practicable cleanup levels, the use of "natural" background levels that reflect existing contamination, "regional" background levels, and Practical Quantitative Limits (PQLs) which represent the median level of contaminants detectable with present technology. The low bar set by these definitions and objectives will mean that PLP's can walk away from contaminated sites without fully cleaning them up, and Washington residents will live with contaminated sites in perpetuity. The cleanup standards are particularly problematic when considering highly potent carcinogens such as dioxin, and high fish-consuming people, such as tribes. The following further explains the how the two tier framework works to undermine ecological and human health based standards:

550 i. Practicable versus possible cleanup levels: The SMS allows Ecology to establish a site-specific cleanup level which permits higher concentrations of contaminants than what would be protective of human and ecological risk. The SMS indicate that the cleanup level be set "as close as practicable to the Sediment Cleanup Objective (SCO) based on technical possibility and adverse environmental impacts." The definition of "practicable" is thus an essential element of cleanup requirements, and unfortunately is not defined in terms of best efforts and technology. "'Practicable' means able to be completed in consideration of environmental effects, technical feasibility and cost." While it may be appropriate to recognize some bases for permitting contamination to remain at a cleanup site in amounts that exceed the SCO, at least on an interim basis, the proposed SMS authorize inappropriate factors, such as cost, as well, with the result that human and ecological health can be sacrificed in the name of providing cheaper cleanups.

551 ii. Natural Background: The proposed SMS state that "'natural background' means the concentration of a hazardous substance consistently present in the environment that has not been influenced by localized human activities (WAC 173-204-200(27)). For example, several metals and radionuclides, naturally occur in the bedrock, sediment, and soil of Washington State due solely to the geologic processes that formed these materials, and the concentration of these hazardous substances would be considered natural background. Also low concentrations of some particularly persistent organic compounds such as polychlorinated biphenyls (PCBs) can be found in surficial soils and sediment throughout

[4] As defined by the proposed SMS rule amendments, and graphically demonstrated on page 11 of the Draft Sediment Management Standards Rule Proposed Amendments, Review version August 15, 2012 page 11.

551 cont. much of the state due to global distribution of these hazardous substances. These low concentrations would be considered natural background, as would radionuclides. While it makes sense to refer to substances that "naturally occur" "due solely to the geologic processes that formed these materials" as natural background, the remainder of Ecology's definition warps the word "natural." Moreover, if Ecology is permitted to redefine natural background in this manner, it will alter our environmental baseline forever. If the "new natural" includes PCBs, all cleanups going forward will aim, at best, to reduce contamination to this new (contaminated) baseline. **Natural background definitions should be limited to natural, and not include widespread persistent contaminants introduced by anthropogenic activities.**

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552 iii. Regional Background (WAC 173-204-200(38)) refers to the level of current contamination present in the area—a vague geographic definition that is particularly confusing in combination with the unnatural definition of natural background. "Regional background" is vaguely defined as "the concentration of a contaminant within a department-defined geographic area that is primarily attributable to diffuse nonpoint sources, such as atmospheric deposition or storm water, not attributable to a specific source or release." Discretion in applying this definition is left to Ecology with little specific guidance. Unfortunately, experience suggests that Ecology is prepared to consider areas that harbor significant contamination to serve as reference points for determining this sort of regional "background." Moreover, the remainder of the definition incorporates significant ongoing contamination (e.g., from nonpoint sources such as storm water) and raises the possibility that cleanup requirements will spiral continually downward to less stringent levels as the regional background level deteriorates, similar to the definition of natural background. **The difference between natural background, area background, and regional background and the need for these distinctions should be clarified.**

Former members of the SMS advisory group indicate that the concept of Regional Background was intended to offer incentive for cleanup in an area that has been polluted by multiple sources, instead of waiting until all parties can clean up at once. However, the regional background definition does not make sense in light of pollution from stormwater and in tidally influenced areas, and further compounds the inconsistencies between SMS and Surface Water Quality Standards. **The SMS should reject the regional background definition, or at least clarify that it is an interim standard to be used only in remediation.**

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553 iv. Practical Quantitative Limits: The proposed SMS recognize that, for some pollutants, concentrations that are protective of human health and the environment are at levels lower than the limits of current detection capabilities (WAC 173-204-200(35); WAC 173-204-560(3)&(4)). **However, existing lab capabilities are not appropriate as a standard to use as a Sediment Cleanup Objective.** Ecology compounds this unacceptable use of lab techniques as standards, by determining PQLs as the median of current lab results, rather than the higher levels of detection. This strategy rewards mediocrity and fails to encourage improvements in detection technology, especially when used as a cleanup standard. Ecology also commits to reevaluate the PQL only every 3-5 years, removing incentives for more rapid improvements in detection technology by private labs. While it is appropriate to recognize current limitations on our ability to detect contaminants in the environment, Ecology's approach punishes technological innovation and improvement and permits our cleanup standards to lag behind what is actually achievable – to the detriment of human

553 cont. and ecological health. **PQL is not appropriate as a standard, and should be structured to provide incentive for better testing methodology.** Therefore, PQL should be modified as a definition, and removed from use as SCO and CSL. More discussion of the PQL issue is included in the Addendum to this letter.

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4. <u>The Proposed SMS amendments need to be consistent within the rest of the Chapter, as well as with the Model Toxics Control Act, State Surface Water Quality Standards, the Federal Clean Water Act, and with other local and tribal governments' standards.</u>

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554 **a. The Sediment Management Standards must be reviewed under the provisions of the Clean Water Act.**

The sediment management standards are water quality standards and therefore must be harmonized with other existing and pending surface water quality standards and reviewed by the federal Environmental Protection Agency. The proposed amendments are currently inconsistent with the mandates of the Clean Water Act, because they allow setting of cleanup standards that do not protect for human health in freshwater and marine environments. Therefore, the SMS should be reviewed as and cross referenced to state water pollution control standards, and the applicability of both the Clean Water Act and Model Toxics Control Act should be specified.

Addendum 3 describes in depth the reasons why the Sediment Management Standards must be harmonized with Washington's Surface Water Quality Standard and recalibrated to receive EPA approval in order to ensure that proposed rules protect designated uses and do not undermine the water quality standards or the Federal Clean Water Act. The proposed updates to the SMS constitute an update to water quality standards and must be reviewed by the Environmental Protection Agency. Tribes have already asked EPA to uphold their responsibilities under the Clean Water Act and to review the SMS standards for their ability to protect human health and the designated uses. [5]

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555 **b. The Sediment Management Standards should specify provisions for applying water quality standards and other requirements of state and federal law on a consistent basis.**

The proposed SMS amendments of WAC 173-204-500 et. seq. must be consistent with the entire chapter. Specifically, part V amendments must be consistent with the laws that authorize the chapter, including the Water Pollution Control Act (WAC 173-204-100(1), must also conform to the goals established in the designated use policy of WAC 173-204-120(2). To accomplish these tasks, that part V amendment must include that these rules are promulgated pursuant to the RCW 90.48, the surface water quality standards, of WAC 173-201A and the Federal Clean Water Act. Amendments to ensure consistency are requested in WAC 173-204-500(1), (2), and (3). Specifically, the subsection 500(1) applicability must be revised to be consistent with the WAC 173-204-100 and & 120. Furthermore, WAC 173-204-500(3) should explicitly state that sediment clean up decision process shall include consideration of all applicable water quality standards, and that provisions in SMS shall not supersede any standards or laws that would otherwise require more stringent cleanup standards.

[5] see NWIFC Letter to Mike Bussell, Director of the Office of Water, EPA region 10 re: EPA engagement in Washington's development of water quality standards and attending fish consumption rates (September 2012) , hereby incorporated by reference.

555 cont. Ecology should also restore the original language in WAC 173-204-100(6) & 560(1). The November 2011 proposed draft rule language did not remove RCW 90.48 from the authorities of part V of the rules found in section 100. However, in the August 15, 2012 version of the proposed rules, Ecology has redacted RCW 90.48 from the WAC 173-204-100(6). The redacted rule language has been in place for over 21 years. It may have been removed because Ecology contends that they no longer need to submit the SMS to EPA for review and approval as water quality standards. Tribes contend that this argument is untenable, and that review under the Federal Clean Water Act is necessary (see Addendum 3).

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556 **c. Ecology must include both marine and freshwater standards as WQS.**

Consistency is needed between freshwater and marine/estuarine environments so that Ecology can add all impaired waters/sediments to the 303d list of impaired water bodies and take action as necessary. Given that rivers are sources of sediment for marine and estuarine areas, the freshwater criteria play an important role in both fresh and marine water cleanups. Therefore, both fresh and marine waters must be considered and implemented as WQS. We are unaware of any sound basis for the marine/estuarine standards and the freshwater standards to have different regulatory status.

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557 **d. Ecology's approach to establishing human health standards applies a different burden of proof versus the standards for ecological receptors. This inconsistency creates disparate treatment and provides for opportunities for abuse of discretion.**

Ecology's proposed approach also creates a disproportionate burden for tribes and members of the public to evaluate whether sediments in the state pose an unacceptable risk to human health. The difference in the approach to developing standards protective of human health, compared to the approach to protecting ecological receptors, repeatedly puts the burden of proof on those who are seeking to protect human health. It is inappropriate to leave it to the discretion of the site manager to choose which standards apply.

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558 **e. Tribes, like other governments, can and do enact standards for environmental and human health protection, which should be incorporated in keeping with the intent of the Centennial Accord between the state of Washington and tribes.**

The proposed SMS refer to risk levels for marine and benthic organisms, human health, ecological bioaccumulative health, or standards set by other governmental entities. The last of these are known as "applicable, relevant, and appropriate requirements" or ARAR's. Both MTCA and the federal Superfund cleanup law provide for multiple governmental requirements, but MTCA fails to include the requirements of tribal governments. This omission is repeated by the SMS, as it states that only local, state, and federal laws are considered applicable. **Federal, state, local and tribal requirements should be applicable.**

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559 **f. Periodic review and tribal consultation requirements should be specified in the SMS.**

The proposed SMS make no effort to expand existing provisions for periodic review, and allow for review "if resources permit" five years after the initiation of a cleanup action. The SMS should contain specific review requirements with timelines, consultation requirements, and evaluation of implementation and effectiveness. Periodic reviews should also incorporate review of new technologies

559 cont. and information. The proposed standards provide few assurances that review and implementation of findings will occur on a timely basis.

Concluding Remarks

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560 At treaty times, tribes consumed all of their fish from local waters and still continue to obtain most of their fish from local sources. The tribes' reserved rights under the treaties and other legal agreements entitle them to continue to do so in perpetuity. Fish and shellfish are important sources of nutrition for tribal consumers. Additionally, fish and shellfish harvesting methods are traditions that are passed down through generations. Many tribal members would consume more fish and shellfish than they do at present, were these resources not depleted or contaminated. Tribes are working toward a future with restored ecosystems that support fisheries resources in abundant levels, with a variety of species that are safe to eat. Tribes thus have the intent, potential, and legal right to consume a mix of species of fish in the future.

The proposed amendments to the Sediment Management Standards fail to fully incorporate consideration of high fish consumption among tribal members, and leave treaty-reserved resources and tribal health at unacceptable levels of risk. The SMS are primarily directed at cleanup of existing contamination. This is an important goal, but the tribes remain concerned about the prevention of future pollution of fish and shellfish through water quality standards. The tribes are prepared to work with the Department of Ecology on the completion of toxic cleanup and water quality standards on a government-to-government basis to protect tribal rights and the health of future generations.

Sincerely,

for

Michael Grayum, Executive Director

Cc:
NWIFC Commissioners
EPA Region X: Dennis McLerran, Dan Opalski, Jim Woods, Angela Chung, Matt Szelag
Kelly Susewind, Water Quality Program Manager, Ecology

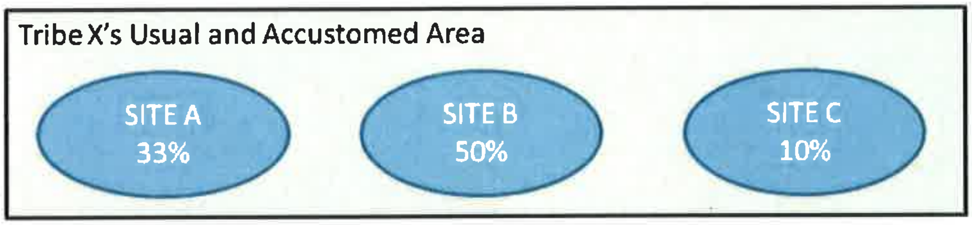
Attachments:
Addendum 1: Site Use Factor and Fish Diet Fraction
Addendum 2: Practical Quantitative Limits
Addendum 3: SMS and Federal Clean Water Act requirements

Addendum 1 to NWIFC comments on Sediment Management Standards
October 29, 2012
Additional discussion on Fish Diet Fraction and Site Use Factor

add to comment on pg 4

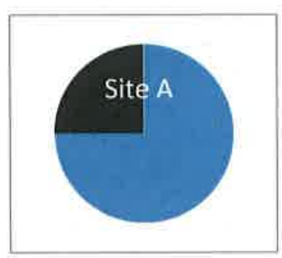
a. Fish Diet Fraction (FDF)

Hypothetical Example of Fish Diet Fraction and Aggregated Risk to Tribes



Tribe X has conducted dietary surveys indicating that the tribe has a fish consumption rate of 150 grams per day (about 5 oz. of fish per day), at the 80th percentile. Additional studies indicate that tribal citizens as a group get 33% of their fish from site A, 50% from site B, 10% from site C, and the rest comes from the open ocean. Site A has contaminated sediments and requires cleanup of toxic pollutants. Ecology has documentation that Tribe X eats 150 grams per day per capita, but they only get 33% of their fish from site A. Ecology thus assigns a fish diet fraction of 33% of the FCR to site A, and sets clean-up requirements accordingly. This allows pollutant levels to be 3 times higher at site A after cleanup than would a FDF of 1.0. However, if sites B and C are similarly contaminated, the permitted level of toxic would similarly be increased, allowing for toxic levels at twice as much for site B and 10 times as much for site C (assuming all else remains equal). Tribal members are not bound to harvest fish in the specified proportions, and frequently don't. An individual tribal member who consumed 100% of his 150 grams per day of fish from site C would be exposed to 10 times the allowable standard.

Fish Diet Fraction is one example of how the SMS is skewed to the perspective of Potentially Liable Parties, whose objective may be to reduce clean-up responsibilities, rather than an overall perspective of protecting public health for tribes and others who consume fish and shellfish at high quantities. The overall effect of Fish Diet Fraction is to decrease the protectiveness of the resulting cleanup standards. There is no justification for applying a diet fraction when the fish and shellfish in an individual's diet is currently or potentially obtained from one or more contaminated sites.



The Fish Diet Fraction also fails to consider how habitat restoration would affect required clean-up levels, and the potential for additional harvest opportunities and an increase in the fish consumption rate. If clean-up levels are determined for Site A based on an assumption that 25% of the habitat is built-out and will no longer produce fish and shellfish, the allowable toxic levels effectively serve as a cap on consumption in Site A, even if habitat is restored. Consumption of higher levels of restored fish and shellfish will increase consumer exposure to contaminants.

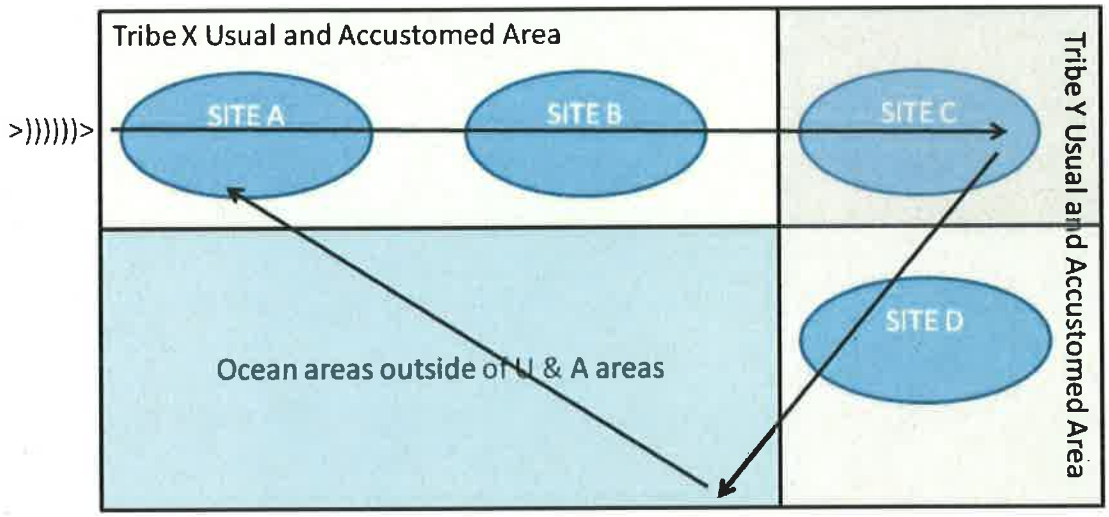
The Fish Diet Fraction fails to consider seasonal and periodic variations in abundance in fishing and harvesting areas. Tribal consumption does not necessarily follow a clean-cut fractional distribution, and can depend on the natural abundance of fish or shellfish in the area, permitting issues, as well as the site's proximity to the reservation. Also, trying to explain this to tribal members could be a risk communication nightmare since tribal members typically do not fish or gather shellfish in this manner.

add to comment on pg 4

b. Site Use Factor (SUF)

Site Use Factor is a measure of a specie's use of a contaminated site. Again, the SMS standards look at each site in isolation from other sites and other pathways for exposure. Ecology reduces the calculation for toxic exposure based on the time a species spends at a site, and what percent of its range is comprised of the site. If each site cleanup is diminished due to the application of the Site Use factor, migratory species may accumulate higher concentrations if they pass through multiple sites. Additionally, there is no way to assess the amount of contaminants absorbed or how much time a creature spends at the site as a portion of its home range. The application of a site use factor to reduce the human health risk calculations is largely theoretical, and if applied to several species, would render the human health risk assessment meaningless and result in increased risk to human consumers. Examples are as follows:

Example 1: Migrating species and multiple sites.



Migratory species, such as salmon, may pass through multiple sites and multiple usual and accustomed areas. Salmon are essential sources of food for many Washington tribes. Application of a SUF to salmon is problematic in that salmon may transit multiple contaminated sites, have significant variability in their life history patterns, and bioaccumulate differently. Salmon may bio-accumulate more at different life stages--picking up a higher percent of body burden at site A, for example. (Comments submitted during the review of the FCR Technical Support Document version 1 contained more information and sources on contaminants in juvenile salmon.) Salmon may pass through several contaminated sites as they migrate. Some salmon species spend more time than others in freshwater and estuary environments. Even within species, there are differences in life history strategies that represent different levels of exposure—Puget Sound Chinook for example have some portions of their populations that migrate out to the Pacific while others remain within Puget Sound for their entire life cycle. The assumption that the bulk of contaminants in salmon tissue come from sources outside of contaminated sites in Washington is not universally supportable. This assumption does not explain why, for example, Puget Sound Chinook have been documented as having higher levels of legacy contaminants than Chinook from other parts of the Pacific Northwest. The findings indicate that contaminant exposure and uptake is higher in

Puget Sound freshwater and estuarine environments, which are under Ecology jurisdiction. Ecology's willingness to assert that contaminants in salmon tissue are due primarily to sources other than a contaminated site suggests a bias toward assumptions that favor Potentially Liable Parties (PLP's) rather than the protection of human and ecological health.

Example 2: Dungeness crab and the "home range" concept. A Dungeness crab has a home range of 2 square miles. If there is a contaminated site within the range and the crab has a high level of the contaminants of concern, logically the source should be assumed to be the site. However, if the site area is 120 acres, it represents less than 1/10 of the range and a site use factor of 0.1 would likely be applied. The site would thus be considered to be only responsible for 10% of the burden and would be cleaned to 90% less stringent standards.

Example 3: Independent calculation of the SUF in separate sites within a home range. Over a period of several years, Ecology independently evaluates 2 sites. Each site represents one-half of the home range of a target species. By using a SUF of 0.5 for each site, each cleanup decision would allow contamination to remain at twice the level that was needed to protect the species and/or human consumers, even though the entire home range would have been regulated by the cleanup. Underestimating risk for resident species using a Site Use Factor can result in inadequate cleanups.

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561 **Addendum 2 to NWIFC comments on Sediment Management Standards**
October 29, 2012
Additional discussion on the use of PQL as a standard for toxic cleanup

Based on the information in the memorandum to file from Joyce Mercuri and Teresa Michelsen dated 4/12/12 referring to establishing practical quantitation limits(PQL) for dioxin mixtures, the proposal indicates that the 17 individual dioxin/furan congeners were multiplied by their respective TEF and added together to develop a TEQ value for the PQLs and MDLs.

Referring the 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds;

Where there was a concern expressed about the application of the TEF/TEQ approach to abiotic environmental matrices such as soil, sediment, etc. The present TEF scheme and TEQ methodology is primarily meant for estimating exposure via dietary intake situations because present TEFs are based largely on oral uptake studies often through diet. Application of these 'intake or ingestion' TEFs for calculating the TEQ in abiotic environmental matrices has limited toxicological relevance and use for risk assessment, unless the aspect of reduced bioavailability and environmental fate and transport of the various dioxin-like compounds are taken into account. If human risk assessment is done for abiotic matrices it is recommended that congener-specific equations be used throughout the whole model, instead of using a total TEQ-basis, because fate and transport properties differ widely between congeners.[2]

This indicates that the attempted application of TEF modifiers to a PQL standard addressing sediments or any other media is not an appropriate use of the methodology and would lead to an inaccurate conclusion as to risk, they therefore recommend if abiotic matrices are attempted only congener specific equations be used instead of using the TEQ-basis. Congener specific equations do not include the use of TEF modifiers.

Using the TEF values outside of the equation is unreliable because TEF estimates represent a low-confidence interim approach to characterizing the highly variable toxicities of dioxin compound mixtures. TEF values are not precise. Individual estimates may range over several factors of ten. Moreover, the research upon which they are based is of variable quality and quantity. The values are frequently set using single compound studies that result in ignoring important interactions that may add or subtract from their toxicities.[3]

All TEF values are assumed to vary in uncertainty by at least one order of magnitude, depending on the congener and its REP distribution. Consequently, a TEF of 0.1 infers a degree of uncertainty bounded by 0.03 and 0.3. For a TEF value of 0.3, a degree of uncertainty bounded by 0.1 and 1 was used. Thus, the TEF is a central value with a degree of uncertainty assumed to be at least +/- half a log, which is one order of magnitude.[2]

Furthermore many of the TEF values are not the result of studies but are based upon the location of the chlorine atoms in the molecular structure of the particular congener. This being the case there is no consensus of confidence in the individual values. The consensus is that though the knowledge of the individual potency of the congeners is limited and that their synergistic or antagonistic effects are not completely known the total TEQ when compared to an equal amount of 2,3,7,8,TCDD has equal

561 cont. predictive effects. The point being that the end result of the TEF/TEQ method is the 2,3,7,8,TCDD toxicity model.[4]

2,3,7,8,TCDD being the equivalency standard the PQL would be logically be that for 2,3,7,8,TCDD not a new number resulting from the various congener TEF modified PQL values.

Reasonable PQL Standard

The next issue is the establishing "reasonable" a PQL standard based upon the EPA methods 1613B and 8290 as proposed using a rounded median value of the mid-range TEQ/PQLs sets a president of average (reasonable) PQL standard that does not give testing labs any motivation to improve their technological standards and lower the PQL. Based upon the Table 1 values for the method 1613B the exclusion of the (4) 11.4ppt PQLs seems appropriate as it is clearly stated that even those labs indicated that it is feasible to reach lower a PQL, and have chosen not to. This supports the theory that *without motivation many labs will only meet the minimum standard and not improve their technology and will result in stagnate cleanup standards*. This indicates that use of analytical detection levels is inappropriate as a standard as it is highly variable among labs.

Your exclusion of the (3) lower values of 2.3ppt appears to be penalizing those labs that are lowering the analytical detection levels resulting in the omission of 41% of the lower detection limit values which results in a Median value of 5.2ppt which is higher that the dredged material management standard of 4 ppt. This would result in a Department of Ecology accepted standard that is mediocre at best, leaving no motivation for labs to improve their technology. This further demonstrates why the National Toxics Rule framers came to the conclusion about analytical detection levels that they did, discounting the use of measuring techniques as a standard.

Instead, Ecology should use the lowest replicable value for the PQL, which in this case is 2.3 ppt. General scientific principle dictates that if a value or outcome can be replicated multiple times using the same method, then it is deemed valid. Even Ecology's definition of a PQL incorporates this: "the lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability during routine lab operating conditions, using department approved methods" (WAC 173-340-200). In this case, multiple labs were able to achieve 2.3 ppt. Ecology claims that "very few labs are capable of reaching these levels," however four of the results shows 2.3 as a value using both methods. Ecology brings up the issues of method blank contamination as well as real-world sample interferences for not choosing the 2.3 ppt value, yet it does not explain how Ecology's selection of a PQL would resolve these issues.

Given that cost and other factors may be used to modify remedial action levels above risk- or effect-based concentrations, cleanup levels may result in significantly higher concentrations than what should be considered protective. The potentiality exists for a cleanup to conceivably use 50ppt for Dioxin remediation cleanup levels, which is clearly not protective of human health or marine mammals. Without further studies identifying the correlation of toxicity of dioxins in sediments and ingestion toxicity levels used in the TEQ methodology this proposed method couldn't be considered protective with any degree of certainty, and is not supported by the bench mark 2005 WHO re-evaluation of human and mammalian toxic equivalency factors for dioxins and dioxin-like compounds.

561 cont. This proposed solution isn't considering the new information that indicates toxicity magnifications resulting from interactions of certain PCBs with certain PBDEs. "Mixtures of each PBDE congener with PCB-126 showed additive effects at threshold concentrations, and synergistic effects at higher concentrations. These results emphasize the concept that the toxicity of xenobiotics may be affected by possible interactions, which may be of significance given the common coexposures to multiple contaminants".[5] Additionally the Ecology rule doesn't add the Dioxin-like PCBs to the Dioxin TEQ formula which results in a potentially less protective human health standard.

These proposed changes are not protective and we do not support their use. In closing we would like to remind Ecology:

Analytical detection limits have never been an acceptable basis for setting standards since they are not related to actual environmental impacts. The environmental impact of a pollutant is based on a scientific determination, not a measuring technique which is subject to change.[1]

REFERENCES

1) National Toxics Rule preamble 40 CFR

2) The 2005 World Health Organization Re-evaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds Martin van den Berg,1,# Linda S. Birnbaum,2 Michael Denison,3 Mike De Vito,2 William Farland,4 Mark Feeley,5Heidelore Fiedler,6 Helen Hakansson,7 Annika Hanberg,7 Laurie Haws,8 Martin Rose,9 Stephen Safe,10 Dieter Schrenk,11 Chiharu Tohyama,12 Angelika Tritscher,13 Jouko Tuomisto,14 Mats Tysklind,15 Nigel Walker,16 and Richard E. Peterson17 Toxicol. Sci. (October 2006) 93 (2): 223-241. doi: 10.1093/toxsci/kfl055 First published online: July 7, 2006

3) Dioxin Toxicity and Toxic Equivalency Factors: The Importance of Getting it Right,Alexander Clark, reference: Van den Berg, M., Birnbaum, L., Bosveld, B.T.C., Brunstrom, B., Cook, P., Feeley, M., Giesy, J.P., Hanberg, A., Hasegawa, R., Kennedy, S.W., Kubiak, T., Larsen, J.C., van Leeuwen, F.X.R., Liem, A.K.D., Nolt, C., Peterson, R.E., Poellinger, L., Safe, S., Schrenck, D., Tillitt, D., Tysklind, M., Younes, M., Waern, F., and Zacharewski, T. (1998). Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and for Wildlife. Environmental Health Perspectives 106, 775

4) Dose-Additive Carcinogenicity of a Defined Mixture of "Dioxin-like Compounds" Nigel J. Walker,1 Patrick W. Crockett,2 Abraham Nyska,1 Amy E. Brix,3 Michael P. Jokinen,4 Donald M. Sells,5 James R. Hailey,1 Micheal Easterling,2 Joseph K. Haseman,1 Ming Yin,2 Michael E. Wyde,1 John R. Bucher,1 and Christopher J. Portier1 Environ Health Perspect. 2005 January; 113(1): 43–48. Published online 2004 October 19. doi: 10.1289/ehp.7351PMCID: PMC1253708

5) Synergistic interactions between PBDEs and PCBs in human neuroblastoma cells. Pellacani C, Tagliaferri S, Caglieri A, Goldoni M, Giordano G, Mutti A, Costa LG. Source Environ Toxicol. 2012 Mar 20. doi: 10.1002/tox.21768. [Epub ahead of print] Department of Human Anatomy, Pharmacology, and Forensic Sciences, University of Parma Medical School, Via Volturno 39, 43100 Parma, Italy. claudia.pellacani@unipr.it.

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562 **Addendum 3 to NWIFC comments on Sediment Management Standards**
October 29, 2012
Additional discussion on the relationship of SMS to Surface Water Quality Standards and the need for federal review

The Sediment Management Standards (SMS) must be harmonized with Washington's Surface Water Quality Standard and recalibrated to receive federal EPA approval in order to ensure that proposed rules protect designated uses and do not undermine the water quality standards or the federal Clean Water Act.

Ecology must undertake the task of revising the RME, PQL, and background definitions of the SMS to accomplish harmonization of sediment clean up rules with water quality standards (WQS)[6] and the federal Clean Water Act (CWA)[7]. This request is not merely academic, but intended to ensure regulatory consistency and rules that ultimately protect human health and the designated uses of both marine and freshwaters. If the SMS are not harmonized, than promulgation of new SMS rule language will allow for cleanup standards determined by factors other than pollutant threshold impact on aquatic species and human health. These proposed default standards are largely driven by background definitions and PQL, which serve to modify existing surface WQS, undermine protection of designated uses, and therefore subject Ecology rules to disapproval by the Environmental Protection Agency (EPA). In turn, disapproval will only cause further delay to much needed environmental protections for human health and aquatic ecosystems in Washington State.

a. Proposed updates to the SMS could modify water quality standards, and are subject to EPA review and (dis)approval.

EPA is obligated to review those laws and standards which have the effect of modifying water quality standards[8] or undermining implementation of those standards.[9] In a recent correspondence to Mike Bussell, the Director of the Office of Water at the EPA, the NWIFC requested EPA's timely review of the SMS. The NWIFC requested that EPA exercise their nondiscretionary duties under the §303(c)(4)(A) [10]of the CWA to review the SMS updates, because the SMS are integral to protecting the designated uses of state water quality standards– particularly salmon and shellfish which the NWIFC member tribes have treaty-reserved rights to harvest.[11] The NWIFC letter also points out that the management and quality of sediments is inextricably linked to the health of the aquatic ecosystem, water quality, and fish and shellfish. Therefore, proposed changes to the SMS, which result in background or PQL driven cleanup levels and or risk-based concentrations determinations that are less stringent than existing SMS or existing or pending water quality standards, will have the effect of modifying state water quality standards. These modifications may also serve to impede delisting of state waters currently listed as impaired for both sediments and water quality on Washington's 303(d) list. The comments contained in the NWIFC letter to Mike Bussell are hereby incorporated by reference.

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[6] WAC-173-201A-010 et seq.
[7] 33 USC § 1251 set seq.
[8] See e.g *Miccosukee Tribe of Indians of Florida* v. EPA 105 F.3d 599 (11th Cir. 1997); *see also friends of Merry Meeting Bay v. Olsen,* 839 F.Supp 2d 366 (D. Me Mar. 16, 2012)
[9] See also *Nw. Envtl. Advocates v. EPA*, 3:05-CV-01876-AC, 2012 WL 653757 (D. Or Feb. 28, 2012)
[10] 33 USC § 1313(c)(4)(A)
[11] See Letter from Mike Grayum to Mike Bussell, Re: EPA engagement in Washington's development of water quality standards and attending fish consumption rates, September 7, 2012.

562 cont.

b. Ecology acknowledges that SMS are in fact water quality standards to be reviewed and approved by EPA.

The concept that the SMS are directly connected to the water quality standards is not new. Ecology's 1996 SMS rules directly state that the purpose of the SMS is to:

> manage waste discharges and sediment quality so as to protect existing beneficial uses and move towards attainment of designated beneficial uses as specified in section 101 (a)(2) of the federal Clean Water Act (33 USC 1251, et seq.) and chapter 173-201 WAC, the Water quality standards for surface waters of the state of Washington.[12]

A further demonstration of the SMS integration with CWA driven goals is that Ecology uses sediment criteria to list water bodies on their § 303(d) list of impaired waters.[13] For example, Washington State's 2008 Water Quality Assessment lists numerous water body segments as category 5 or "impaired" due to sediment bioassays which did not meet SMS criteria. Ecology has also utilized the CWA process of conducting Total Maximum Daily Loads (TMDLs) for the purpose of bringing applicable pollutant parameters that exceeded SMS into compliance with the water quality standards.[14] Ecology was able to apply this authority to develop a TMDL because the SMS fell under the purview, and applicability of 33 USC §1313(d).

c. EPA acknowledges that SMS are in fact water quality standards, and are subject to review and approval.

EPA also acknowledges the role of SMS in protecting water quality and Washington's designated uses. Over the last two decades EPA has given several CWA approvals related to the SMS. In 1991, SMS were adopted by EPA as Water Quality Standards. In 1999, EPA sent a letter to Ecology further underscoring that the SMS were considered water quality standards. [15] Finally, since at least 1996, EPA has regularly reviewed and approved Ecology's 303(d) list of impaired waters which included those waters impaired by sediments not meeting criteria. In fact, in 1998, EPA partially disapproved the 303(d) list on the basis that Ecology failed to include waters that violated SMS, stating:

> EPA disapproves not listing those waters because data showed that the State's sediment quality Standards had been violated and, based on the State's 303(d) listing policy, these waters need to be listed.[16]

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[12] WAC 173-204-120(2)

[13] Washington State's Water Quality Assessment is available at http://apps.ecy.wa.gov/wats08/Default.aspx

[14] Bellingham Bay Contaminated Sediments Total Maximum Daily Load, Submittal Report Prepared by: By *Pam Elardo, P.E.* Washington State Department of Ecology Water Quality Program September 2001 Publication No. 99-58-WQ.

[15] See Letter from Randall F Smith, Director of Office of Water, EPA R10 to Megan White and Jim Pendowski, Department of Ecology, in which EPA discusses which standards are applicable under the CWA in 1999.

[16] See letter from Randal Smith, Director of the Office of Water, EPA Region 10 to Megan White Water Quality Program Manager, Department of Ecology, Re: partial approval of the 1998 303(d) list, August 25, 1999, available at http://www.ecy.wa.gov/programs/wq/303d/1998/AppDisapp.pdf

562 cont. Finally, EPA has also exercised CWA approval authority over TMDLs, which were developed for the sole purpose of addressing 303(d) listings based on violations of the SMS.[17]

d. EPA's recent guidance underscores that the SMS proposed rules are actually revised water quality standards that need to be calibrated to protect designated uses.

EPA has recently established a conservative four part test in establishing whether a specific provision must be mandatorily reviewed and (dis)approved by the agency.[18] Although case law in the Northwest suggest a broader interpretation of EPA's review and approval authority over water quality standards, the guidance nonetheless further demonstrates that SMS fall squarely within the purview of EPA authorities. EPA's guidance questions are answered in the context of the SMS to further clarify that Ecology's standards are, and have the affect of modifying water quality standards and therefore need to be reviewed and approved:

Is it a legally binding provision adopted or established pursuant to state law?
Yes. See WAC 173-204-100 demonstrating that the SMS are established pursuant to the Model Toxics Control Act, Water Pollution Control Act, and the Water Resources Act.

Does the provision address designated uses, water quality criteria (narrative or numeric) to protect designated uses, and/or antidegradation requirements for waters of the United States?
Yes. See WACT 173-201-120 which establishes that the purpose of the SMS is to, *inter alia*, protect designated uses.

Does the provision express or establish the desired condition (e.g., uses, criteria) or instream level of protection (e.g., antidegradation requirements) for waters of the United States immediately or mandate how it will be expressed or established for such waters in the future?
Yes. Sediment criteria are established through chemical specific calculations which are determined by human health, and protection of aquatic species.

Does the provision establish a new WQS or revise an existing WQS?
Yes. The proposed SMS revise both numeric criteria for aquatic life and human health as well as the antidegradation standards by proposing new cleanup levels based not on designated use protection, but instead on background definitions and PQL. As previously stated the SMS form the basis for listing water bodies in violation of the CWA. However, under the rubric of the proposed SMS, cleanup standards will be based on PQL and background definitions, and not necessarily on the criteria that was used as the basis to list the waters with impaired sediments. The net result is that the various default criteria, such as PQL and background definitions allow the Ecology to modify sediment standards based on the extent of surrounding pollution or certain technological/economic considerations such as the ubiquity/affordability of laboratory detection methods. This has the effect of creating new or modified standards that are not based on protection of designated uses, and setting clean up targets that are inconsistent with the standards for surface waters, or the criteria originally used to place the sediments on Washington's 303(d) list of impaired waters.

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[17] According to Ecology's TMDL website, EPA approved the Bellingham Bay Sediment TMDL on December 31, 2001.
[18] See EPA Guidance What is a New or Revised Water Quality Standard Under CWA 303(c)(3)? - Frequently Asked Questions, October 2012 available at http://water.epa.gov/scitech/swguidance/standards/cwa303faq.cfm

562 cont. In summary, even when viewed through the conservative lens of EPA's guidance, the proposed SMS are clearly within the scope of EPA's nondiscretionary review and approval authority.

e. SMS are integral in the protection of designated uses, because sediment quality directly affects water quality and aquatic life.

The SMS are integral element of protection and clean up of the aquatic ecosystems because the quality of sediments directly affects both chemical water quality and aquatic species. This relationship has been studied in both the context of equilibrium partitioning and sediment threshold concentrations on aquatic species. Ample science exists which demonstrates impacts to benthic invertebrates and fish.[19] The EPA website serves as a clearinghouse of agency data and studies on the impacts of contaminated sediments on water quality and aquatic species. That data and studies is incorporated here by reference.[20]

f. PQL and background defaults must be eliminated from SCO and CSL determinations in order to protect the designated uses.

The federal Clean Water Act, the SMS, and surface water quality standards direct that the purpose of sediment and water quality standards is ultimately to ensure the protection of designated uses. However, according to proposed rules the current construction of the sediment cleanup objectives (SCO) and cleanup screening levels (CSL) - the upper and lower bounds of the clean up criteria – will largely be determined by PQL and regional and natural backgrounds, and will not be based on protection of aquatic species. This is simply because the proposed rules allow the setting of upper and lower clean up limits on the least protective of three different standards: background, risk based or PQL. Ecology's own documents explain how this works.

> Ecology expects the proposed rule to result in more efficient determination of cleanup standards, though in the short term the cleanup level is likely to be based on background concentrations (CSL = regional background and SCO = natural background) because risk based levels are typically more conservative than background.
>
> Under the proposed rule amendments, some cleanup actions for sediment sites may not require active remedial actions to reduce contaminants to the level that would be required under the baseline (because the baseline results in a cleanup standard of natural background, while the proposed rule amendments result in a cleanup standard potentially as high as regional background). This

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[19] See e.g Meador, James, An analysis in support of tissue and sediment based threshold concentrations of polychlorinated biphenyls (PCB) to protect juvenile salmonids listed by the Endangered Species Act, October 13, 2000. See also EPA

[20] See EPA's list of technical studies and methodologies regarding contaminated sediments and impacts to water quality available at http://water.epa.gov/polwaste/sediments/cs/techres_contaminants.cfm

562 cont. could result in higher risks for human health and the environment under the proposed rule amendments as compared to the baseline.[21]

The simple solution to this problem is to eliminate PQL and regional and natural background definitions from consideration of site cleanup levels. This would have the effect of establishing SCO and CSLs that were based upon human health risks and ecological bioaccumulative narratives calibrated to protect high fish consuming members of the public and aquatic species, including those reserved by treaty and protected by the federal Endangered Species Act. This would also have the effect of preventing the proposed SMS from removing cleanup liability from PLPs merely because local pollution problems are prevalent, and cleanup levels will be established to those degraded levels.[22] In other words, calibrating the SMS to achieve protection of designated uses as required by the CWA sets clean up goals to protect and restore aquatic environments, instead of setting clean up levels that maintain the status quo of the degraded area.

g. To further ensure CWA compliance and protection of public health; Risk-based concentrations should be calibrated to protect human health and the designated uses.

In addition to eliminating the PQL and background defaults, Ecology must ensure that site specific cleanup criteria are chosen at levels which protect salmon and high fish consumers. To accomplish this, Ecology rules must encourage clean up calculations based on biota-sediment accumulation factors (BASF) approach in addition to relying upon, equilibrium partitioning.[23] These methods are more likely to be effective at setting clean up levels that protect endangered species, and more accurately reflect the sub lethal impacts of pollutants such as PCBs on all life stages of salmon.[24]

In the context of human health, risk-based concentrations must be calculated with a numeric default rate in excess of 175 grams per day in order to protect the health of Washington's tribal members. The current approach of establishing a RME, in part by utilizing a fish diet fraction and site use factors, unjustly reduces fish consumption rates to levels that are not representative of the tribal consumption rates and further contributes to the factors which suppress local fish consumption. The RME approach also establishes criteria that will not accurately reflect the reality of accumulative exposure patterns, and also sets less stringent standards, allowing toxic contaminants to remain in the environment. Under the proposed RME rubric, contaminated sites that do not support safe consumption of fish are afforded less stringent standards merely because the current local environmental conditions do not support safe consumption (SUF applied). According to Ecology's rules these sites should not be cleaned up to levels that will once again support a viable consumption, because clean up is based in part on what can be consumed locally.[25] In other words, the proposed SMS yet again establish clean up goals that merely perpetuate the status quo degraded environment and fail to work toward achieving ecological conditions that would allow local fish to be safely consumed. This type of standard setting is directly

[21] Department of Ecology, Preliminary Cost-Benefit and Least Burdensome Alternative Analyses *Chapter 173-204 WAC Sediment Management Standards* August 2012
Publication no. 12-09-051
[22] See comments submitted by the Indian Law and Policy Center, incorporated herein by reference.
[23] Meador, J.supra.
[24] Id.
[25] For additional examples see comments from the Indian Law and Policy Center.

562 cont. contrary to the explicit statutory goals of the CWA[26] and the aims of the state water quality standards – fishable waters.

In summary, SMS fall squarely within the purview of EPA review and approval authority under the CWA. Ecology's Toxic Clean Up program must therefore work to ensure that the SMS rules are calibrated to meet the goals of the CWA, in order to receive approval. To develop approvable standards, avoid delayed rule implementation and/or federal intervention, Ecology must eliminate PQL and background defaults, and establish risk-based criteria at levels which protects the designated uses and human health.

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[26] See 33 USC § 1251

NORTHWEST PULP&PAPER

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VIA E-Mail: ruleupdate@ecy.wa.gov

October 25, 2012

Ms. Adrienne Dorrah
Washington Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Re: NWPPA comments on proposed amendments to Chapter 173-204 WAC, Sediment Management Standards (SMS)

Dear Ms. Dorrah:

Please accept the Northwest Pulp and Paper Association's (NWPPA) comments on the above-referenced rulemaking. NWPPA is a 58-year old regional trade association representing eight (8) member pulp and paper mills in Washington State. We appreciate the opportunity to comment on this matter.

As you know, this rule making represents several years of diligent work by Department of Ecology staff. Throughout this rule making process, the agency has been committed to an open and transparent process with a variety of stakeholder interests. We believe, generally, that there has been much good work accomplished in this process and offer the following specific remarks.

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563 First, we support the Department of Ecology's recent decision, as outlined in Director Ted Sturdevant's letter of July 16, 2012, to sever the human health based water quality criteria issue (and a corresponding increased numeric default limit on fish consumption rates) from this rulemaking process. We support the more inclusive and deliberative process outlined in Director Sturdevant's letter and look forward to participating in that process.

As we've stated in the past, the ability of our members to comply with any new SMS standards or surface water quality standards is of paramount importance. Given that a significant increase in Washington's fish consumption rate (FCR) would have very likely created water quality standards that could not be met (by public and private sector NPDES permittees alike) with any existing or reasonably foreseeable technology, compliance and implementation tools became a critical part of that discussion. For this reason, adopting an increased default FCR in advance of necessary implementation tools

563 cont. that are acceptable to both Ecology and EPA, would likely have established a bad precedent and resulted in an unacceptable outcome in this process and, ultimately, in Ecology's new rulemaking for surface water quality standards.

564 Second, the Department of Ecology should base the sediment cleanup objective in WAC 173-204-560(3) on the regional background concentrations of a chemical of concern as defined in WAC 173-204-200(5). In most clean up actions it will be impracticable, if not impossible, to achieve a level of clean up below regional background levels. By definition, regional background represents concentrations of chemicals attributable to diffuse non-point sources such as atmospheric deposition and storm water. Typically, a cleanup action is not going to be able to address these sources of re-contamination. This is particularly important where the revised draft rule eliminates any consideration of ongoing sources, practicability, or cost in the selection of a sediment cleanup level in WAC 173-204-560(2)(a).

565 Third, NWPPA supports Ecology's intent to promulgate the SMS revision solely under the authority if the Model Toxics Control Act (MTCA). WAC 173-204-500(a) clearly provides that the provisions of Part V are to be used to set sediment cleanup standards and not sediment quality standards used for source control in Part III, and presumably Part IV, of the SMS. Ecology should make clear the Sediment Cleanup Standards provisions in Part V are not considered implementation tools for the state Water Quality Standards in Chapter 173-201A of the WAC. If not, Ecology should defer final adoption of the SMS revision until it has completed the public policy review process it has initiated for development of waster quality human health criteria (HHWQC). Ecology should not take any action that would result in EPA review and approval of the SMS that would in any way prejudice the consideration of HHWQC in the State Water Quality Standards./

566 Further, if Ecology in fact determines that the SMS revision constitutes a water quality implementation tool, then the agency is obligated to consider the implications of that determination in its compliance with requirements for significant legislative rules under RCW 34.05.328 including a Small Business Economic Impact Analysis and Preliminary Cost-Benefit Analysis and Least Burdensome Alternative Analysis.

567 Fourth, pursuant to draft WAC Section 173-204-561(2)(b)(i), it is apparent that Ecology may adjust fish consumption rates based on site-specific factors, and WAC Section 173-204-561(2)(b)(i)(D) implicitly acknowledges that species-specific ecological factors (e.g., home range) are relevant in this context. Although this language lacks detail, we fully support this concept and the associated flexibility it affords Ecology in addressing site-specific conditions./

568 It also leads us to reiterate our position that anadromous fish should not be included as part of the FCR as the science clearly shows that a majority of the contaminant body burden is accumulated in the open ocean, and not in fresh or estuarine waters.

568 cont. On this point, NWPPA supports the October 24, 2012 National Council for Air and Stream Improvement (NCASI) comment letter submitted to Ecology on this matter relative to its recommendation of non-inclusion of salmon as part of any fish consumption rate used in risk assessments associated with site-specific sediment cleanups. Please see NCASI's specific comment to the draft language for WAC 173-204-561(2)(b)(i)(D).

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569 Fifth, in accordance with WAC Section 173-204-564(2)(iii), we do not believe that Ecology should arbitrarily expand the definition of what a "bioaccumulative chemical" is beyond the criterion set forth in WAC 173-333-320(2)(b).

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570 Finally, it is apparent that WAC Section 173-204-560(2)(b) of the draft rule allows the Department of Ecology to create cleanup targets that are more stringent than those provided in the existing rule, based on site-specific information (e.g. fish consumption). However, it is also apparent that the same sections of the draft rule explicitly exclude development of less stringent targets, regardless of the circumstances. We believe that it is contrary to good science and policy to disallow adjustments which result in less stringent targets when science shows this is justified. In order to correct this, we believe that all sections of the draft rule addressing adjustments to the default risk assessment that presently disallow any adjustments leading to less stringent targets should be modified to allow adjustments based on good science, regardless of the impact on clean up targets.

Thank you again for the opportunity to provide comments on this important matter.

Sincerely,

Christian M. McCabe
Executive Director
Northwest Pulp and Paper Association

Washington State Department of Ecology
Sediment Management Standards Rule
Review/Comment Form

Please submit all comments to RuleUpdate@ecy.wa.gov

Reviewer Name:	Chris Waldron, PIONEER Technologies Corporation, 360.570.1700, waldronc@uspioneer.com
Sections of Document Reviewed:	SMS – All Sections
Document Version/Date:	Draft Revisions SMS – August 15, 2012

	Comment Number	**Line Number**	**Comment**
	1	General	Thank you for the opportunity to provide comments on the Draft SMS Rule. I am very concerned that the August 15, 2012 Draft SMS Rule incorporates language/concepts that are significantly different than previous drafts of the rule language that I have reviewed and discussions with Ecology that occurred during the SMS Advisory Committee process. Consequently, I have signed a letter, along with six other SMS Advisory Committee members, (dated October 29, 2012) to Jim Pendowski that expresses some of our concerns and requests significant changes to the August 15 Draft SMS Rule language in order to align these rule amendments with the more practicable approach needed to move forward with sediment cleanups in Washington.
571	2	General	Regional Background. This concept is a new addition to the Draft SMS Rule language and was introduced during the SMS Advisory Committee Process to help expedite cleanups for sediment sites without the need to tackle the issue of baywide cleanups right away. However, in order for this concept to be effective it requires careful implementation by Ecology. Regional Background concentrations are key to establishing the two-tiered framework for selecting Sediment Cleanup Standards for bioaccumulative contaminants because the health-based values for the upper and lower tiers are identical and the PQLs are identical. Consequently, if Ecology establishes Regional Background concentrations that are similar to Natural Background concentrations, then the Sediment Cleanup Standards for most sites with bioaccumulative contaminants will be based on Natural Background concentrations, which essentially means that the SMS will be based on a single-tiered framework (i.e., the lower end of the range of cleanup values).
572	3	58	The rule language for WAC 173-204-330 (Low salinity sediment quality standards) was not included in the Draft SMS.
573	4	261	Recommend revising the definition of “Biologically active zone” to state a biologically active zone corresponding to the top 10 cm of sediment should be assumed at all SMS sites unless there is site-specific data to indicate that the biologically active zone should be deeper than 10 cm. This will minimize the time and cost associated with establishing the biologically active zone at most sites, while enabling incorporation of site-specific information to establish a deeper biologically active zone at sites where it is appropriate.
574	5	278	The definition of Cleanup Screening Level (CSL) should be revised to explicitly state that the CSL shall not be lower than the Maximum of regional background and the Practical Quantitation Limit (PQL).
575	6	389	Recommend revising the definition of “Regional background” to reflect Comment #2.
576	7	457	Recommend revising the definition of “Technically possible” to “Technically practicable.” Technically practicable means including consideration of environmental effects, technical feasibility, and cost. Recommend that all references to “technically possible” in the Draft SMS be replaced with “technically practicable.” In order to expedite the investigation/cleanup of sediment sites, Ecology should work with PLPs to identify technically practicable solutions rather than spend significant time and resources evaluating technically possible solutions that will be impossible to implement because of environmental effects, technical feasibility, and/or cost.
577	8	410	The definition of Sediment Cleanup Objective should be revised to explicitly state that the Sediment Cleanup Objective shall not be lower than the Maximum of natural background and the PQL.
578	9	415	The definition of Sediment Cleanup Standard should be revised to explicitly state that the Sediment Cleanup Standard shall not be lower than the Maximum of natural/regional background and the PQL.
579	10	518	This line references WAC 173-204-315 but WAC 173-204-315 was not included in the Draft SMS text.
580	11	607	Why aren’t SQS values presented for TPH-Diesel and TPH-Heavy Oil (Residual) in Table I when these are included in Table VII for Freshwater Sediments?
581	12	1509	In order to provide more flexibility with respect to establishing the restoration time frame and the requirements of sediment recovery zones recommend modifying the line that follows, “At sites or sediment cleanup units where the cleanup action cannot practicably achieve sediment cleanup standards within 10 or more years as approved by the department on a site-specific basis after completion of the cleanup action, the department expects that a sediment recovery zone will be established and managed in accordance with WAC 173-204-590.”

Washington State Department of Ecology
Sediment Management Standards Rule
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Please submit all comments to RuleUpdate@ecy.wa.gov

Reviewer Name:	Chris Waldron, PIONEER Technologies Corporation, 360.570.1700, waldronc@uspioneer.com
Sections of Document Reviewed:	SMS – All Sections
Document Version/Date:	Draft Revisions SMS – August 15, 2012

	Comment Number	**Line Number**	**Comment**
582	13	1540-1544	Recommend revising the text to replace the phrase "technically possible" with "technically practicable." Please see Comment #7.
583	14	2055-2180	Recommend revising/reorganizing this section to present the process for evaluating remedial alternatives in the FS. The current text is confusing and many concepts that are vital to the remedy selection process are only included by reference. Recommend reorganizing this section consistent with the USEPA's Nine Remedy Selection Criteria: **Threshold Criteria** – Must be met for a remedial alternative to be acceptable 1. Overall protection of human health and the environment 2. Compliance with applicable or relevant and appropriate requirements (ARARs) (unless a waiver is obtained) **Balancing Criteria** – Additional criteria used to help rank the remedial alternatives that meet the Threshold Criteria 3. Long-term effectiveness and permanence 4. Reduction of toxicity, mobility, or volume 5. Short-term effectiveness 6. Technical implementability 7. Cost **Modifying Criteria** – Criteria that may result in the selection of a less desirable (i.e., less desirable in terms of the Threshold and Balancing Criteria) remedial alternative as the remedy for a site. 8. State acceptance 9. Community acceptance
584	15	2196-2197	Recommend revising the text to replace the phrase "technically possible" with "technically practicable." Please see Comment #7.
585	16	2202-2203	Recommend deleting the limit on upward adjustments to the sediment cleanup level to the CSL. The SQS and CSLs developed under the SMS should be based on protection of human health and the environment, background (natural and regional background, respectively), and practical quantitation limits. However, the Sediment Cleanup Level WAC 173-204-560(2) should also be based on the Technical practicability of achieving the SQS and/or CSL. This evaluation should include consideration of environmental effects, technical feasibility, and cost and ultimately may result in a Sediment Cleanup Level that exceeds the CSL (and by default the SQS).
586	17	2289-2287	Recommend revising the text to clarify the intent. Regional background is vital to establishing the two-tiered framework under the SMS and must be reasonable and representative of site/region-specific conditions. If regional background concentrations are set close natural background (i.e., less than a factor of 10 higher), then the SMS two tiered framework essentially collapses to a single tier at most sites. The purpose of regional background was to reflect conditions representative of recontamination proximate to a cleanup site but not associated with area background. In addition, regional background plays a key role in the "glide path" that was discussed at the SMS Advisory Committee meetings where hot-spots of contamination are removed to significantly reduce contaminant concentrations with the long-term goal of reducing concentrations in sediment to the SQS and/or natural background concentrations. If regional background is set at concentrations similar to natural background then the "glide path" becomes a "cliff face" which acts as a significant disincentive to cleanups due to the significant cost difference. In my view, regional background should incorporate contributions from all permitted discharges, storm sewers, and combined sewer outfalls, etcetera in an area proximate to a site because these represent the "background sources" that will re-contaminate the sediment at the cleanup site. Regional background should not include contributions from MTCA Cleanup sites or other hazardous waste sites (upland or sediment).
587	18	2364-2366	Recommend revising the citation to WAC 173-340-708 to identify the specific sections of WAC 173-340-708 that apply. WAC 173-340-708 includes various concepts and approaches that are not applicable to the SMS (e.g., discussion of indicator hazardous substance, cleanup levels vs. remediation levels, land uses [e.g., residential, commercial, agricultural], et cetera) that are not applicable to the SMS and may be confusing and misinterpreted by readers. If it is not practical to reference the specific subsections of WAC 173-340-708 that apply to the SMS, then the reference should be deleted from the

Washington State Department of Ecology
Sediment Management Standards Rule
Review/Comment Form

Please submit all comments to RuleUpdate@ecy.wa.gov

Reviewer Name:	Chris Waldron, PIONEER Technologies Corporation, 360.570.1700, waldronc@uspioneer.com
Sections of Document Reviewed:	SMS – All Sections
Document Version/Date:	Draft Revisions SMS – August 15, 2012

	Comment Number	Line Number	Comment
587cont.			SMS and the necessary text should be included in the SMS.
	19	2345	Recommend revising the citation to WAC 173-340-708 to identify the specific sections of WAC 173-340-708 that apply. If it is not practical to reference the specific subsections of WAC 173-340-708 that apply to the SMS, then the reference should be deleted from the SMS and the necessary text should be included in the SMS.
588	20	2390	Recommend revising the citation to WAC 173-340-708 to identify the specific sections of WAC 173-340-708 that apply. If it is not practical to reference the specific subsections of WAC 173-340-708 that apply to the SMS, then the reference should be deleted from the SMS and the necessary text should be included in the SMS.
589	21	2591	Recommend that Ecology include additional text/notes that clearly describe the information presented in Table V. For example, all acronyms, calculations, and comparisons should be transparently documented.
590	22	2677	Recommend that Ecology include additional text/notes that clearly describe the information presented in Table VII. For example, all acronyms, calculations, and comparisons should be transparently documented.
591	23	2720	The text states that “three endpoints” should be included in the suite of biological tests for freshwater sediment; however, Table VIII and Table IX only include two endpoints (i.e., mortality and growth). The text and/or Tables VIII and IX should be revised for consistency.
592	24	2677	Recommend that Ecology include additional text/notes that clearly describe the information presented in Table VIII. For example, all acronyms, calculations, and comparisons should be transparently documented.
593	25	2791-2793	Recommend that this sentence be revised as follows “Sediment cleanup objectives and cleanup screening levels based on protection of higher trophic level species shall ~~not~~ be established at concentrations that do not have the potential for minor adverse effects.”
594	26	2814-2815	Recommend that Ecology include the criteria/procedures for determining “Whether contaminants are present at the site that are known or suspected to have minor adverse effects on higher trophic level species.”
595	27	2819	This section should explicitly reference the RI/FS reports (WAC 173-204-550). In addition, I recommend revising/reorganizing this section to present the process for selecting the sediment cleanup action based on the remedial alternatives presented in the FS. The current text is confusing and many concepts that are vital to the remedy selection process are only included by reference. Recommend reorganizing this section consistent with the USEPA’s Nine Remedy Selection Criteria: **Threshold Criteria** – Must be met for a remedial alternative to be acceptable 1. Overall protection of human health and the environment 2. Compliance with applicable or relevant and appropriate requirements (ARARs) (unless a waiver is obtained) **Balancing Criteria** – Additional criteria used to help rank the remedial alternatives that meet the Threshold Criteria 3. Long-term effectiveness and permanence 4. Reduction of toxicity, mobility, or volume 5. Short-term effectiveness 6. Technical implementability 7. Cost **Modifying Criteria** – Criteria that may result in the selection of a less desirable (i.e., less desirable in terms of the Threshold and Balancing Criteria) remedial alternative as the remedy for a site. 8. State acceptance 9. Community acceptance
596	28	2906-2908	Recommend revising the following text as follows, “Cleanup actions shall not rely primarily on monitored natural recovery or institutional controls and monitoring where it is technically ~~possible~~ practicable to implement a more permanent cleanup action.”
597	29	2920-	Recommend revising this section to remove the reference to WAC 173-340-360 and explicitly include

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Please submit all comments to RuleUpdate@ecy.wa.gov

	Reviewer Name:	Chris Waldron, PIONEER Technologies Corporation, 360.570.1700, waldronc@uspioneer.com	
	Sections of Document Reviewed:	SMS – All Sections	
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	Comment Number	**Line Number**	**Comment**
597 cont.		2926	cost and other factors for selecting a cleanup action directly in the text. WAC 173-340-360 includes various concepts and approaches that are not applicable to the SMS (e.g., discussion of groundwater cleanup actions, cleanup actions for soils at current/future residential area, et cetera) and may be confusing and misinterpreted by readers.
598	30	2927-2938	Recommend deleting the hierarchy. The hierarchy significantly limits Ecology site manager's and PLP's ability to select technically practicable remedial alternatives for their site by imposing additional, unnecessary constraints on the long-term effectiveness evaluation. Remedy selection should be a site-specific process and the Nine Remedy Selection Criteria are sufficient for selecting the appropriate remedy for a site. For example, at some sites dredging and capping may be the best (as indicated by the screening performed in the FS) remedial alternative at one site, while enhanced natural recovery may be the best (as indicated by the screening performed in the FS) remedial alternative at another site.
599	31	2957-2958	There appears to be a typographical error in the following sentence "The department must authorize any restoration time frame longer than ten years after the start of the cleanup action." Should this sentence read, "The department ~~must~~ may authorize ~~any~~ restoration time frames longer than ten years after the start of the cleanup action."?
600	32	2958	Recommend that "years after the start of the cleanup action" be defined in the SMS Rule. Does this mean after construction of the cleanup action has been completed? Recommend that the restoration time frame be triggered after construction of the cleanup action has been completed.
601	33	3096	Recommend that "potentially affected landowner" be defined in the SMS Rule. Does this mean a landowner whose property was impacted (i.e., contaminated) by releases from the site and, therefore, is being proposed as part of the sediment recovery zone? Or, does this mean a landowner whose property was not impacted by releases from a site but is located adjacent to the proposed sediment recovery zone?

Port of Olympia

Commissioners

Bill McGregor
George Barner
Jeff Davis

October 29, 2012

Adrienne Dorrah
Washington Department of Ecology
Toxics Cleanup Program
P.O. Box 47600
Olympia, WA 98504-7600

Subject: Draft Sediment Management Standards Amendments

Dear Ms. Dorrah:

The Port of Olympia (the "Port") appreciates the opportunity to submit the enclosed comments on the Draft Sediment Management Standards (SMS) Rule Proposed Amendments (August 15, 2012 Review Version). The Port also appreciates Ecology's granting of a two-week extension to the comment deadline.

A copy of the Port's comments were also sent via e-mail to RuleUpdate@ecy.wa.gov. If you have any questions about the attached or would like the Port to clarify any of its comments, please do not hesitate to contact me.

Sincerely,

Alexandra K. Smith
Director of Environmental Programs

Enclosure

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

Name of Commenter:	Alex Smith
Version of Document Reviewed:	_x_ Review Version (Reader Friendly) ___ Official Version
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602	General	N/A	The Port of Olympia (the "Port") appreciates the work Ecology put into this effort. Overall, Ecology worked hard to strike a balance between environmental protection and risk reduction on the one hand, and implementability and incentivizing sediment cleanups on the other. The Port has concerns, however, that the changes taken together will lead to cleanup levels at or close to natural background, and few implementable remedial alternatives. Although many of the changes in isolation do not appear to lead to this result, taken together, the removal of cost from the calculation of cleanup levels, the definition of regional background, and the inability to rely on monitored natural recovery when a more "permanent" cleanup can be engineered (regardless of cost) have the potential to lead to cleanups that require extensive (and expensive) dredging and/or capping. The Port is concerned that Ecology's goal of incentivizing sediment cleanups will not be met with these draft rule revisions.
603	11	N/A	Figure 1 shows the two-tier framework for establishing cleanup standards under the revised rule. There are two concerns with Figure 1: First, the original SMS rules and the prior drafts both allowed cost to explicitly be taken into account in setting sediment cleanup levels (or standards). The ability to consider cost in setting sediment cleanup levels provided essential flexibility to ensure that cleanup actions selected for a site were ultimately implementable (i.e. the PLP could afford to implement them). There are so few cleanup alternatives for sediment sites – either high cost dredging or thick layer capping (or a combination of the two), or lower cost enhanced or monitored natural recovery – and the cost difference between these two sets of cleanup actions is great. What cleanup level is set for the site will determine whether a PLP will be required to implement the costly dredging and/or capping, or can rely on enhanced or monitored natural recovery. Unlike an upland cleanup, it is unlikely that a disproportionate cost analysis will help the PLP. At an upland cleanup, a PLP can argue that a less expensive remedy than excavation of all contaminated material (like isolation of contaminants under an impermeable cap, or a conditional point of compliance) will achieve cleanup levels. In a sediment cleanup, however, those kinds of alternatives are simply not available. If the sediment cleanup levels are set at a low level for the protection of human health, it could well be that the only cleanup actions that will achieve them are costly dredging and/or capping. Since these will be the only remedial alternatives evaluated in a disproportionate cost analysis, it will provide little flexibility, and PLPs are not likely to have high incentives to move forward on sediment cleanups.
604			Second, the following language about where the site-specific cleanup level should be set has the potential to confuse: "Set as Close as Practicable to Sediment Cleanup Objective based on Technical Possibility and Adverse Environmental Impacts" The area of confusion comes in the definitions of the terms "practicable" and "technically possible." Section 173-204-200(34) (page 33, ll. 371-72) defines "practicable" as "able to be completed in consideration of environmental effects, technical feasibility ***and cost***." Section 173-204-200(49) (p. 37, ll. 457-58) defines "technically possible" as "capable of being designed, constructed and implemented in a reliable and effective manner, ***regardless of cost***." This results in an internally inconsistent requirement of setting the cleanup level "as close to the SCO as able to be completed, taking into account environmental effects, technical feasibility and cost; based on whether a remedy meeting the cleanup levels can be designed, constructed and implemented regardless of cost." To address both these concerns, the Port of Olympia prefers that the language in the chart read "Set as Close as **Practicable** to the Sediment Cleanup Objectives," and that rule language in 173-204-560 be similarly changed.
605	36	440	The definition of a "Sediment recovery zone" ("SRZ") indicates that an SRZ may be established when Ecology determines the selected cleanup actions cannot achieve the applicable cleanup

Questions? Please Contact: Adrienne Dorrah at (360) 407-7195

Name of Commenter:	Alex Smith
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605 cont.			standard “”within ten years after the start of the cleanup action.” The primary concern is that the ten year period for achieving cleanup standards begins at “the start of the cleanup action,” rather than at the completion of active cleanup. As has been expressed to Ecology, the reality of sediment cleanups is that they sometimes have to span more than one construction season due to no fault of the PLP. In addition, because of the cost of mobilizing dredging equipment, barges, etc., PLPs are already motivated to complete active cleanups as quickly as they can. Accordingly, a more appropriate trigger for the 10 year period to achieve cleanup standards is “at the completion of active cleanup actions.”
606	36-37	443-450	The definition of “Sediment site unit” sets out a very helpful concept. It allows smaller portions of a larger site to be addressed expeditiously, and allows a PLP to move forward with some cleanup and achieve a measure of finality, even when development is a driver behind cleanup. This incentivizes cleanup that might not otherwise occur.
607	xciv-xcvi	1480-1525	The “Cleanup process expectations” set out in 173-204-500 are a helpful context for how Ecology will implement these cleanup rules.
608			In particular, it is helpful to have explicit mention of Ecology’s expectations in the event of recontamination (ll. 1494-1499). It would be helpful if the rules explicitly indicate that the demonstration a PLP is required to make to prove it did not recontaminate is that the PLP complied with the source control requirements for its property or facility.
609			As indicated above, the Port also believes the use of a sediment recovery zone should only occur if a cleanup cannot achieve cleanup standards within 10 years from the completion of active cleanup, rather than from the start of active cleanup (ll. 1508-1511).
610	xcvii	1537-1547	For the reasons set forth above in our comment on Figure 1 (on page 11), the Port of Olympia is concerned that cost is not taken into account in setting site-specific sediment cleanup levels, and the Port’s comments on Figure 1 are incorporated by reference here. Although the draft rule still allows cleanup levels to be set within a range, we believe the range is less meaningful when “technical possibility” (i.e. whether something can be engineered, regardless of cost) is what determines how close to the sediment cleanup objective the cleanup level must be set. The Port would prefer that lines 1540 through 1543 read as follows: “The sediment cleanup level shall be the sediment cleanup objective and shall be adjusted upward as required based on what is ~~technically possible~~ **practicable** and whether meeting the sediment cleanup objective will have an adverse impact on the aquatic environment, including natural resources and habitat.”
611	xcix	1588	The Port believes this should read “A site **or sediment cleanup unit** cleaned up with sediment standards determined in (a) of this subsection . . . . “ It seems that this provision should apply to both sites and sediment cleanup units.
612	cxvi	1890-1893	The Port appreciates that the concept of “Incidental cleanups” is retained in the rules. The Port would like to tie this section to WAC 173-322-070 to allow for ports and other local governments to utilize grant funds, where appropriate, to help defray the costs of incidental cleanups. As one way to address this issue, the Port suggests adding a subsection to the regulation governing Remedial Action Grants – specifically WAC 173-322-080(2). The Port proposes a new subsection (d) that reads “The applicant must have completed incidental cleanup actions within the meaning of WAC 173-204-540(c) and must have ensured that the Department’s requirements for such incidental cleanup actions were incorporated into the federal or state permits authorizing the applicant’s activities.” For incidental cleanups completed as part of a larger site for which Oversight Remedial Action Grants have already been awarded, it would be helpful if Ecology could work with an eligible PLP to allow for the use of grant funds where available and appropriate.
613	cxxxi	2196-2197	The Port’s concerns here are the same as expressed above about cost no longer being taken into

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613 cont.			account when setting site-specific cleanup levels. The Port prefers that 173-204-560(2)(a)(i)(A) read "Whether it is ~~technically possible~~ **practicable** to achieve the sediment cleanup level at the applicable point of compliance within the site or sediment cleanup unit." A countervailing concern was raised about the difficulty or uncertainty of how to factor cost into setting the cleanup level – and then evaluating cost again as part of a disproportionate cost analysis. Yet, if a PLP is putting together an RI/FS for a sediment site, it will know the range of cleanup alternatives as it puts that document together. Given the high costs of cleanups, PLPs will want to do whatever analysis is required to come up with a protective, yet implementable, cleanup level. It is not a difficult exercise to assess the likely costs at the time the PLP evaluates what the cleanup level should be. In addition, the current version of the SMS (which has been in effect for close to 20 years) provided for the consideration of cost in setting cleanup levels, and both Ecology and the regulated community have used these rules without this cost evaluation being an issue.
614	cxxxv-cxxxvi	2275-2297	The Port appreciates that Ecology has simplified the definition of "Regional background" from previous versions of the rule. Yet, as others have expressed, we have concerns that the rule does not appear to allow the calculation of regional background to include low-level contamination from diffuse stormwater that happens to be collected into a pipe, such as a municipal CSO, before it is discharged into the water body at issue. The language in this section provides a fair amount of discretion to Ecology as to how regional background can be calculated, so until we have a better sense of how Ecology will implement this section, it is hard to evaluate its impact on the regulated community.
615			A comment on the bigger picture – it is important for regional background to be meaningfully different from natural background. The fear of having to cleanup large contaminated embayments to natural background has been one reason many PLPs have been reluctant to move forward on sediment cleanups. Without a meaningful difference between regional and natural background, the two tier paradigm for setting sediment cleanup levels is also meaningless, and the "glide path" to achieving the sediment cleanup objective that was discussed in the SMS Advisory Group becomes a sheer cliff face. If a goal of this rule revision process was to incentivize getting some active cleanups going (on the theory that getting some cleanups done is better than none), it is critical that there be a meaningful difference between regional background and natural background.
616	clxxv	2897-2900	As previously indicated, the Port believes that the time frame for achieving cleanup standards (the reasonable restoration timeframe) should be ten years from the completion of active cleanup, not from the "start of the cleanup action."
617	clxxv	2906-2910	For the reasons set forth by other commenters, the Port would like the language in this section changed to read: "Cleanup actions shall not rely ~~primarily~~ <u>exclusively</u> on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action."
618			In addition, this section provides that if institutional controls are used, Ecology will give preference to "the types of institutional controls with a demonstrated ability to control exposures and ensure the integrity of the cleanup action." What institutional controls did Ecology have in mind that meet this criteria? In the Port's experience, there are few institutional controls available for sediment cleanups, and even fewer that have "a demonstrated ability to control exposures and ensure the integrity of the cleanup action."
619	clvvvi	2920-2923	This section is the place where the draft SCUM II indicates an evaluation of cost is factored into the equation. Yet, it is far from an explicit reference to cost in the draft rules. Instead it is a general reference to WAC 173-340-360, which includes at subsection (3)(e) a disproportionate cost analysis. This could lead to confusion as to whether the SMS rules are intended to include a disproportionate cost analysis at all. The Port would prefer an explicit reference to the disproportionate cost analysis of WAC 173-340-360(3)(e) in this section of the SMS, especially if

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619 cont.			this will be the only place in a sediment cleanup evaluation where cost is taken into account.
620	clxxvi – clxxvii	2920-2938	The Port has concerns with the hierarchy of cleanup action alternatives. More than at an upland site, how contaminated material can be remediated or disposed of varies significantly from one sediment site to another. This is because of differences in what can be disposed of at open water sites, whether it is even possible to treat certain sediment contamination, the difficulty in siting and permitting near-shore or in-water disposal facilities, etc. It is likely that the ultimate protection of human health and the environment and the long-term effectiveness of the remedies will be the same for a number of remedial alternatives, but some that rank high on the hierarchy will be impractical or cost-prohibitive at a given site due to site-specific conditions. In addition, as sediment remediation technologies are developed, this hierarchy does not account for them or allow for them to be factored into future analyses of remedial alternatives. If Ecology places a great deal of weight on this remedial alternatives hierarchy when deciding which remedial alternative should be implemented at a site, the Port has concerns. The Port prefers that the hierarchy be removed altogether, as it is ultimately not necessary for successful sediment cleanups or the successful implementation of these rules.
621	clxxxi	3014-3018	As indicated in comments above, the Port has concerns with the requirement that cleanup standards be met within ten years of the start of a cleanup action; the Port prefers that the trigger for this time frame is the completion of active cleanup.
622			The Port has a second concern about the timing of Ecology's determination "that the selected cleanup actions cannot practicably achieve sediment cleanup standards within a ten year restoration time frame[.]" If would be helpful if the rules identified when that determination will be made.

PORT
OF PORT ANGELES
WASHINGTON

October 29, 2012

Ms. Adrienne Dorrah
Washington State Department of Ecology
Toxics Cleanup Program
P.O. Box 47600
Olympia, WA 98504-7600

BY EMAIL (to RuleUpdate@ecy.wa.gov)

SUBJECT: PROPOSED AMENDMENTS TO CHAPTER 173-204 WAC, SEDIMENT MANAGEMENT STANDARDS (SMS)

Dear Ms. Dorrah:

The Port of Port Angeles (Port) appreciates the opportunity to submit comments on the Washington State Department of Ecology's (Ecology's) *Draft Sediment Management Standards (SMS) Rule Proposed Amendments* dated August 15, 2012. The Port recognizes the substantial work performed by Ecology in preparing and proposing draft rule language, and we value the opportunity to review and comment on this work.

The Port appreciates the addition of many of the important concepts in the SMS rule amendments, as discussed in the public venues over the past few years. However, there are a number of important modifications that need to be made to the rule language prior to finalization. As currently written, the Rule is not implementable and actually undermines several of the most important tools that Ecology and the public have worked on over the last several years. It is imperative that cost, feasibility, and net environmental benefits are included in the derivation of sediment cleanup standards and in the development and selection of alternatives.

We have been working cooperatively with Ecology on the cleanup of Port Angeles Harbor and look forward to this continuing and resulting in a harbor that fully supports ecological communities and the community of Port Angeles. However, the language of the current draft of SMS threatens this by eliminating, or overly constraining, the very tools we have been discussing in our meetings with you.

We have attached your review form on the rule with several of our key concerns highlighted. This does not represent all of our concerns, but gives a solid starting point for finding a path forward in the Rule revision that will meet the goals of defining a practicable cleanup approach for sediments in the State.

The Port remains committed to working with Ecology and other stakeholders on these significant issues.

Sincerely,
PORT OF PORT ANGELES

Jeffery K. Robb
Executive Director
Attachment

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Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

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	Page Number	Line Number	Comment
623 & 624	General Comment	N/A	The Port of Port Angeles ("Port") has been following the revision process of SMS for a number of years, during which time numerous other sediment programs around the country have been struggling with similar issues. While we believe that it was Ecology's intent to improve the functioning and strength of SMS in order to facilitate the cleanup of sediments in Washington state, we find that several of the proposed SMS changes have the opposite affect: they will delay cleanup, which will result in much higher costs than Ecology presented in their Cost Analysis and they will result in unnecessary cleanup, which will either not benefit the environment or whose benefit will be marginal and disproportionate to the cost. We believe that Ecology needs to make additional major revisions after they have the receipt of current comments.
625	General Comment	N/A	The current draft of the SMS rule demonstrates that Ecology is trying to address many of the technical issues, policy issues, and comments received previously in ways that meet the over-riding goal of making the SMS protective and implementable, including the following: • A multi-phase approach for sediment recovery over a long timeframe and broad geographic areas • A regional background approach to allow incorporation of technical feasibility, cost considerations, and net environmental benefits in cleanup decisions • Provisions for discrete sediment cleanup units and/or sites within larger bay-wide areas of sediment impact • Consideration of practical incentives to encourage potentially liable parties (PLPs) to take action regarding problems they can control and potential cash-out settlements for larger bay-wide problems • Strategic analysis of how the SMS update will be interpreted and implemented by different federal, state, and local environmental regulatory programs (e.g., Water Quality Program, NPDES industrial and municipal permits, MTCA, CERCLA, etc.)
626	General Comment	NA	Ecology undertook a great deal of outreach and involvement with knowledgeable professionals and other stakeholders leading up to the proposed SMS amendments, including several advisory committees. From our perspective, it appeared that both Ecology and the committee members put a great deal of time and energy into reaching workable solutions to problems that have posed a genuine impediment to moving forward with sediment cleanups. Based on sample rule language distributed in October 2011 and other materials Ecology presented at the last meeting held with advisory committee members in December 2011, Ecology appeared to have charted a course for focused rule amendments that would create a workable path through some very thorny MTCA/SMS issues and help in expediting needed sediment cleanups. However, while the proposed rule amendments include some aspects of the pragmatic approach that resulted from the advisory committee process, other portions of the amendments represent very significant changes to the current rule that we believe were either never discussed, or were discussed and quickly put aside by the advisory committee as unworkable. The changes needed to align these rule amendments with a more practicable approach are fundamental enough that new draft language needs to be proposed.
627	17	65–69	The new requirement to establish sediment recovery zones at sites and cleanup units where cleanup levels cannot be met within 10 years of the start of the cleanup is highly problematic. We understand that the final advisory committee made clear to Ecology that including the sediment recovery zone standards of WAC 173-204-590 in the new SMS rule revisions would stymie cleanup, as this element of the existing SMS regulations has proved totally unworkable in the real world because of "technical impracticability" and other similarly difficult criteria that need to be achieved to use this element of the SMS rule. Given that the highly conservative background or practical quantitation limit (PQL)-based sediment cleanup levels for bioaccumulative chemicals (i.e., PCBs, dioxins/furans, and PAHs) are anticipated to be exceeded at nearly every sediment cleanup site, in part because of uncontrollable and diffuse non-point source inputs of these regional contaminants, the entirety of subsection (4), which discusses sediment recovery zones, needs to be deleted. As clearly discussed in numerous forums, these non-point source inputs cannot be effectively regulated through toxics cleanup programs regulations and do not belong here because the party being regulated does not, in general, have the legal authority or technically practical

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627 cont.			solution necessary to affect the underlying problem.
628	26	223–227	The proposed language of WAC 173-204-200(1) is problematic WHEN combined with the provisions of WAC 173-204-570(3)(h), which establishes "active" cleanup as the presumptive remedy at all sites. Please see our comment on the revised language of WAC 173-204-570(3)(h) below. The problem is not in the definition but in the use of the presumptive approach to require "active cleanup" at all sites <u>at the same time that other revisions of SMS have driven the cleanup levels for key bioaccumulatives to less than background; thus, Ecology is effectively saying that ACTIVE cleanup will be required for most of the sediments in the state.</u> The whole approach to requiring active cleanup as the presumptive approach irrespective of net environmental benefit, bioavailability, and commiserate source control must be completely rethought and reformulated. As written it is not implementable.
629	27	254	The new definition of BMP requires departmental approval. The addition of "as approved by the department" is likely to severely limit the use of new and improved BMPs, especially in storm water, dredge return water, and other operational areas due to a lack of available time and staff at Ecology. This added language is of no benefit. Please remove it.
630 & 631	28	261	The biologically active zone definition has been written to include everything from plant roots to groundwater upwelling; most of which have nothing to do with the pathways controlling exposure. An excellent example is the use of 45 cm for Human Health Exposure during beach play. This exposure point was developed for several sites in Puget Sound, but only along beaches and tideflats people could walk at low tide. Yet nowhere in the guidance or the regulation does it make this clear. The definition is so broad, and the implication of BAZ on cleanup decisions so direct, that the new language introduces major confusion in the very heart of compliance—the definition of the point of compliance. At the very least this needs to be fixed in guidance.
632	29	283–285	The definition of "contaminant" needs to be expanded to explicitly recognize that the bioavailability of sediment contaminants may vary significantly both within and between sites based on site-specific geochemistry and other factors. Subsection (15), and other related sections and sub-sections, need to be re-written to clarify that site-specific bioavailability considerations should be incorporated into the development of site-specific cleanup levels using approaches developed by the Interstate Technology & Regulatory Council (ITRC) and discussed in other relevant Agency guidance documents. Note that the ITRC's February 2011 Technical/Regulatory Guidance (which Ecology helped co-author): "*Incorporating Bioavailability Considerations into the Evaluation of Contaminated Sediment Sites*" states: "*Overall, this guidance establishes that bioavailability considerations should be incorporated in the exposure assessment process to obtain a clearer understanding of contaminant toxicity and exposure pathways such that remedy selection decisions can be focused and resources efficiently used. By incorporating bioavailability considerations into the early stages of site characterization, the risk assessment process, and remedy selection, a more effective remediation may be accomplished, which may well optimize overall cost. This web-based technical and regulatory guidance can help the user understand the proper application of these tools to assess bioavailability and more effectively protect human health and the environment.*"
633	31	330–340	The concept here is good, but it should acknowledge that the "determination of natural background may need to consider geographic regions, sediment morphology, grain size, and the present of naturally occurring organic matter."
634 & 635	34	389–393	While the general definition of "regional background" in subsection (38) is workable with revisions (see below), the utility of this approach will be entirely dependent on how regional background is ultimately calculated, which presumably will be described in detail in the Sediment Cleanup User Manual. We understand that Ecology is developing a pilot study to examine this issue in greater detail, but we have significant concerns that the regional background calculation approaches that Ecology is currently considering are all too stringent to be practical. Previous case study applications using approaches similar to what Ecology is now considering do not allow sufficient differentiation between existing or prospective SMS site units and bay-wide contamination

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cont.			problems. This creates gridlock in the processing of the current backlog of sediment sites. Regional background should include contaminants contributed to the region from multiple urban stormwater sources, in order to distinguish those pollution problems from more discrete sediment sites that can be linked to a more specific, and likely historical, past practice. Regional background problems should be addressed under the appropriate regulatory tool (e.g., Phase II municipal permits) and not site-specific MTCA/SMS enforcement. Calculation of regional background should allow for inclusion of certain contaminants if they are due to the influence of <u>multiple</u> urban sources. The concept of regional background should be specifically used to determine discrete SMS sites or site units.
636	34-35	400–405	The definition of "Sediment" was completely changed from its earlier 2011 definition. The current definition would appear to include ditches, swales, and retention ponds including those that are part of engineered storm water conveyance systems. In combination with the addition of the freshwater standards, it appears that the freshwater standards would now be applicable to the majority of stormwater system features throughout the state. Many of these are specifically designed to trap/collect contaminants from stormwater before it enters waters of the state; therefore, the previous definition of "sediments" used in the 2011 revision, specifically excluded stormwater systems. The operation of these stormwater swales, ditches, basins, and ponds are critical to the approaches being used and considered for use throughout Washington State as stormwater controls. The exclusion of engineered stormwater features is critical to the stormwater program and to the application of freshwater sediments.
637	36	435–442	The proposed revisions significantly and unrealistically shorten the maximum restoration timeframe for a cleanup. Informed by the committee members' collective experience with how long many cleanup projects take to implement, the Port understands that the final advisory committee considered and rejected the option of changing the rules from the current requirement that cleanup standards must be met with 10 years following completion of cleanup, to requiring that cleanup standard must be met within 10 years of *initiating* cleanup. However, the August 2012 proposal ignores the committee's recommendation. Thus, the next to last sentence of subsection (46) needs to be revised to read: "*within ten years after the completion of the cleanup construction.*" The last sentence of this subsection referring to sediment recovery zones needs to be deleted, consistent with the comment above regarding page 17.
638	37	457–458	MTCA contains a clear definition of "practicable" that has been used for cleanup throughout the state in all other environmental media for almost 2 decades. It states: ""Practicable" means capable of being designed, constructed and implemented in a reliable and effective manner including consideration of cost. When considering cost under this analysis, an alternative shall not be considered practicable if the incremental costs of the alternative are disproportionate to the incremental degree of benefits provided by the alternative over other lower cost alternatives." This definition sets up the concept for Disproportionate Cost Analysis, which is one of the most important tools available in assessing sediment cleanups. Is it Ecology's intent by the definition of "Technically possible," and its use throughout the regulations, to eliminate cost from consideration in sediment cleanups and to eliminate the Disproportionate Cost Analysis tool? The Port understood that Ecology was moving toward an understanding of sediment cleanups that included considerations of net environmental benefit, bioavailability of contaminants, and DCA analysis showing the relationships between costs of the cleanups and risk reduction. The current draft appears to have abandoned this is favor of "technically possible."
639	xcv	1500–1507	Given the complexities of permitting and coordinating beneficial reuse opportunities at sediment cleanup sites it is unrealistic for Ecology to expect that sediment cleanup construction within sediment cleanup units (let alone entire sites) can be completed within a single construction season. This subsection needs to be rewritten to more simply state that: "*restoration will be completed as soon as practicable, consistent with the general requirements of WAC 173-204-570.*"

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640	xcvi	1508–1511	Similar to the comment on page 36 above, the entirety of this sub-section either needs to be deleted or the text of subsection (d) revised to read: "….*within ten years after the ~~start~~completion of the cleanup ~~action~~construction, …*".
641	cxxxi	2190–2203	Ecology's October 2011 sample rule language specified that, in determining where to set cleanup levels between the sediment cleanup objective ("SCO") and regional background, three factors should be considered: technical feasibility, cost, and net environmental benefit. The document distributed in late 2011 to the final advisory committee titled "*Framework for Sediment Cleanup Decisions*" stated at page 7 "*The current SMS framework allows consideration of cost, technical feasibility and net environmental effects both when setting cleanup standards in a range between the upper and lower bounds and during remedy selection. This has been successful because the system provides needed flexibility… In the revised rule, this paradigm will remain.*" Yet, despite this, the cost criterion has been dropped in the proposed amendments. This change is difficult to understand given that, by Ecology's own admission, the current rule's consideration of cost in setting cleanup standards is one of the parts of the rule that works well because of the flexibility it provides. Furthermore, the inclusion by reference disproportionate cost analysis ("DCA") in selecting cleanup actions does not take the place of cost consideration in setting cleanup standards because the threshold requirement that cleanup standards must be attained within a reasonable restoration timeframe dictates which potential cleanup actions can be considered in the DCA. To be clear, the way the current rule is written eliminates ACTUAL the use of DCA and cost. In order to preserve the flexibility that Ecology admits is afforded by the current rule, cost should be restored as a criteria for setting site specific cleanup levels under WAC 173-204-560.
642	clxxv	2906–2910	The August 2012 proposal appears to have ignored the Committee's advice and includes the requirement in WAC 173-204-570(3)(h) that "*Cleanup actions shall not rely primarily on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action.*" The proposed language is problematic because it establishes "active" cleanup as the presumptive remedy at all sites, despite years of collective experience demonstrating that the unique challenges posed by sediment sites often make "active" remedies impracticable. This opinion is not confined to Washington; USEPA's current sediment guidance states there is no presumptive remedy for sediment contamination. Consistent with this widely held position, the Port understands that the final advisory committee that addressed this issue held the consensus view that there is no presumptive sediment remedy, including a requirement for "active" cleanup, for any contaminated sediment site, regardless of the contaminant or the level of risk. Given the widely differing sediment cleanup situations in Washington State, the sediment cleanup remedy should always be the product of careful site-specific evaluations. With lower and lower cleanup levels for constituents like dioxins/furans and PCBs, leading to very large sites, exchanging the site-specific evaluation for a presumptive remedy can and will lead to impracticably broad mandates for active cleanup—for instance, under the proposed rule language, for a 1,000 acre site an active remedy may have to be implemented on more than 500 acres, regardless of how great or small the exceedances of cleanup levels might be. Because the proposed language both ignores real-world nature of sediment cleanups and partially discards the MTCA process by mandating an active cleanup in advance of compiling and evaluating all available options and data, the Port believes this portion of the proposed amendments is substantially flawed. The presumptive approach to require "active cleanup" will only further stymie cleanup progress. Thus, the entirety of WAC 173-204-200(1) needs to be deleted. Similar edits need to be made to related parts of the SMS rule.
643	clxxviii	2957–2962	Refer to comments regarding pages 17 and 36. The entirety of sub-section (b) needs to be deleted.
644	clxxxi to clxxxvii	3007–3136	Refer to comment regarding page 17. The entirety of WAC 173-204-590 sediment recovery zones needs to be deleted.

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Name of Commenter:	Douglas A Hotchkiss, Port of Seattle
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645	General		The application of these proposed WAC amendments have not been thought through thoroughly enough to illuminate their flaws. What is needed during the next round of revisions are detailed "case study" examples of the most complex types of sites to make sure the proposals will work in the complex and high priority areas. These case studies will need to be reviewed and worked out with the experts from the regulated community to provide accurate feedback on the consequences, intended and otherwise, of the proposals.
646	11	Fig 1	The human health non-cancer risk statements in the upper and lower bounds do not reflect the text in Section 561.
647			Also the illustrated upper bound HI = < 1 is more restrictive than the illustrated lower bound HQ = <1, so they are reversed from what would be an upper and lower bound.
648	17	65 - 69	Sediment Recovery Zones (SRZ), this element of the SMS has proven unworkable in the past application of SMS due to the burdensome process and difficult criteria embodied in its application, and also the lack of finality for the parties involved. So now to rely on this element to bridge that most difficult gap, between an unattainable cleanup objective and the need to move forward with the sediment cleanups that we can and need to do, is a path to failure. The (SRZ) approach in its current form needs to be deleted. It is unworkable in the common situation of multiple, diffuse, uncontrollable "non-point" sources of ubiquitous regional contaminants with conservative background and PQL based cleanup levels. There is a place in a workable sediment management standard for something similar to a remodeled (SRZ). It would have to have finality for those involved, it would have to be streamlined so that the process was not burdensome and hampered by overly difficult criteria. It would probably be most useful in situations where there was a clearly defined site surrounded by background level sediments, but without a large enough clean sediment source to attain background within 10 years (from end of construction) in the "large area/low level" margins within and/or around the site. The other possibility would be where there is a large multi/sourced site with a PRP group that has accepted responsibility for cleanup, and you have municipal and local governments taking a major share, and they have been provided with long term MTCA grant funding to insure that their involvement will not create a unworkable financial burden. Need to provide the detailed complex case studies necessary to show how it will work in reality. Should convene a group of knowledgeable consultants, lawyers and local government entities. To review the case studies to insure they match the reality of how these sites will move forward.
649	29	283 - 285	The definition of contaminant needs to be expanded to explicitly include the concept of bioavailability and how it may vary with the geochemistry, and it may be manipulated by "treatments" (such as carbon).
650	34	389 – 393	The workability of the "regional background" approach laid out in this definition and discussed in the proposed changes is totally dependent on how the regional background is calculated, both the data set used and the statistics employed. Of these two, the filtering of the data set to match Ecologies definition of Regional background is the most subjective and prone to "when in doubt, be conservative", as we saw in the LDW discussions regarding establishing an area background, or local background without direct influence, and also the recent work at Bellingham and Port Angeles. The decision about individual stations being influenced by "diffuse non-point sources vs. a suspected contaminant source" is often not a straight forward decision. The mention of the constraints on regional background in the Preliminary Cost Benefit and Least Burdensome Alternative Analysis document (Ecology2012e) Section 3.5.1 "use of regional background concentrations to establish sediment cleanup standards will be limited by the proposed revisions that eliminate cost as a consideration when setting cleanup standards" also seem to indicate that it will be a very conservative approach. The regional background calculation approaches currently being considered by Ecology are too stringent to be practicable. Regional background needs to include the ubiquitous regional contaminants from multiple, diffuse, uncontrollable "non-point" sources as well as the multiple urban stormwater sources so that the approach to those sources can be covered the most appropriate regulatory vehicle, (such as the Phase II municipal permits for storm water), and leave the discrete

Questions? Please Contact: Adrienne Dorrah at (360) 407-7195

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Name of Commenter:	Douglas A Hotchkiss, Port of Seattle
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650 cont.			sediments sites tied to a specific location and (often historic) practice can be dealt with under this WAC. A good start would be to remove "non-point" (line 390) and "or equal to" (line 392) from this definition.
651	36 And many other locations	435 – 442 And many other locations	Meeting cleanup standards should remain tied to 10 years following completion of construction, not changed to 10 years following initiation, The size and complexity of many sediment sites, along with the reduced "in-water" construction season result in many (if not most) sediment cleanups taking multiple years.
652	37	457	"Technically possible" ….regardless of cost" needs to be removed. When the objective is as low (and in many cases unachievable) as natural background, is a policy that doesn't allow the potential action to be weighed against all the other actions that may have a positive impact on the same end point. Many of the major sediment cleanups will have at least one public entity that is a primary party. As currently defined, this approach would have people spending public and private resources well down the curve of diminishing returns, making those limited resources unavailable to other programs that could potentially have a greater positive impact on the same endpoints (i.e. human health and biological resources). "Technically practicable" means capable of being designed, constructed, and implemented in a reliable and cost effective manner." Would be a workable policy approach as it would allow the thoughtful weighing and balancing necessary in major complex decisions involving large expenditures of public resources.
653	xciv	1447	See comment on line # 65 – 69 above. An alternative concept that should be included is a process comparable to the Technical Impracticability (TI) waiver. That approach would provide the level of finality needed for liability allocation and insurance claims to proceed.
654	cxxxi	2196	See comment on line # 457 above
655 & 656	cxxxvi and cxxxvii	2301 -2304	It is good to allow tissue analysis, as this can allow a more direct comparison to the impact pathway of risk from fish and shellfish consumption. It will provide another method of comparing to natural and regional background that may be informative and useful in some situations. The department will need to work on some guidance regarding appropriate sampling to account for site specific variability, sampling and analytical methodology, etc. from the different available sources.
657	cxxxviii and cxxxix	2335 – 2339 and 2382 – 2384	For non-carcinogens the sediment cleanup objectives and the cleanup screening levels are the same. There is no effective separation in the two-tier system.
658	cixxv	2906 - 2910	The presumptive approach proposed in this sub-section (…570(3)(h) especially tied to "technical possibility" (see comment on page#37 above) needs to be deleted as it does not allow for site specific maximization of efficient cleanup and therefore will waste resources and have the unintended consequence of driving parties away from cooperative cleanups.
659	clxxxi	3007	See comment page 17 above
660	General	Cost analyses doc.s	The cost analyses are overly optimistic, and simplistic to capture the real impact on the business community, ports, and local governments.

Questions? Please Contact: Adrienne Dorrah at (360) 407-7195

Extracted from Craig's spreadsheet of comments submitted by City of Renton.

SMS related

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661 1. The regulation of water and sediment quality in Washington only has the potential to affect chemical concentrations in fish and shellfish tissue if they are raised or spend significant periods of their life cycle in Washington waters. [3rd para, page 1]

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662 2. Some fish species may have higher bioaccumulation rates and thus high concentrations of toxins in their tissue. However, if that species is not consumed or has a low consumption rate, it should not be the dominant species used when establishing the human health criteria or changing the state's water quality and sediment standards. [4th para, page 2]

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663 3. The use of salmon consumption rates should be excluded in water and sediment quality (clean-up) standards for these reasons. Due to popularity of salmon to the consumers in Washington, it is important that the Technical Support Document distinguishes salmon consumption rates separately from consumption rates of other fish species. [5h para, page 2]

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664 4. As with an change to regulatory requirements, there are other factors that deserve equal consideration such as the effect of the regulatory requirements on employment and the state's economy, and cost to citizens, businesses, cities, counties, and special purpose districts. The change in water and sediment quality standards could result in more streams being listed on the EPA 303(d) list of impaired water bodies, which requires more Total Maximum Daily Load pollutant clean-up plans. [7th para, page 2]

Denis Law
Mayor

City of Renton
Mayor's Office

October 24, 2012

Adrienne Dorrah
Washington Department of Ecology
Toxics Cleanup Program
P.O. Box 47600
Olympia, WA 98504-7600

RE: Ecology's Fish Consumption Rates Technical Support Document Public Review Draft (Version 2)

Dear Ms. Dorrah:

The following are the City of Renton's comments on the second version of the draft Fish Consumption Rates Technical Support Document. We appreciate the work that Ecology has done to prepare this technical document and thank you for the opportunity to provide comments.

The Technical Support Document does not provide a complete and unbiased presentation of the relevant factual and scientific information for Washington's general population. Fish consumption rates should be based upon a comprehensive survey of fish consumption by the entire general population of Washington. The Technical Support Document focuses on fish consumption of specific population segments (Native American and Asian) within Washington. The Technical Support Document should be revised to reflect fish consumption rates of Washington's general population.

The Technical Support Document needs to account for and include information about the source of fish and shellfish being consumed. The regulation of water and sediment quality in Washington only has the potential to affect chemical concentrations in fish and shellfish tissue if they are raised or spend significant periods of their life cycle in Washington waters. The consumption of fish and shellfish reared in other geographical areas, fish that spend relatively short periods of their life cycles in Washington waters, and different species of fish must be accounted for in the Technical Support Document and in future human health risk calculations. The document should acknowledge the limitations of the data, if the source of fish or shellfish is unknown.

The species of fish or shellfish being consumed is important because of the different bioaccumulation rates and application of bioconcentration factors used to establish human health criteria. Some fish species may have higher bioaccumulation rates and thus higher concentrations of toxins in their tissue. However, if that species is not consumed or has a low consumption rate, it should not be the dominant species used when establishing the human health criteria or changing the state's water quality and sediment standards.

As the Technical Support Document acknowledges, the consumption of salmon and other anadromous fish should be addressed differently than consumption of other less mobile, resident fish species. Again, their life cycle and time spent in Washington waters should be accounted for when attempting to associate salmon tissue concentrations with local water and sediment quality standards. The current scientific data and past practice has not supported the application of higher clean-up standards as a way to reduce concentrations of toxins in salmon tissue. The use of salmon consumption rates should be excluded in water and sediment quality (clean-up) standards for these reasons. Due to the popularity of salmon to the consumers in Washington, it is important that the Technical Support Document distinguishes salmon consumption rates separately from consumption rates of other fish species.

The Technical Support Document acknowledges that fish consumers make up a relatively small percentage of the total population, but presents the fish consumption rates in terms of percentiles of fish consumers. This creates confusion and appears to suggest a higher level of fish consumption in the total population. The Technical Support Document should present averages and percentile information for both the entire population and the fish consuming subpopulation to present the information in a complete and unbiased manner.

The proposed change in fish consumption rates is an important factor when considering changes to water quality and sediment clean-up standards. As with any change to regulatory requirements, there are other factors that deserve equal consideration such as the effect of the regulatory requirements on employment and the state's economy, and cost to citizens, businesses, cities, counties and special purpose districts. The change in water and sediment quality standards could result in more streams being listed on the EPA 303(d) list of impaired water bodies, which requires more Total Maximum Daily Load pollutant clean-up plans. This could lead to more stringent stormwater regulatory requirements that are costly and impact existing business, new economic development, jobs and affordable housing. The change in these regulations could significantly increase the cost of wastewater treatment that would have to be passed on to the rate payers (citizens). The ability to achieve new water and sediment quality standards would be expensive, may not be achievable given current technologies, and may impact the state's economy without significant benefit.

We look forward to continuing to work with Ecology on future rulemaking processes. If you require additional information or have questions, please contact Gregg Zimmerman, Public Works Administrator, at (425) 430-7311.

Sincerely,

Denis Law

Denis Law
Mayor

DL:aa

cc: Renton City Councilmembers
Jay Covington, Chief Administrative Officer
Gregg Zimmerman, P.E., Public Works Administrator
Chip Vincent, Communities and Economic Development Administrator
Suzanne Dale Estey, Economic Development Director
Lys Hornsby, P.E., Utility Systems Director
Ronald J. Straka, P.E., Surface Water Utility Engineering Supervisor

Seattle University School of Law
Center for Indian Law & Policy

Center for Indian Law and Policy
Comments on Ecology's Draft Sediment Management Standards Rule Proposed Amendments

Please accept these comments on the Washington State Department of Ecology's *Draft Sediment Management Standards (SMS) Rule Proposed Amendments* (August 15, 2012)(hereinafter "proposed SMS"), submitted on behalf of the Center for Indian Law & Policy, Seattle University School of Law. The Center for Indian Law & Policy was established in 2009. Under the Center are the classes, projects, programs and activities that focus on Indian law at Seattle University School of Law. The mission of the Center, beyond emphasizing learning opportunities for law school students, includes assisting Indian tribes and individuals to deal with the variety of unique laws that apply to them and making information about current legal issues available to Indian tribes and people. The Center does not represent any tribe in this process. Indeed, the Center wishes to underscore the importance of working directly with the individual tribes affected, within the context of a government-to-government relationship, as committed to under the terms of the *Centennial Accord between the Federally Recognized Indian Tribes in Washington State and the State of Washington*.[1] Rather, the Center offers these comments in the hope that they will be of value to Ecology as it considers its proposed SMS.

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665 **Introduction**

Washington's environmental laws are intended to ensure that our land, air, and water sustain ordinary, necessary, and cherished human activities. They are meant to foster human and environmental health, for current and future generations. The environmental laws governing the waters and sediments that support fish,[2] indeed, were enacted with these ends in mind. At that time, it was recognized that we had permitted our resources to become depleted and our aquatic environments to become contaminated. So our foundational environmental laws aspired to a more healthful state. They envisioned fishable waters[3] for all. And, because this was obviously not the case at the time, they called for cleanup and restoration of existing pollution; and they called for the reduction or prevention of new pollution.

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[1] Washington Governor's Office of Indian Affairs, Centennial Accord between the Federally Recognized Indian Tribes in Washington State and the State of Washington (1989), *available at* http://www.goia.wa.gov/Government-to-Government/Data/CentennialAccord.htm.

[2] Throughout this document, the term "fish" refers to all fish, including shellfish, unless the context suggests otherwise.

[3] Throughout this document, the term "waters" refers to the sediments, water, and other constituents of our aquatic environments.

665 cont. For example, the federal Clean Water Act's stated objective is:

> to restore and maintain the chemical, physical, and biological integrity of the Nation's waters,

including, *inter alia*, the goal of:

> water quality which provides for the protection and propagation of fish, shellfish, and wildlife.[4]

The state's Model Toxics Control Act declares:

> Each person has a fundamental and inalienable right to a healthful environment and each person has a responsibility to preserve and enhance that right. The beneficial stewardship of the land, air, and waters of the state is a solemn obligation of the present generation for the benefit of future generations.[5]

The tribes fully anticipate restoration of our aquatic environments. Tribal rights to take fish, including rights secured by treaty, are a touchstone for tribes' vision for a restored future. As the Center outlined in its comments on what is now termed "Version 1.0" of Ecology's draft *Fish Consumption Rate Technical Support Document*, tribes comprise distinct *peoples* with inherent rights.[6] Tribes' status as self-governing sovereign entities pre-dated contact with European settlers. Today, tribes are recognized to have a unique political and legal status – one that sets them apart from every other "subpopulation" or group that might warrant particular consideration in a risk assessment or in decisions about environmental standards more broadly. Tribes' rights and interests, moreover, are protected by a constellation of laws and commitments that are unique among groups affected by Ecology's decisions. These include protections secured by treaties, laws, and executive orders that speak to the rights of tribes and their members.[7] These rights cannot be eviscerated or redefined by current depletion and contamination. So, tribes envision – and are entitled to – a future in which aquatic habitats are restored, the waters are again fishable in a robust sense of the term, and tribes' treaty-secured and other rights to fish can be exercised to their full extent. This is the appropriate baseline for cleanup and water quality standards (which two terms include the SMS);[8] every step in the standard setting process should proceed from this restorative orientation.

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[4] Federal Water Pollution Control Act, 33 U.S.C. 1251(a). Washington's state Water Pollution Control Act similarly recognizes among its goals "the propagation of wild life, birds, fish, and other aquatic life," and contemplates that the Department of Ecology will seek delegation to administer the federal Clean Water Act within the state, and authorizes Ecology to "take all action necessary to secure to the state the benefits and to meet the requirements of that act." Washington State Water Pollution Control Act, RCW 90.48.010 and 90.48.260.

[5] Washington State Model Toxics Control Act, RCW 70.105D.010.

[6] Center for Indian Law and Policy, *Comments of the Center for Indian Law and Policy on the Washington State Department of Ecology's Draft Fish Consumption Rates Technical Support Document* (January, 2012) [hereinafter, CILP, Comments on FCR TSD 1.0]. This document is attached hereto, and resubmitted in its entirety as part of the Center's official comments on Ecology's proposed SMS rule. See also, Center for Indian Law and Policy, *Comments of the Center for Indian Law and Policy on the Washington State Department of Ecology's Draft Fish Consumption Rates Technical Support Document Version 2.0* (October, 2012). This document is also attached hereto, and submitted in its entirety as part of the Center's official comments on Ecology's proposed SMS rule.

[7] *See, id.*, elaborating the legal basis of these rights.

[8] The proposed SMS appear to seek to divorce themselves from the WQS of which they have been recognized to be a part. Although this constitutes a change from the previous agency position, Ecology does not provide any explanation for it. This issue is taken up below, in Part II.C of these Comments.

665 cont. In contrast, Ecology's proposed SMS appear crafted to guarantee that cleanup and restoration of our aquatic environment never occurs. Although the purported aim of the SMS is "to reduce and ultimately eliminate adverse effects on biological resources and significant health threats to humans from surface sediment contamination," the proposed SMS would do little to rectify current contaminated conditions. Meanwhile, fish consumption advisories blanket the state warning people that our fish and shellfish are too contaminated to eat.[9] Against this backdrop, Ecology's abrupt announcement, just weeks before publishing the proposed SMS rule, that it would retreat from specifying a protective default fish consumption rate (FCR) in this rule (while also declining to go on record with any recommendations for this and other crucial exposure parameters in its *Fish Consumption Rate Technical Support Document (Version 2.0)*), is distressing.[10] Because the proposed SMS can only be understood in the context of Ecology's efforts to address the related issues of sediment cleanup and water quality – and because Ecology's approach has involved some shuffling between these two rulemakings – the Center's comments will speak first to this deeply troubling bigger picture. These comments will then address the SMS, in which Ecology proposes to employ an array of devices that would both redefine the goals for our aquatic environment and undermine efforts to protect human and environmental health.

I. The Sediment Management Standards in Context: Ecology's Arbitrary and Unsupportable Reversal of Course

On July 16, 2012, Ecology unexpectedly announced that it would reverse course and no longer specify a default FCR in its forthcoming proposed SMS rule. Additionally, Ecology announced that it would be backing away from recommendations regarding the FCR and related issues that had been set forth in September, 2011 and publicly vetted in its *Fish Consumption Rate Technical Support Document* ("FCR TSD 1.0") – importantly, that it would no longer be on record regarding what would constitute an appropriate range of FCRs for use as default values in the forthcoming SMS rule and water quality standards (WQS) rule.

Yet, as Ecology had recognized, its current FCRs were horribly dated, inaccurate as a matter of science, and utterly underprotective of tribes and their members and of Washingtonians in general. In its WQS, for example, the FCR is based on a survey taken of the general U.S. population in 1973-74. A steady stream of evidence from tribes and other groups in Washington showed this FCR to be grossly inaccurate, understating actual contemporary consumption in some cases by more than two orders of magnitude. Moreover, Ecology was bound, under the CWA, to examine its WQS every three years and update them to keep pace with developments in science and policy. Quantified evidence of contemporary tribal consumption became available as early as 1994, when CRITFC published its survey results.[11] And Ecology has always been obligated to uphold tribes' rights to take fish, among other things under the treaties and other agreements between the fishing tribes and the United States, to

[9] Washington State Department of Health, *Fish Consumption Advisories*, available at http://www.doh.wa.gov/CommunityandEnvironment/Food/Fish/Advisories.aspx

[10] Ted Sturdevant, Director, Washington State Department of Ecology, Open Letter to Interested Parties (July 16, 2012)[hereinafter Sturdevant, Change of Course Announcement], available at http://www.ecy.wa.gov/toxics/docs/20120716_FCR_SturdevantLetter.pdf.

[11] Quantified evidence of historical tribal consumption rates and practices was available earlier than this. See, e.g., Gordon W. Hewes, *Indian Fisheries Productivity in Pre-Contact Times in the Pacific Salmon Area*, 7 NORTHWEST ANTHROPOLOGICAL RESEARCH NOTES 133 (1973); U.S. v. Washington, 384 F. Supp. 312, 380 (W.D. Wash. 1974). The issue of historical fish consumption practices versus contemporary, "suppressed," practices and rates is discussed at greater length in CILP, Comments on FCR TSD 1.0.

665 which Washington is a successor-in-interest. In short, for at least eighteen years, Ecology had been
cont. aware that its current FCRs were neither scientifically defensible nor legally supportable.[12]

Although already overdue, Ecology finally committed to increase its FCR and to update its WQS and its SMS. Ecology, however, announced a curious sequencing for this work: it would update the SMS first, and then tackle the WQS; with respect to the latter, it would first address "implementation tools" (i.e., regulatory mechanisms for altering compliance measures and deadlines) and then address the substantive water quality standards. This further delay in the long-awaited update to the FCR and the WQS was salved by Ecology's statement that it would include an increased default FCR in the SMS. Those seeking to rectify the lack of protection in the current WQS recognized that the SMS also affected the health of our waters, our fish, and our people – and that the SMS, indeed, were a part of the WQS. In addition, they recognized that the technical documentation Ecology believed it needed to support an increased FCR in the SMS would also support an increased FCR in the WQS. So, tribes and others engaged in good faith in the process as outlined by Ecology, on the assumption that a more protective default FCR would serve as linchpin for cleaning up and preventing further contamination to our aquatic environment.

Ecology's announcement in July that it was "revising" its approach meant that a more protective default FCR, which was expected to be promulgated by rule before the end of 2012, would now be delayed – further – for months if not years (Ecology's current projection is 2014). Ecology explained its change of course by citing the "concerns" it had heard that the FCR established in the SMS would set precedent for WQS, i.e., that Ecology "would necessarily adopt the same number" in the WQS. Ecology's stated rationale is unsatisfactory and shows the arbitrariness of Ecology's about-face. The SMS and the WQS are interrelated because the sediments and the surface waters are interrelated *in our aquatic environment*. Contaminants move between these two components of the aquatic environment. Inadequately cleaned up sediments have the potential to undermine attainment of the "uses" designated in the State's water quality standards. Indeed, as elaborated below, the SMS are WQS within the meaning of the federal Clean Water Act and/or so affect water quality standards that they are part and parcel of the WQS. Where aspects of Ecology's SMS rulemaking are relevant for its WQS rulemaking, it stands to reason that one will inform the other. However, where the different rulemaking contexts call for different approaches, then Ecology may opt for differences. For Ecology to rely on the notion that an FCR in the SMS would "necessarily" determine the FCR in the WQS as the justification for omitting an FCR from the SMS altogether is unsupportable and arbitrary.

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[12] This is a generous accounting, given the fishing tribes' historical practices and legally recognized rights to take fish; and given the longstanding insistence by tribes and other researchers that tribal people consume far greater quantities of fish than recognized by current regulatory assumptions based on the "average American." See, e.g., Letter from Merle Jefferson, Executive Director, Lummi Nation Natural Resources Department, to Ted Sturdevant, Director, Department of Ecology (October, 2012); Letter from David Lopeman, Chairman, Squaxin Island Tribe, to Dennis McLerran, Regional Administrator, Environmental Protection Agency, Region X (September, 2012); Letter from Harry Smiskin, Chair, Yakama Nation Tribal Council, to Ted Sturdevant, Director, Department of Ecology (October, 2012); Letter from Terry Williams, Commissioner, Fisheries and Resources, The Tulalip Tribes, to Dennis McLerran, Regional Administrator, Environmental Protection Agency, Region X (September, 2012); and Letter from Michael Grayum, Northwest Indian Fisheries Commission, to Michael Bussell, Director, Office of Water and Watersheds, Environmental Protection Agency, Region X (September, 2012)(chronicling the delays in Ecology action to update its outmoded FCRs). *See, generally*, Catherine A. O'Neill, *Variable Justice: Environmental Standards, Contaminated Fish, and "Acceptable" Risk to Native Peoples*, 19 STANFORD ENVIRONMENTAL LAW JOURNAL 3 (2000).

665 cont. Ecology's announcement that it would retreat from specifying a default FCR in the SMS rule was coupled with a statement that it would be backing away from recommendations regarding the FCR and related issues that had been published in its FCR TSD in September, 2011 and had undergone public comment in the ensuing months. Importantly, Ecology announced that it would no longer be on record regarding what would constitute an appropriate range of FCRs for use as default values in the forthcoming SMS rule and WQS rule. Because the SMS would no longer contain a default FCR or other default exposure parameters (e.g., exposure duration, fish diet fraction), these crucial numbers would need to be determined anew at each cleanup site. Without an Ecology recommendation on an appropriate range of FCRs, the outcome of these site-specific determinations has been thrown up for grabs. Instead, Ecology issued guidance on the topic in the form of its *Draft Sediment Cleanup Users Manual II* (SCUM) – guidance on which it expressly stated it is *not* taking public comment.[13] According to this guidance, Ecology will entertain numerous bases for eviscerating the protectiveness of an increased FCR by enlisting less protective numbers for the other parameters used to estimate exposure at each site. The result is a method for setting sediment cleanup standards that is certain to delay cleanups across the state, as these controversial determinations of science, law, and policy are rehashed over and over again at each site. Moreover, it is a method that is likely to sacrifice human and ecological health, with no protective default numbers in the SMS rule, yet a raft of end-runs in the rule and the SCUM guidance – and no mechanism to attend to the aggregate risks and impacts to tribes' resources and rights that are permitted to accrue, site by site.

Finally, Ecology's announcement included a statement that it would "begin the process" of updating the substantive WQS, which would include a more protective default FCR. Ecology stated that it would now undertake this rulemaking as a "separate – but concurrent" rulemaking process from the implementation tools. Although Ecology made much of the earlier *start* date it was announcing for the substantive WQS rulemaking, the timelines included in the letter reveal that Ecology will nonetheless work to *complete* the implementation tools rule first (by 2013), leaving the substantive WQS rule for last (as noted above, by 2014).

Throughout its July letter and in communications since,[14] Ecology has assiduously downplayed its retreat from its earlier course, terming it a "revised approach," a "modification," or an "adjustment."[15] In a similar vein, Ecology Director Ted Sturdevant recently celebrated the "accelerated" schedule for updating Washington's WQS.[16] These attempts to portray Ecology's abrupt and dramatic change of course as the merest adjustment – an acceleration, even – are unavailing. They also evince a callous disregard for those tribal people whose health and lifeways are at stake, given the years of delay that they have already had to suffer while unacceptable standards remain in place.

[13] WASHINGTON STATE DEPARTMENT OF ECOLOGY, DRAFT SEDIMENT CLEANUP USERS MANUAL II: GUIDANCE FOR IMPLEMENTING SEDIMENT MANAGEMENT STANDARDS, CHAPTER 173-204 WAC (August, 2012). See also Washington State Department of Ecology, *SMS Rulemaking* (August 15, 2012), available at http://www.ecy.wa.gov/programs/tcp/regs/2011-SMS/2011-SMS-hp.html (stating that the draft guidance "is not part of the public comment process").
[14] See, e.g., Washington State Department of Ecology, *SMS Rulemaking*, "Ecology director announced revised approach to updating fish consumption rates," (July 17, 2012), available at http://www.ecy.wa.gov/programs/tcp/regs/2011-SMS/2011-SMS-hp.html.
[15] Sturdevant, Change of Course Announcement, *supra* note 10.
[16] Ted Sturdevant, Director, Washington State Department of Ecology, Letter to Denis McLerran, Regional Administrator, U.S. Environmental Protection Agency Region X (September 25, 2012)(on file with the Center).

II. The Proposed Sediment Management Standards Rule

666 A. Overview

The proposed SMS set forth a framework for sediment cleanups that will delay actual cleanups while the standards are debated anew at each site; decrease the protectiveness and scope of cleanups once they do occur; yet permit potentially liable parties (PLPs) to "resolve liability" and walk away from contaminants left in place, even where these pose threats to human and ecological health.

1. Delay

As noted above, Ecology's move to a site-by-site approach for determining the FCR and other exposure parameters will necessarily build in a layer of delay that would not exist if default values were specified in the SMS rule. Ecology's Draft Environmental Impact Statement (DEIS)[17] imagines that cleanups will occur relatively quickly under the proposed SMS framework, and touts this as one of its virtues. However, the DEIS completely ignores the time required for determining anew the relevant exposure parameters for each site. In the meantime, actual cleanup will have yet to begin, and those who consume fish affected by the site will continue to be exposed to toxic contaminants.

667 2. Protectiveness and Scope

Ecology's proposed SMS will decrease the protectiveness and scope of sediment cleanups once these take place, through an array of devices that work together to decrease the number and size of "sites" delineated for cleanup; to deem a site "clean" when contamination remains in concentrations that pose a risk to human and ecological health; to low-ball and undermine estimates of risk to human and ecological health; and to (re)define "natural" background and other key concepts so that toxic contaminants are considered part of our baseline aquatic environment forever.

Ecology's DEIS presents a series of case studies that provide a basis for comparing the "area requiring cleanup" under a human health risk-based approach and under Ecology's proposed approach. In every environment studied (e.g., non-urban shoreline, urban shoreline, urban environment, and freshwater river), for virtually every pollutant, Ecology's proposed SMS would lead to fewer acres being designated for cleanup. For example: in a non-urban shoreline, a risk-based approach for dioxins/furans would require cleanup of 299.30 acres whereas Ecology's approach would require cleanup of 0 acres; in an urban shoreline, a risk-based approach for arsenic would require cleanup of 46.48 acres whereas Ecology's approach would require cleanup of only 28.84 acres; in an urban embayment, a risk-based approach for mercury would require cleanup of 6554 acres whereas Ecology's approach would require cleanup of only 4612 acres; and in a freshwater river, a risk-based approach for PCBs would require cleanup of 25.05 acres whereas Ecology's approach would require cleanup of only 12.83 acres.[18] These narrowly defined "sites" under Ecology's approach mean not only that fewer acres will be cleaned up, but also that the contaminants that are not addressed are left to pose a threat of future recontamination at the site. Further, a "site" defined to include fewer acres can work together with other exposure concepts, namely the fish diet fraction and the site use factor (discussed further below),

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[17] WASHINGTON STATE DEPARTMENT OF ECOLOGY, DRAFT SEDIMENT MANAGEMENT STANDARDS RULE REVISIONS CHAPTER 173-204 WAC ENVIRONMENTAL IMPACT STATEMENT (August, 2012) [hereinafter Ecology, DEIS], available at https://fortress.wa.gov/ecy/publications/SummaryPages/1209054.html.

[18] Ecology, DEIS, at Tables E.3, E.6, E.9, and E.12.

667 cont. to diminish the fish resources and the human dietary intake deemed to be affected by contamination at the site – with the result that less protective standards will be determined to be warranted. Put simply, Ecology intends to entertain the argument that the smaller the "site," the smaller the quantity of fish affected by the site, and so the less protective need be the human health-based standards for that site.

Ecology's DEIS also provides a comparison of the protectiveness of the standards that would result under a human health risk-based approach and under Ecology's approach. Again, in every environment studied (e.g., non-urban shoreline, urban shoreline, urban environment, and freshwater river), for virtually every pollutant, Ecology's proposed SMS would lead to cleanup standards at diminished levels of protection. Indeed, in several instances, the difference in protectiveness is an order of magnitude or more and in one instance, the difference may be as great as four orders of magnitude. For example: in a non-urban shoreline, a risk-based approach for dioxins/furans would result in a cleanup standard of 0.187 ng/kg whereas Ecology's approach would result in a cleanup standard of 5.0 ng/kg; in an urban shoreline, a risk-based approach for arsenic would result in a cleanup standard of 0.0243 mg/kg whereas Ecology's approach would result in a cleanup standard of 7.3 mg/kg; in an urban embayment, a risk-based approach for mercury would result in a cleanup standard of 0.016 mg/kg whereas Ecology's approach would result in a cleanup standard of 0.104 mg/kg; in an urban embayment, a risk-based approach for dioxins/furans would result in a cleanup standard of 0.00921 ng/kg whereas Ecology's approach would result in a cleanup standard between 5.0 ng/kg and 14.6 ng/kg; and in a freshwater river, a risk-based approach for PCBs would result in a cleanup standard of 1.2 µg/kg whereas Ecology's approach would result in a cleanup approach of between 5.5 µg/kg and 12.0 µg/kg.[19] In only one instance – an urban shoreline for PAHs – would it be the case that Ecology's method might approach the protectiveness of a risk-based approach, inasmuch as a risk-based approach would result in a cleanup standard of 37.9 µg/kg whereas Ecology's approach would result in a cleanup standard somewhere between 37.9 µg/kg and 42.59 µg/kg.[20]

Ecology's DEIS then presents Ecology's evaluation of the alternative approaches based on various criteria, including three "threshold" criteria addressing protection of human and ecological health and compliance with ARARs. These threshold criteria are awarded either 4, 8, or 12 points for, respectively, "low," "medium," or "high" marks. The first of these criteria is "impacts to human health and the environment from residual contamination." Remarkably, Ecology awards *low* marks to the human health risk-based approach for this criterion and *high* marks to Ecology's approach (such that these receive, respectively, 4 and 12 points). Given that Ecology's approach would lead to fewer acres being designated for cleanup (and so greater areas of unaddressed contamination) and markedly less protective standards for the areas that are cleaned up, Ecology's evaluation in its DEIS can only be described as delusional.[21]

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[19] Ecology, DEIS, at Tables E.2, E.5, E.8, and E.11.
[20] Ecology, DEIS at Table E.5.
[21] Indeed, the explanatory comments reveal the generous and self-serving assumptions that were invoked to support this ranking. For example, while a human health risk-based approach is recognized to require "lower," i.e., more protective, cleanup levels, it is supposed that there will be "less capping and dredging because of cost, and more reliance on natural recovery;" further, it is assumed that there will be "higher residual contamination for a longer period." Conversely, Ecology's proposed approach is credited with having a "mechanism to immediately reduce high risk areas while allowing a longer period to achieved risk-based cleanup;" and, somehow, imagined to result in "overall lower residual contamination." Ecology, DEIS at Table 5.5, p. 84. It should be noted, again, that Ecology's DEIS ignores entirely the added delay occasioned by the need to set standards anew at each site; presumably, the failure to account for this delay is one reason for the DEIS' rosy assumptions about the relative time that will be required for cleanups under Ecology's approach. The purpose of the EIS requirement under

667 cont. In total, the proposed SMS bend every effort toward allowing PLPs to "resolve liability" and walk away from contamination that will remain in place at concentrations above those that pose a threat to human and ecological health. It is appropriate for Ecology to work with PLPs to ensure that their contamination can be addressed and human and ecological health protected by the most cost-effective means. But it cannot do this at the expense of the resources and people that it is obligated to safeguard.

The next section discusses in more detail the devices included within the proposed SMS that work together to both redefine the goals for our aquatic environment and undermine efforts to protect human and environmental health.

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668 **B. The Dirty Dozen**

Ecology's proposed SMS establish a new framework for determining cleanup standards for sediments. In this framework, the cleanup standard would be set at a concentration somewhere between two bracketing levels: on the low (i.e., most protective) end, the Sediment Cleanup Objective (SCO), and, on the high (i.e., least protective) end, the Cleanup Screening Level (CSL). Each of these brackets is to be determining by reference to the highest (i.e., least protective) of three benchmarks. For the SCO, these three benchmarks are (a) "natural" background, (b) human or ecological risk (at 10^{-6}), or (c) a detection limit termed the "practical quantitation limit" (PQL). For the CSL, these three benchmarks are (a) regional background; (b) human or ecological risk (at 10^{-5}) and ARARs, or (c) the PQL. The proposed SMS anticipate that cleanup standards will be adjusted upward (i.e., become less protective) from the SCO on the basis of technical feasibility, adverse environmental impacts arising from the cleanup itself, and costs to PLPs, up to the point of the CSL. In addition, the CSL will serve as a screening mechanism for identifying sites to be cleaned up and for delineating the boundaries or size of each site. The proposed SMS define each of the concepts that make up this framework – often in ways that work to the detriment of human and ecological health. Indeed, as demonstrated by the case studies in Ecology's DEIS, *under Ecology's proposed approach, human and ecological health will rarely, if ever, turn out to drive actual cleanups* – rather, cleanup standards will be set at the less protective levels of PQLs or the currently contaminated "regional background."[22] The proposed SMS accomplish this by means of at least twelve devices that, together, work to undermine actual cleanup and restoration of our aquatic environments. These twelve devices discussed below can be thought of as the Dirty Dozen.

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669 **1. Default Fish Consumption Rate (FCR): The Linchpin that Got Removed**

The proposed SMS retreat from establishing a default FCR, despite Ecology commitments to set a default FCR by rule. Similarly, the proposed SMS decline to establish key exposure parameters, for example, a default fish diet fraction (FDF) of 1. Instead, Ecology leaves these crucial numbers up for grabs, to be determined anew at each site. This "site-specific" approach guarantees that actual cleanup will be delayed, while PLPs maneuver to have low fish consumption rates and lenient interpretations of Ecology's guidance applied to their respective sites. While PLPs enjoy the reprieve from actually having to clean up the contamination for which they are responsible, Washingtonians are left exposed for additional months and years. Moreover, scarce Ecology time and money must be devoted to rehashing

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Washington's SEPA, like the federal NEPA, is to provide a thorough, objective evaluation of the environmental impacts of a proposed action or rule; as such, courts have routinely rejected as inadequate EISs that present unsubstantiated or self-serving assessments.

[22] Ecology, DEIS, at Tables E.2, E.5, E.8, and E.11.

669 cont. the science and policy debates at every site – clearly a waste of taxpayer money. Smaller tribes and communities will bear the burden of fighting to secure protective standards for each site that impacts them, an effort that will likely outstrip their resources and so leave them less protected than they would be with default exposure parameters in place – an affront to environmental justice that Ecology should not perpetrate.

670 **2. Reasonable Maximum Exposure (RME): Reasonable if it Protects Real People**

The proposed SMS state that cleanups will be set to protect those Washingtonians who are most exposed, given present and future "uses" of a site and the resources impacted by a site. This level of protection is captured by the concept of Reasonable Maximum Exposure (RME). The proposed SMS correctly recognize that, because the fishing tribes have resided in this place and relied upon the fish resources here for thousands of years, tribal members are likely in fact to be the most exposed among us. So the proposed SMS appropriately define RME by reference to tribal exposures. Importantly, the proposed SMS instruct RME to be determined by reference to "historical, current, and future tribal use of fish and shellfish," which appropriately recognizes the relevance of tribes' historical practices and future aspirations for more robust consumption in a context of tribal health and well-being. But the proposed SMS then provide myriad ways to undermine protection for the actual people represented by this exposure scenario, and thus to depart from a true RME.

- First, the proposed SMS allow Ecology to substitute an "alternate" exposure scenario for the RME, by reference to a process that makes no mention of the word "tribal." Again, this possibility leaves tribes to fight to secure their protection at each site.

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- Second, Ecology's SMS guidance undermines the intended protectiveness of the RME concept by suggesting that an RME scenario is reasonable *because* it is comprised of a mix of high-end and average or median values for the various exposure parameters. This formulation misstates the derivation and point of an RME. An RME scenario is reasonable when it reflects *actual* exposures of *real* people, under *realistic* present or future conditions; it is unreasonable if it reflects hypothetical or phantom exposures, likely not to be experienced by any actual people under present or future conditions. If people's actual exposure is comprised of a mix of high-end and average values – for example, if the community exposed consumed large amounts of fish (so had a high-end FCR), but only did so for a short period of their lives (so had an average exposure duration) – then Ecology's formulation would be apt. But, for tribes and their members, *actual* exposure is described by very high-end values for most exposure parameters. Actual tribal people live here and harvest and consume fish here – and do so for their entire lives. This is not a fanciful or "worst-case" scenario, but an actual one. Moreover, for tribes, *realistic* future conditions include restoration of the fish and shellfish resources on which they depend – such that tribal people will once again be able to consume fish at unsuppressed, historical or "heritage" rates, as they are legally entitled to do. (Consider, for example, the once-future "use" scenario associated with fisheries on an undammed Elwha River, a future that few but the tribes would have dreamed realistic even a short time ago.)

670 cont.
- Third, the proposed SMS go on to provide numerous tools for whittling away at those high-end values that are employed as part of the RME scenario. Thus, even if Ecology were to select a relatively protective FCR for a site, it could potentially slash this number by means of the FDF or the source use factor (SUF) – problematic concepts elaborated further below. Indeed, although the proposed SMS do not use either of these terms, they state these concepts "shall" be considered when selecting or approving exposure parameters used to represent RME.

670 cont. Ultimately, by these means, the supposed protectiveness of the RME concept in theory stands to be undermined at each site in practice.

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672 **3. Sediment Cleanup Objective (SCO) Should Reflect Our Actual Objective: Cleaning Up Contaminated Aquatic Environments**

The proposed SMS should set forth an approach in which the Sediment Cleanup Objective is what it says: our actual objective, i.e., cleaning up contamination in Washington's aquatic environments so that they no longer pose risks to human and ecological health. The proposed SMS use the term SCO and set this as the "lower bound" for contaminant concentrations permitted to remain in the sediments following cleanup. That is to say, the SCO is the cleanest that we will aim to get our sediments. Thus, a SCO would be expected to equal a level that is protective of human and ecological health – the ultimate aim, or objective, of our cleanup efforts. But the proposed SMS recalibrate this goal, by defining the SCO as the *highest* (i.e., least protective) of a risk-based level; "natural" background (which itself is redefined by Ecology to include contamination – an unacceptable move elaborated below); or the practical quantitation limit (PQL), i.e., the level of contaminants detectable with present technology (which is also determined by Ecology using a lenient and untenable method, as elaborated below). This slight-of-hand removes the goal from sight. As a consequence, not only will PLPs be able to walk away from the contamination they have caused without ever being asked fully to clean it up, but the citizens of Washington will be deprived of the means to discover that this is so, as a greater-than-healthful amount of contamination left in place will be deemed to be "clean." Such lack of transparency is poor governance. It bears emphasis that the PQL, in particular, has no business serving as the *objective* for sediment cleanup; yet, the PQL will in many cases drive the cleanup standards, given the proposed SMS framework's instruction that the *highest* of the three options be deemed the SCO. This is true for such potent carcinogens as dioxins.

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673 **4. So-Called "Natural" Background: The New Natural**

The proposed SMS allow the Sediment Cleanup Objective to be set equal to "natural background," if this turns out to be the least protective among the options for SCO (see discussion above). Ecology then defines this term to incorporate contamination that is anything but natural, i.e., to include PCBs, potent carcinogens that are the result of human-caused pollution. The proposed SMS state that "'natural background' means the concentration of a hazardous substance consistently present in the environment that has not been influenced by localized human activities. For example, several metals and radionuclides, naturally occur in the bedrock, sediment, and soil of Washington state due solely to the geologic processes that formed these materials and the concentration of these hazardous substances would be considered natural background. Also low concentrations of some particularly persistent organic compounds such as polychlorinated biphenyls (PCBs) can be found in surficial soils and sediment throughout much of the state due to global distribution of these hazardous substances. These low concentrations would be considered natural background." Ditto for radionuclides. While it makes sense to refer to substances that "naturally occur" "due solely to the geologic processes that formed these materials" as natural background, the remainder of Ecology's definition warps the word "natural." Moreover, if Ecology is permitted to redefine natural background in this manner, it will alter our environmental baseline forever. If the "new natural" includes PCBs, all cleanups going forward will aim, at best, to reduce contamination to this new (contaminated) baseline. And, again, there are serious concerns for transparency and accountability: Washingtonians are likely to think – and surely should be able to think – that "natural" means "natural." The true natural, not the new natural.

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5. Practical Quantitation Limit (PQL): Limiting Our Limitations

674 The proposed SMS recognize that, for some pollutants, concentrations that are protective of human health and the environment are at levels lower than the limits of current detection capabilities. Having recognized as much, Ecology inappropriately substitutes our current limitation in this respect for our ultimate cleanup objective (the SCO) – so that, as elaborated above, our cleanups aim not for what is healthful, but for what we can detect. / Ecology compounds this unacceptable move by using a method
675 to determine PQL that aims for mediocrity and fails to harness market forces to encourage improvements in detection technology. Ecology's PQL guidance inappropriately equates PQL with levels detectable by the mid-performing labs, jettisoning the results of the best-performing labs.[23] Ecology also commits to reevaluate the PQL only every 3-5 years, removing incentives for more rapid improvements in detection technology by private labs.[24] While it is appropriate to recognize current limitations on our ability to detect contaminants in the environment, Ecology's approach forsakes technological innovators and permits our cleanup standards to lag what is actually achievable – to the detriment of human and ecological health.

676 & 677 **6. Fish Diet Fraction (FDF): Unsupportably Carving Up the Fish Consumption Rate I**

The proposed SMS and the SMS guidance anticipate that the FCR reflecting a "tribal RME individual" may effectively be reduced by a regulatory concept called the fish diet fraction, which these define as the proportion of fish in this individual's diet "that is obtained from the site or the general vicinity of the site." Ecology's guidance states that a FDF less than 1 can be used to reduce the FCR if the site is small; if the site does not or will not support certain species of fish; or if the habitat at the site does not or will not support sufficient overall quantities of fish. Consider this (simplified) example: a survey of contemporary tribal fish consumption practices might reveal that tribal members consumed 100 grams/day of finfish and shellfish, 80% of which was harvested within Bellingham Bay (comprised of 30 grams/day shellfish and 50 grams/day finfish). A diet fraction of 0.8 might be used to distinguish the portion of fish affected by a cleanup site in Bellingham Bay from the portion of fish obtained elsewhere. But note that a diet fraction of 0.5 might be used to further exclude shellfish consumption if the site within Bellingham Bay were judged not to be able to support growth and harvest of shellfish, now or in the future, in sufficient quantities (due, e.g., to built infrastructure that currently displaces quality intertidal habitat at the site, or to the presence of debris that would impede access to harvest at the site, or to evidence of predation and disease due to non-site related contaminants such as fecal coliform.) The diet fraction concept has generally been advanced by PLPs; its effect is to decrease the protectiveness of the resulting cleanup standards.

In general, there is no justification for applying a diet fraction when most or all of the fish and shellfish in an individual's diet is obtained or has the potential in the future to be obtained from waters affected by a contaminated site. This is the case for tribal fish consumers.

- First, while tribes at present obtain most or all of their fish from local sources, it is crucial to note that at treaty time, Indian people obtained *all* of their fish from local waters. Importantly, tribes' reserved rights under the treaties and other legal agreements entitle them to do so in

[23] Memorandum to File on Establishing PQLs for Dioxins, Joyce Mercuri & Teresa Michelsen, Washington State Department of Ecology Toxics Cleanup Program (April 12, 2012); Washington State Department of Ecology, Draft SMS Issue Paper on Use of PQLs (April 12, 2012).
[24] *Id*.

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perpetuity. The survey in our example reflects contemporary, suppressed consumption practices. Even if the entire 20% of non-local fish currently consumed by survey respondents were assumed to come from open ocean sources (say, from tuna), it would not be appropriate to apply a diet fraction of 0.8 and thereby place a ceiling on future consumption at more robust levels. As the Suquamish, Swinomish, and Lummi surveys document, many tribal members *would like to consume more fish and shellfish*, were these resources not depleted or contaminated, were they better able to access and harvest the resources, etc. Tribes envision and have worked toward a future in which the ecosystems that support fish are restored to health, and the fish resource is returned to abundance. Thus, even if tribal members currently obtain less than 100% of their diet from waters affected by a contaminated site, they have "the potential in the future" to do so – indeed, they have not only the potential, but also the expressed desire, intention, and right to do so.

- Second, tribes' rights are not limited to certain mixes of species consumed historically or at present: these rights encompass all species of fish. So, while a survey of contemporary tribal fish consumption practices may document a particular proportion of species consumed (e.g., in our example, from Bellingham Bay, 30 grams/day shellfish and 50 grams/day finfish), tribal members are not in any sense bound to consume this mix of species in the future. To use the language of the EPA Region X Framework, tribal members are free to undertake "resource switching." Yet Ecology's SMS guidance appears to anticipate slicing and dicing, even down to the level of species-specific fish consumption rates, based on contemporary consumption patterns. This approach is at odds with tribes' rights to determine the mix of species that will comprise their dietary intake in the future. And, again, it bespeaks a vision for the future that doesn't anticipate actually restoring high quality habitat, reducing fecal coliform and other causes of disease, returning the fishery resource to sustainable levels, and ensuring ample access for tribal harvest. This vision is not shared by the tribes.
- Third, even in cases where an individual's fish intake can only partially be supported by productivity (current and future) of resources affected by a contaminated site, the application of a diet fraction is problematic. Again, consider a hypothetical individual whose total FCR is 100 grams/day. Assume that he obtains (or would obtain) all of his fish from local sources. Assume further that Site A is a small lake that, even if pristine, is only likely to support productivity of fish sufficient to supply 50 grams/day. Application of the diet fraction concept would result in a cleanup level that permitted fish at Site A to harbor twice the level of toxic contaminants, on the theory that this individual would only ever obtain half of his fish diet from the lake at Site A (i.e., because only 50 grams/day of this individual's fish intake is likely to be supplied by fish caught in the lake, a site-specific cleanup standard should be set using an effective FCR of 50 grams/day (FCR = 100 grams/day x DF = 0.5), on the theory that such an individual is only going to be exposed to 50 grams/day of local fish). It is important to note that this argument does not consider the remaining 50 grams/day of fish comprising this individual's diet. But suppose he obtained it from a nearby lake at Site B. The logic applied to Site A means either that Site B must be cleaned up to a level twice as protective as would otherwise be permissible (presumably, simply because Site B is batting second) or, if the same logic is applied to Site B, that our hypothetical individual is left exposed to *twice* the level of contaminants that would otherwise be healthful. It is telling that Ecology's SMS guidance mentions only that the FDF may be "reduced" (as to Site A), but does not mention that it may be increased (as to Site B). (See the discussion of aggregate risk, below).
- Fourth, the SMS guidance too narrowly defines the sphere of influence of a contaminated site, referring to fish "from the site or the general vicinity of site." But contamination at a site will often have impacts on fish resources beyond the site boundaries. The EPA Region X Framework

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recognizes this point and refers variously to "fish and shellfish affected by a cleanup site," and "site-impacted fish." A diet fraction that is selected by reference to Ecology's narrow definition will exclude fish that are adversely affected by contamination at the site at various points in their lifecycles but not currently present at or "from the site," resulting in underprotective cleanup standards.

- Finally, this narrow conception of the sphere of influence of a site is rendered more problematic given that it is coupled with Ecology's proposed basis for delineating the boundaries of a "site." As noted above, Ecology's DEIS illustrates the impact of Ecology's approach on the number of acres requiring cleanup, i.e., the size of the site, demonstrating that it will lead to diminished site size in a variety of environments. When sites are drawn to include fewer acres, the projections for productivity for that site may be decreased, and PLPs can be expected to argue for a FDF less than 1 and, thus, for less protective standards.

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7. Site Use Factor (SUF): Unsupportably Carving Up the Fish Consumption Rate II

In a similar vein, the SMS guidance anticipates that the FCR reflecting a "tribal RME individual" may effectively be reduced by a regulatory concept called the site use factor, which it defines as "the percentage of time that a fish/shellfish is in contact with contaminants at the site." Ecology's guidance again anticipates mechanisms for reducing the SUF below 1, namely, based on the size of the site and on species-specific estimates of how much time the species spends "at or in the vicinity of the site," given its particular home range and migratory habits. The guidance gives the example of a FCR that is based on consumption of a high proportion of salmon: "in this case, the SUF may be reduced to reflect the fact that the concentrations of contaminants in the salmon's tissue are primarily related to sources other than the site." As with the diet fraction, the SUF concept has generally been advanced by PLPs; the effect of applying a SUF is to decrease the protectiveness of the resulting cleanup standards.

Ecology's anticipated application of the SUF is generally not supportable where tribes' rights and resources are affected.

- First, in the case of salmon, Ecology's willingness to assert by way of example that the contaminants in the salmon's tissue are due "primarily" to sources other than a contaminated site suggests a predisposition to answer the several science and policy questions at issue in a manner that favors PLPs and that disfavors protection of human and ecological health. As tribal and other commenters to Ecology's FCR TSD 1.0 made clear, numerous studies show that all salmon in fact uptake contaminants during their periods of residency in areas affected by contaminated sites; that some salmon spend their entire lifecycles in such areas; and that the contaminants themselves may be dispersed, resuspended, or transported, such that they impact environments far afield from the narrowly drawn cleanup site. Additionally, to the extent that scientific uncertainties remain about the source of the contaminants in salmon tissue, a health-protective posture would counsel against reducing the FCR (i.e., a health-protective policy judgment would "keep salmon in" by not applying an SUF).
- Second, for all species, Ecology again too narrowly defines the sphere of influence of a contaminated site by speaking of the time that fish and shellfish are "in contact with contaminants at the site." Contaminants originating from a PLP's actions at what becomes a cleanup site may be dispersed, resuspended, or transported such that they have adverse impacts on species beyond a site's boundaries. Moreover, different species will themselves uptake and bioaccumulate contaminants at different rates during different lifestages. The simplistic bases for calculating the SUF suggested by the guidance underscore the PLP-friendly –

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and underprotective – assumptions in this respect (e.g., “divide the time that the fish spends at the site by the lifetime of the fish (migrating species);” “divide the area of the site by the size (area) of the home range of the fish/shellfish being consumed (non-migrating species)”).

- And note that, again, the impact of the SUF considered together with Ecology’s basis for delineating the boundaries of a “site,” as illustrated by the DEIS’s discussion of the “areas requiring cleanup.” When sites are drawn to include fewer acres, Ecology’s intention to “divide the area of the site by the size (area) of the home range of the fish/shellfish being consumed (non-migrating species),” will lead PLPs to argue for an SUF less than 1 and, thus, for less protective standards.

Additionally, it bears noting that application of the devices for whittling away at the FCR – the FDF and SUF – have a *multiplicative* effect on the risk assessment equation. Thus, even a comparatively protective FCR can be gutted, for example, if it is halved by application of a FDF of 0.5 and then halved again by application of a SUF of 0.5.

680 **8. Acknowledging Other Governments’ Standards: Federal, State, Local, *and* Tribal Requirements Should be “Applicable”**

The proposed SMS determine risk-based cleanup levels by looking to the most protective of (a) levels calculated by reference to marine and benthic health; (b) levels calculated by reference to human health; (c) levels calculated by reference to ecological bioaccumulative health; or (d) standards set by other government entities. The last of these are known as “applicable, relevant, and appropriate requirements,” (or “ARARs”). Both MTCA and the federal Superfund cleanup law similarly provide for recognition and incorporation of sister governments’ laws and requirements of general applicability, as relevant to a particular cleanup site. MTCA, however, departs from the federal Superfund law in failing to recognize the duly enacted requirements of tribal governments. The proposed SMS repeat this affront, by mentioning only “local, state, and federal laws” among those it deems “applicable,” and then cross-referencing MTCA’s process for determining when such laws constitute ARARs. While the inclusion of tribal laws among those afforded recognition as ARARs under the SMS will not necessarily result in more protective risk-based cleanup levels – tribes, like other governments, can and do enact standards of differing levels of protectiveness – the fact that many tribes are leaders in protecting human and ecological health suggests that their inclusion augers for greater, rather than lesser, protection. More importantly, however, to exclude tribal governments from the list of recognized governments is an affront to tribal sovereignty and an embarrassment to a state whose *Centennial Accord* with the tribes promised more. Washington’s SMS should provide for the recognition and incorporation of tribal governments’ laws and requirements of general applicability as ARARs.[25]

681 **9. Adjusting Upward from the Sediment Cleanup Objective (SCO): Ask “What is Possible?” Not “What is Practicable?”**

The proposed SMS set up a scheme for determining the site-specific cleanup level by which greater concentrations of contaminants will be permitted than would be protective of human and ecological risk, by allowing “adjustments” upward from the Sediment Cleanup Objective. The SMS indicate that

[25] Note that Washington should not limit ARARs to those tribal laws and requirements that have been federally approved, for example, WQS approved under the CWA for those tribes who have sought “treatment in the same manner as a state;” rather, Washington should accord full recognition to duly enacted tribal standards, consonant with tribes’ status as sovereign governments.

681 cont. the cleanup level be set "as close as practicable to the SCO based on technical possibility and adverse environmental impacts." Adjustments upward will only be permitted to a level termed the Cleanup Screening Level, which is the *highest* (i.e., least protective) of a risk-based concentration (which is an order of magnitude less protective than the current MTCA target, i.e., 1 (10^{-5})); regional background (which itself is defined in a manner that permits considerable contamination to remain in place – discussed further below); or the PQL (the infirmities of which have been discussed above). Much turns, then, on the definition of "practicable." Although the word might ordinarily be thought to refer to the degree of contaminant cleanup we are able to achieve, given our best efforts and technology, Ecology's definition asks considerably less of PLPs: "'Practicable' means able to be completed in consideration of environmental effects, technical feasibility and cost." While it may be appropriate to recognize some bases for permitting contamination to remain at a cleanup site in amounts that exceed the SCO, at least on an interim basis (but see the discussion of periodic reviews and reopeners, below), the proposed SMS authorize inappropriate bases, such as cost, as well, with the result that human and ecological health can be sacrificed in the name of providing cheaper cleanups for PLPs. This is not to say that costs are never to be considered in the cleanup process; indeed, it is important to consider costs when comparing among alternative remedies that might be used to attain health-based cleanup standards. But "cost" shouldn't provide a basis for scaling back from standards that will clean up our aquatic environments and protect human and ecological health.

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682 **10. Regional Background: Decline by Design**

The proposed SMS, as noted above, will permit greater concentrations of contaminants to be left in place than would be protective of human health, by allowing adjustments upward from the SCO, up to the *highest* of three levels, one of which is the level of current contamination present in the area – a concept called "regional background." "Regional background" is defined as "the concentration of a contaminant within a department-defined geographic area that is primarily attributable to diffuse nonpoint sources, such as atmospheric deposition or storm water, not attributable to a specific source or release." This definition is unsettling for its indeterminacy, leaving the relevant geographic area to be defined by Ecology at some point and by some means it deems appropriate (the SMS guidance leaves considerable detail regarding this key concept to be filled in at a later date, containing, as it does, a "placeholder"). Unfortunately, experience suggests that Ecology is prepared to consider areas that harbor significant contamination to serve as reference points for determining this sort of regional "background." Moreover, the remainder of the definition incorporates significant ongoing contamination (e.g., from nonpoint sources, from storm water), rather than assuming a future in which source control is taken seriously. Ecology's approach ensures decline by design. Consider the following scenario: under Ecology's approach, one or more sites in an urban embayment are required to be cleaned up to the level of current contaminated "regional background," and so permitted to leave greater than healthful amounts of contamination in place. These residual contaminants migrate, contributing to elevated levels in the surrounding geographic area. Future sites in this area would be required to be cleaned up to only these elevated levels, which would now be considered "regional background" by Ecology. In the meantime, the Department of Health is compelled to issue Fish Consumption Advisories, given the elevated risk to those who consume fish affected by contamination in the relevant geographic area; in response, at least some people reduce their intake of fish. Subsequently, sources and PLPs argue that Water Quality Standards and site-specific cleanup levels should be less protective, because people are eating less fish and so are less exposed. Greater amounts of contamination would be permitted in these future regulatory rounds, and our aquatic environments would continue to decline. This scenario is troubling, given the reality that cleanup standards for some of the most harmful pollutants are likely to be set equal to regional background. PLPs and their

682 cont. consultants have admitted (and applauded) the "paradigm shift" that this approach represents[26] – away from seriously pursuing restoration of our aquatic environments and toward embracing a steady decline in our environmental baseline.

683 **11. Periodic Review: Perhaps … Despite Leaving More Contamination in Our Waters**

The proposed SMS make no effort to expand the current provision for so-called periodic review; rather, they simply cross-reference MTCA, which calls for review under certain circumstances "if resources permit" 5 years after the initiation of a cleanup action. The point of periodic reviews – which are akin to the "Five-Year Reviews" under federal Superfund cleanups – is to revisit sites post-cleanup to ensure that human and ecological health are being protected. Periodic reviews involve a number of considerations, including whether the remedy selected (including engineering or institutional controls) is actually intact and effective at limiting human exposure to any contaminants that have been permitted to remain in place; whether new scientific information (e.g., about the hazard posed by the contaminants of concern or about exposure assumptions – although the latter is not mentioned in MTCA); whether uses of the site and affected resources differ from those projected; whether new analytic technologies permit better detection of contaminants. While the proposed SMS include expanded avenues for allowing more contamination to be left in place than would be healthful (i.e., cleanup standards set by reference to PQL or regional background), this additional leniency on the front end is not coupled with any additional surveillance or accountability on the back end. The SMS guidance suggests that, where cleanup levels are determined by PQLs, Ecology "shall" undertake periodic reviews, but the language in MTCA quoted above appears to qualify this by the availability of resources to Ecology. To this end, experience on the ground suggests that Ecology often in fact lacks the resources to conduct meaningful periodic reviews. And neither the proposed SMS nor the SMS guidance provide for periodic review where cleanup levels are determined by reference to regional background, despite the fact that such sites will be permitted to harbor unhealthful concentrations of contaminants. Further, MTCA also appears to authorize Ecology to discontinue periodic reviews (except in cases where institutional controls have been relied upon) at its discretion. In all, the proposed SMS provide more opportunities for PLPs to leave unhealthful levels of contaminants unaddressed, but fail to address gaps and questions in Ecology's authority to ensure that human and ecological health are nonetheless protected.

684 **12. Aggregate Risk: The Question that Doesn't Get Asked**

In proceeding site by site, the proposed SMS nowhere ask questions about aggregate risk, i.e., the total risks suffered when people are exposed not only to Site A, but also to Site B, Site C, and so on – as is likely to be the case for many tribes, whose "usual and accustomed" or "U&A" areas include more than one potential cleanup site. While a default FCR and other exposure factors do not in themselves assure attention to the issue of aggregate risk, the use of defaults allows for coordinated judgments on questions of science, law, and policy that can address these sorts of big-picture issues and ensure that cleanups across the state are adequately protective. The proposed SMS and SMS guidance also permit use of a fish diet fraction in a manner that neglects to consider the fact that tribal members may be exposed to contamination affected by more than one site (see discussion of FDF above); rather, by

[26] *See, e.g.*, Brad Helland, Hart Crowser, *Comments on Preliminary SMS Rule Language* (November, 2011), available at http://www.ecy.wa.gov/programs/tcp/regs/2011-SMS/adv-comm/SMS-comments/Jan-20,2012/Hart_Crowser.pdf.

684 cont. proceeding site by site, Ecology will effectively apply the FDF in a vacuum, resulting in unhealthful exposures to those who rely on fish.

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685 **C. Sediment Management Standards Are Water Quality Standards**

Ecology's proposed SMS appear to seek to divorce themselves from the WQS of which they have been recognized to be a part, no longer citing the relevant provisions of the federal Clean Water Act. Although this is a change in the agency's position,[27] Ecology offers no explanation for it. It is a change that is at odds with the real world, where sediment cleanup and surface water quality are intimately related. Contaminated sediments can undermine efforts to protect and attain the designated "uses" that are the touchstone for efforts to ensure water quality under the federal Clean Water Act. If rules addressing sediment cleanup permit contamination to remain at levels that fail to protect the health of humans or aquatic species, they can effectively modify the relevant water quality standards and/or undermine implementation of those standards. This relationship – and the consequent need to harmonize SMS and WQS – is ignored in Ecology's proposed SMS rule. And, given that the proposed SMS will indeed permit contamination to remain at levels that fail to protect human and ecological health for the large number of cleanups that will be PQL- or "regional background"-driven, WQS in Washington in fact stand to be undermined.

To the extent that this change is an attempt by Ecology to avoid the federal oversight that comes with WQS, it is troubling and inappropriate. It is also unavailing. Courts have recognized that the U.S. EPA's duty to review state water quality standards stems from Congress' directive in the federal Clean Water Act, and have uniformly rejected narrow readings of the term "water quality standard" in order to avoid triggering EPA's mandatory duty.[28] Importantly, courts have declined to take at face value states' and the EPA's assertions that particular measures are *not* water quality standards where, as a practical matter, the measures in question would negate or undercut the goals set in the state's water quality standards, in effect modifying the WQS or undermining their implementation. As the district court in Oregon recently observed, EPA is not free simply to parrot a state's label or to accept without question a state's decision not to submit regulatory provisions to EPA for review as water quality standards.[29] Rather, EPA needs to conduct a searching review of the provisions to ascertain their actual effect. Otherwise, a state could "modify its water quality standards, simply disavow that a change had taken place, and the EPA could rely on [the state's] disavowal to avoid its mandatory review of the modified

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[27] Notably, the current SMS standards make explicit that a purpose of the SMS is "to protect existing beneficial uses and move toward attainment of designated beneficial uses as specified in section 101(a)(2) of the federal Clean Water Act (33 USC 1251, et seq.) and chapter 173-201 WAC, the Water quality standards for the surface waters of the state of Washington." WAC 173-204-120(2). Ecology's past practice with respect to compiling its list of "impaired" water bodies within the meaning of section 303(d) of the federal CWA and in developing TMDLs also indicates its understanding of the integral relationship between contaminated sediments, the SMS, and the CWA. See, e.g., Northwest Indian Fisheries Commission, *Comments on the Proposed Sediment Management Standards, Addendum: Relationship of SMS to Surface Water Quality Standards and the Need for Federal Review* (October, 2012)(describing examples of Ecology's past practice).

[28] *See* Northwest Environmental Advocates v. U.S. Environmental Protection Agency, 855 F. Supp.2d 1199 (D. Or. 2012); Fla. Pub. Interest Research Group Citizen Lobby, Inc. v. EPA, 386 F.3d 1070 (11th Cir. 2004) (" *FPIRG*"); Miccosukee Tribe of Indians of Florida v. EPA, 105 F.3d 599 (11th Cir. 1997) (" *Miccosukee I*"); Miccosukee Tribe of Indians of Florida v. U.S., No. 95-0533-CIV-DAVIS, 1998 WL 1805539 (S.D. Fla. Sept. 14, 1998) (" *Miccosukee II*"); Miccosukee Tribe of Indians of Florida v. U.S., 2006 WL 648055 (S.D. Fla. February 16, 2006) (" *Miccosukee III*").

[29] Northwest Environmental Advocates, 855 F. Supp.2d at 1211.

685 cont. standards."[30] Ecology's apparent attempt to distance the proposed SMS from its WQS is all the more surprising given EPA's explicit statement in writing to Ecology that the bulk of its current SMS are, in EPA's view, WQS.[31]

Ecology's apparent attempt to avoid EPA involvement is also disturbing insofar as it sidelines a federal trustee with fiduciary obligations to protect tribal rights and resources. This effect of "de-federalizing" the proposed SMS cannot have escaped Ecology's notice. It is, again, a move that runs counter to the spirit and promise of the *Centennial Accord*.

Conclusion

The end result is that Ecology's proposed SMS unacceptably work to undermine tribal rights and to threaten tribal health and well-being, as well as the health and well-being of all Washingtonians, in the present and future generations. MTCA emphasizes *each person's* "inalienable right" to a healthful environment. MTCA also recognizes *each person's* "responsibility" to safeguard that right. Indeed, MTCA states that it is our "solemn obligation" to ensure the health of our land, air, and waters for our children and for the generations to come. And the federal Clean Water Act and its state counterpart envision a future in which our waters are truly fishable, and healthy enough to support birds, wildlife, and all manner of aquatic life. While our foundational environmental statutes reflect Washingtonians' restorative aspirations, the proposed SMS bear the imprint of PLPs' influence. The proposed SMS fall seriously short of upholding Ecology's duties to protect Washington's people and resources, and seriously short of upholding Ecology's obligations to honor the treaties and other sources of rights held by tribes and their members.

Respectfully submitted,

Catherine A. O'Neill
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Faculty Fellow, Center for Indian Law & Policy

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[30] *Id.* (citing FPIRG, 386 F.3d at 1089).

[31] Letter from Randall F. Smith, Director, Office of Water, U.S. Environmental Protection Agency, Region X, to Megan White and Jim Pendowski, Washington State Department of Ecology (1999). As elaborated by the Northwest Indian Fisheries Commission, EPA's past practice underscores its understanding that the management of Washington's sediments is integrally related to the quality of its surface waters, and EPA guidance further suggests that SMS satisfy the criteria for being considered – and reviewed by EPA as – WQS. Northwest Indian Fisheries Commission, *Comments on the Proposed Sediment Management Standards, Addendum: Relationship of SMS to Surface Water Quality Standards and the Need for Federal Review* (October, 2012)

October 29, 2012

Jim Pendowski
Program Manager
Toxics Cleanup Program
Department of Ecology
PO Box 47600
Olympia, WA 98504

RE: Proposed SMS Rule Amendment

Dear Jim:

686 Entire Letter

We are writing to express our concerns with the draft amendments to WAC 173-204, the Sediment Management Standards (SMS), proposed by Ecology in August 2012. As you know, Ecology has engaged in a great deal of outreach and involvement with knowledgeable professionals and other stakeholders leading up to these proposed SMS amendments. In particular, Ecology engaged in an advisory committee process that involved multiple committees that worked together during 2009 and 2010, and then the most recent Sediment Cleanup Advisory Committee that was convened in 2011. The signatories to this letter served at Ecology's request on the final Sediment Cleanup Advisory Committee, and/or the 2009 and 2010 committees.

Many of the committee members put in a great deal of time and effort in hopes of helping Ecology find workable solutions to the MTCA/SMS problems that have posed a genuine impediment to sediment cleanups in Washington. The committees worked through a wide range of issues with Ecology staff and, based on the presentations and discussion in the last meeting of the Sediment Cleanup Advisory Committee in December 2011, we believed Ecology had charted a course for focused rule amendments that would create a workable path through some thorny MTCA/SMS issues and help expedite needed sediment cleanups. That course was the product of many vigorous discussions, active sharing of information and views, and compromise on the part of Committee members and Ecology. Although there were still differing perspectives expressed, the final Committee meeting was remarkably free of dissention, and we left the last meeting with the view that Ecology's proposed approach, which was reflected in draft rule language at that time, was basically sound.

After having been through this long yet ultimately productive process, and believing we were well on the way to workable rule changes, we were puzzled to see what appears to be a significant change in focus in the rule amendments that were proposed by Ecology in August 2012. We see some aspects of the pragmatic approach we had arrived at by the end of the Advisory Committee process, but we also see significant changes that were either never discussed, or were discussed and quickly put aside as unworkable. For example, we recall the Committee's consensus view (consistent with EPA's current sediment guidance), that there is no presumptive sediment remedy, including a requirement for "active" cleanup, for any contaminated sediment site, regardless of the contaminant or the level of risk. Given the widely

686 cont. differing sediment cleanup situations in Washington State, the sediment cleanup remedy should always be the product of careful site-specific evaluations. Yet the August 2012 proposal ignores the Committee's advice and includes the requirement in WAC 173-204-570(3)(h) that "*Cleanup actions shall not rely primarily on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action.*" This inadvisable presumptive approach will only further stymie cleanup progress.

Given how long many cleanup projects may take to implement, the Committee also recommended that Ecology **not** impose the requirement that cleanup standards be met within 10 years of *initiating* cleanup (which is a change from the current requirement of 10 years following completion of active cleanup measures), yet the August 2012 proposal ignores that recommendation. Of even more concern is the provision in the August 2012 proposal in WAC 173-340-570(5)(b) that: "*If the department approves a longer restoration time frame, the department must also establish a sediment recovery zone in accordance with WAC 173-204-590.*" We recall the Committee's advice that a sediment recovery zone requirement would certainly stymie cleanup, as this element of the SMS regulations has proved totally unworkable in the real world. Despite Ecology giving every indication that it agreed with this point, including in the December 2011 materials, the August 2012 proposal specifically requires sediment impact zones for longer term cleanups. There are important issues involved with these changes that should have been discussed in the Advisory Committee process.

We are also concerned that the August draft rules appear to have been substantially changed since the Advisory Committee last saw them to align them more closely with MTCA terminology and processes. For example, the draft sediment rules include points of compliance, and the concepts of cleanup levels and cleanup standards (i.e. a cleanup standard = cleanup level + a point of compliance + additional regulatory requirements such as institutional controls). However, we are concerned that these aspects of MTCA do not translate well to sediment environments where there are fewer remedial options, and far fewer institutional controls available than exist for upland cleanups. These are just the kinds of changes that would have benefitted from the expertise of the Advisory Committee to work through how (or whether) these concepts could translate to effective sediment cleanups.

Most notably, the draft rules proposed in August eliminate the flexibility associated with a consideration of cost in determining the cleanup level. Although the draft rules allow the cost of a remedial alternative to be factored in at the back end of the process through the use of a disproportionate cost analysis, this provides little flexibility. This is because there are a limited range of cleanup alternatives available for sediments in general, and an even more limited range in the draft rules because they restrict the use of monitored natural recovery and institutional controls when Ecology believes it is "technically possible" to implement a more "permanent" (i.e. costly) cleanup alternative. We left the Advisory Committee process believing everyone at the table understood flexibility was needed to ensure sediment cleanups move forward. We are disappointed that Ecology has opted to remove that flexibility.

After reviewing the draft rule language, it is now clear that significant aspects of what we believed were consensus approaches and solutions were abandoned in the internal Ecology

686 cont. deliberations that occurred between the December 2011 Advisory Committee meeting and the August 2012 publication of the proposed rule amendments. As you have no doubt discerned, we are dismayed that our years of work and collaboration on these issues has been discounted, and in some instances completely rejected, in favor of views and approaches that were not brought forward in the very process Ecology set up to review and discuss these issues.

This letter will not provide the array of comments that underpin our desire for the rule proposal to be significantly modified; individual comment letters will articulate our more specific concerns. However, as a group we believe that significant changes are needed to align these rule amendments with the more practicable approach needed to move forward with sediment cleanups in Washington.

Thank you for your consideration of our concerns.

Very truly yours,

Alex Smith

Clay Patmont

Tom Newlon

Mike Stoner

Kris Hendrickson

Halah Voges

Paul Fuglevand

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This letter will not provide the array of comments that underpin our desire for the rule proposal to be significantly modified; individual comment letters will articulate our more specific concerns. However, as a group we believe that significant changes are needed to align these rule amendments with the more practicable approach needed to move forward with sediment cleanups in Washington.

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Via E-mail & U.S. Mail

October 25, 2012

Ms. Adrienne Dorrah
Toxics Cleanup Program
Washington Department of Ecology
PO Box 47600
Olympia, WA 98504-7600
RuleUpdate@ecy.wa.gov

Re: Sediment Management Work Group's Comments on the Proposed Amendments to the Sediment Management Standards Rule, WAC 173-204, August 15, 2012 Review Version

Dear Ms. Dorrah,

The Sediment Management Work Group ("SMWG")[1] is an ad hoc group of industry and government parties actively involved in the evaluation and management of contaminated sediments on a nationwide basis. The SMWG has long advocated a national policy addressing contaminated sediment issues that is founded on sound science and risk-based evaluation of contaminated sediment management options. The SMWG recognizes that the management of sites involving contaminated sediments frequently involves unique and complex scientific and technical issues, including assessment methodologies and evaluation of risk and risk reduction options. As an active participant in the national discussions on sediment management issues, the SMWG welcomes the opportunity to offer observations and comments on the Proposed Amendments to the Sediment Management Standards Rule, WAC 173-204 ("Proposed Amendments").

Although we are mindful that the State of Washington and many other states have their own contaminated sediment policies and regulations, we believe it is appropriate to consider the substantial, broad-based national scientific and technical experience and lessons learned on this complex environmental issue. This experience includes U.S. EPA's various guidance documents and technical bulletins, two reports of the National Research Council, *Sediment Dredging at Superfund Megasites: Assessing the Effectiveness* (2007) and *A Risk-Management Strategy for PCB-Contaminated Sediments* (2001), the Interstate Technology & Regulatory Council's (ITRC) work on contaminated sediments (e.g., *Incorporating Bioavailability Considerations into the Evaluation of Contaminated Sediment Sites*, 2011), the results of the 4Rs Workshop conducted by the U.S. Army Corps of Engineers and U.S. EPA (summarized in *The Four Rs of*

[1] See Exhibit "A" for a list of its Members.

Environmental Dredging: Resuspension, Release, Residual, and Risk, Bridges, et al. 2008, ERDC/EL TR-08-4), and the collective national experience in addressing contaminated sediment sites. These sources generally and uniformly support the development, evaluation and implementation of all available remedial options and focus on optimizing risk-reduction in a cost-effective manner.

The State of Washington's current review of the Sediment Management Standards offers an excellent opportunity to promulgate revisions to the Sediment Management Standards that expedite cleanups by incorporating scientific, technical and policy advances learned through prior efforts to manage contaminated sediment sites across the country. Many of the key scientific, technical and policy advances are embodied in the *11 Risk Management Principles for Contaminated Sediment Sites* (U.S. EPA 2002)[2] and the *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* (U.S. EPA 2005)[3] ("Guidance") as well as in evolving risk-based approaches by many states.[4] The SMWG's review of the Proposed Amendments has identified a number of critical areas where the Proposed Amendments do not comport with the national state-of-the-practice focus on using a risk management framework to develop and evaluate sediment management options based on site-specific conditions. In particular, the Proposed Amendments do not embody a risk management framework for selecting a risk-reduction focused remedy. Moreover, the Proposed Amendments are likely to have the unintended consequence of to making progress at sediment sites in the State of Washington even more difficult to achieve. Thus, the Proposed Amendments should be withdrawn and new amendments drafted that comport with the Sediment Cleanup Advisory Committee's recommendations and state-of-the-practice national policy, which embodies key scientific and technical advances in managing contaminated sediment sites.

The comments below offer more discussion of the significant issues with the Proposed Amendments.

687 I. <u>The Proposed Amendments Inappropriately Incorporate Bias Against Monitored Natural Recovery and Codify a Presumptive Remedy</u>

The Proposed Amendments are inappropriately biased against monitored natural recovery. Whereas the state-of-the-practice national policy position is that there should be no presumptive remedy[5], the Proposed Amendments codify "active cleanup action" as the presumptive remedy. Please see the following Proposed Amendments for examples of this inappropriate bias.

[2] United States Environmental Protection Agency. 2002. Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites. OSWER Directive 9285.6-08.

[3] United States Environmental Protection Agency. 2005. Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. OSWER 9355.0-85.

[4] For example, please see the ITRC's Contaminated Sediment webpage, which is available at www.itrcweb.org.

[5] "EPA's policy has been and continues to be that there is no presumptive remedy for any contaminated sediment site, regardless of the contaminant or level of risk." (U.S. EPA 2005 at 7-16).

687 cont.

> "Active cleanup actions are preferred over passive cleanup actions." WAC 173-204-500(5)(b)(i).
>
> "Cleanup actions shall not rely primarily on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action." WAC 173-204-570(3)(h).
>
> "The department expects that the sediment component of sites and sediment cleanup units with limited contamination will be restored within a single construction season using active cleanup actions such as dredging or capping." WAC 173-204-500(4)(c).
>
> "Passive cleanup actions, such as monitored natural recovery and institutional controls, may be used in combination with active cleanup actions and source control measures to address sediment contamination." WAC 173-204-500(5)(b)(ii). This provision appears to limit the ability to use MNR as a stand-alone remedy.

This bias against monitored natural recovery is inconsistent with the Proposed Amendments' appropriate acknowledgment that some actions taken to meet the sediment cleanup level could have "an adverse impact on the aquatic environment, taking into account the long-term positive effects on natural resources and habitat restoration and enhancement and the short-term adverse impacts on natural resources and habitat caused by cleanup actions." WAC 173-204-560(2)(a)(i)(B). Monitored natural recovery is much less disruptive of sensitive habitats than removal alternatives[6] as well as being less disruptive of the neighborhoods and communities surrounding the site.[7]

----

688 Moreover, the hierarchy of the relative degree of long-term effectiveness in WAC 173-204-570(4) inappropriately characterizes the long-term effectiveness of various remedial alternatives by elevating dredging remedies over capping and monitored natural recovery remedies. Each of the three major approaches (monitored natural recovery, capping, and dredging) are capable of meeting both short-term and long-term effectiveness criteria,[8] and, therefore, there should not be a presumption that removal of contaminated sediment is more

[6] "MNR typically involves no man-made physical disruption of the existing biological community, which may be an important advantage for some wetlands or sensitive environments where the harm to the ecological community due to sediment disturbance may outweigh the risk reduction of active cleanup." (U.S. EPA 2005 at 4-3).

[7] "Other advantages of MNR may include no construction or infrastructure is needed, and may, therefore, be much less disruptive of communities than active remedies such as dredging or in-situ capping." (U.S. EPA 2005 at 4-4).

[8] "It is important to remember that each of the three major approaches may be capable of reaching acceptable levels of both short-term effectiveness and long-term effectiveness and permanence[.]" (U.S. EPA 2005 at 3-15).

688 cont. effective or permanent than in-situ alternatives.[9] Instead of a presumptive hierarchy of long-term effectiveness, the effectiveness of in-situ (e.g., monitored natural recovery, capping, in-situ amendments) and ex-situ alternatives (e.g., dredging) should be evaluated based the conditions present at the site or sediment cleanup unit.[10] Thus, what constitutes an acceptable level of effectiveness should always be a site-specific decision.

In summary, rather than focus on presumptive active cleanup actions, new amendments should be drafted that are focused on selecting an alternative that represents an appropriate risk reduction strategy for either the site or an individual sediment cleanup unit. At a minimum, the above quoted provisions on the desirability of active cleanups over passive cleanups and the hierarchy of long-term effectiveness should be deleted from the Proposed Amendments.

II. By Ignoring the Contribution of COCs from Point Sources in Setting the Sediment Cleanup Level, the Use of Regional Background as an Upper Bound to the Sediment Cleanup Level may Unnecessarily Result in "Recontamination" of Sites above the Sediment Cleanup Level due to Discharges from Point Sources

689 The upper bound for the sediment cleanup level for a particular contaminant of concern (COC), the cleanup screening level, may be based on the regional background concentration of the COC. WAC 173-204-560(4)(b). Using the regional background as a potential upper bound for the sediment cleanup level is problematic because, by definition, it excludes point sources discharges and only accounts for diffuse nonpoint sources, such as atmospheric deposition and storm water. WAC 173-204-200(38). "Regional background is the concentration of a contaminant within a department-defined geographic area that is primarily attributable to atmospheric deposition or diffuse nonpoint sources not attributable to any source." WAC 173-204-560(5). Moreover, regional background is specifically anticipated to be lower than "area background,"[11] which is defined in the Model Toxics Control Act regulations as "the concentrations of hazardous substances that are consistently present in the environment in the vicinity of a site which are the result of human activities unrelated to releases from that site." WAC 173-340-200. Thus, although point sources, both permitted and unpermitted, can contribute COCs to a site or a sediment cleanup unit, under the Proposed Amendments, their influence is not considered in setting the sediment cleanup level.

Setting an upper bound for the sediment cleanup level that is lower than a "background" concentration that includes the influence of permitted and unpermitted point sources or area background and implementing a remedy to achieve that artificially low sediment cleanup level will likely lead to recontamination of the remediated area with concentrations of COCs above the sediment cleanup level. Activities to control point sources may not sufficiently limit discharges

[9] "There should not be necessarily a presumption that removal of contaminated sediments from a water body will be necessarily more effective or permanent than capping or MNR." (U.S. EPA 2005 at 3-16).

[10] "Project managers should evaluate and compare the effectiveness of in-situ (capping and MNR) and ex-situ (dredging) alternatives under the conditions present at the site." (U.S. EPA 2005 at 3-16).

[11] "Regional background is generally expected to be greater than or equal to natural background, and less than area background as that term is defined in WAC 173-340-200." WAC 173-204-200(38).

689 cont. of COCs to avoid recontamination above the sediment cleanup level. Moreover, even if activities could sufficiently limit discharges of COCs from point sources, those activities often occur on a different time scale than the sediment cleanup action. Thus, due to challenges in reducing discharges from point sources and the temporal disconnect between point source control activities and sediment cleanup actions, recontamination above the sediment cleanup level is likely to occur.

The Proposed Amendments anticipate recontamination due to ongoing discharges: Recontamination of sediment at remediated sites or sediment cleanup units may occur from ongoing discharges." WAC 173-204-500(4)(b). Although the Proposed Amendments state that "further cleanup of recontamination will not be required by the person(s) conducting the initial cleanup when the person(s) can demonstrate, upon department approval, that the recontamination is caused by a source or a permitted release not under the authority or responsibility of the person(s) conducting the initial cleanup," making this demonstration may be exceedingly difficult, time consuming, and expensive in practice. WAC 173-204-500(4)(b). Moreover, setting an artificially low sediment cleanup level and implementing a cleanup action while anticipating recontamination above the sediment cleanup level due to sources or general "area background" does nothing to reduce risk below that which could have been achieved by setting a sediment cleanup level that considered ongoing sources or area background. Nor is this a cost-effective approach to addressing risks posed by impacted sediment. Approving a remedy, therefore, that is virtually certain to be unsustainable on a long-term basis due to continuing sources and recontamination while driving up the cost of the cleanup would not appear to be a progress contaminated sediment policy.

This concern over sediment cleanup levels, recontamination, and overly expansive remedies that do nothing to further reduce risk is not an academic concern. An example, albeit a federal example, of a proposed plan where the cleanup level was set at natural background while fully anticipating that the site would "unavoidably re-equilibrate to levels above natural background over the longer term" due to "urban pollutant influences" in Elliott Bay recently occurred at the Lockheed West Seattle Superfund Site as described in U.S. EPA's proposed plan and its response to the National Remedy Review Board's comments on the proposed plan. The proposed plan expanded the remediation footprint approximately 10 acres by extending it from the Urban Background boundary to the Study Area boundary. This increase of 10 acres of remediation (from 30 acres to 40 acres) is not expected, however, to result in additional risk reduction because it is fully expected that the site's post-construction surfaces will recontaminate to urban background levels within a couple of years of remediation.

A possible solution to the problem described above with the sediment cleanup levels and recontamination would be to recognize the influence of point sources, both permitted and unpermitted, in setting the upper bound for the sediment cleanup level. This approach would result in using a background concentration higher than regional background, but would still be a "background" concentration similar to MTCA's area background. Thus, to reduce risk to the extent feasible without implementing an overly expansive cleanup action, influences beyond those accounted for in setting regional background should be considered when setting the sediment cleanup level. This could be accomplished either by expanding the definition of

689 cont. regional background to incorporate those influences or using a different "background" as an upper bound to potential sediment cleanup levels.

III. The Concept of "Technically Possible" is Highly Problematic and Should be Modified

690 The Proposed Amendments add the concept of "technically possible," which is defined as "capable of being designed, constructed and implemented in a reliable and effective manner, regardless of cost." WAC 173-204-200(49). The term is used in defining how the sediment cleanup level should be set: "The sediment cleanup level shall be adjusted upward as required based on what is technically possible and whether meeting the sediment cleanup objective will have an adverse impact on the aquatic environment, including natural resources and habitat." WAC 173-204-500(5)(a)(i)." The language is reiterated in WAC 173-204-560(2)(a)(i)(A): "The sediment cleanup level may be adjusted upward from the sediment cleanup objective based on the following site specific factors: (A) Whether it is technically possible to achieve the sediment cleanup level at the applicable point of compliance within the site or sediment cleanup unit; … ."

This use of "technically possible" is problematic because it specifically excludes any consideration of cost. This could lead to scenarios where it is technically possible to achieve the sediment cleanup level, but where the remedy is overall not cost-effective. For example, at the Lockheed West Seattle Superfund Site (federal site) U.S. EPA, in its proposed plan, elected an alternative that would achieve natural background rather than urban background. No additional risk reduction, however, was anticipated due to the acknowledged likelihood that the site would recontaminate within a couple of years of construction completion to urban background. The additional cost of achieving natural background, albeit temporarily, as well as incorporating additional dredging rather than capping into the proposed plan raised the cost of the remedy from $18.6 million to $48.1 million. The additional $30 million was not anticipated to buy additional risk reduction as the alternative was not expected to measurably reduce risks to human health via the fish consumption pathway.

Rather than encouraging expedited cleanups, the exclusion of cost considerations in determining what is technically possible will likely impede progress at sediment sites. Allocation at multi-party sites becomes more difficult and time consuming as the anticipated cost of the remedy increases. Parties are also less likely to move forward with projects that unnecessarily consume resources but do not yield greater long-term risk reduction benefits. Thus, to avoid impeding progress at sediment sites, the "regardless of cost" phrase should be deleted from the definition of "technically possible."

691 IV. Ten Year Time Frame for Site Restoration

The Proposed Amendments significantly and unrealistically shorten the maximum timeframe for meeting sediment cleanup levels. Instead of continuing to use ten years following completion of the cleanup action as the timeframe for meeting sediment cleanup levels, the Proposed Amendments have changed it to ten years from the start of the cleanup action. Given the extended duration of construction for large sediment sites (some requiring 10 to 15 years of construction alone), requiring achievement of sediment cleanup levels within ten years of the

691 cont. initiation of the cleanup action is unrealistic. Thus, the Proposed Amendments should eliminate the proposed change from ten years following completion to ten years from the start of the cleanup action.

V. Recommended Changes to Definitions

The following definitions should be revised as described below: monitored natural recovery and natural recovery.

692 The definition of "monitored natural recovery" is too prescriptive and it should be revised to preserve regulatory flexibility to address site-specific needs. Monitored natural recovery is defined as "a form of natural recovery that includes regular monitoring of sediment quality, tissue, and biota to assess the effectiveness of natural recovery to restore sediment quality." WAC 173-204-200(26). This definition is too prescriptive because it appears to require monitoring of sediment quality, tissue, and biota regardless of the site-specific appropriateness of metrics associated with them. Thus, please consider the following revision: "a form of natural recovery that includes regular monitoring of sediment quality, tissue, ~~and~~ **or** biota**, as appropriate, on a site-specific basis,** to assess the effectiveness of natural recovery to restore sediment quality."

693 The definition of "natural recovery" is too narrow because it focuses on deposition. Natural recovery means:

> "physical, chemical or biological processes that act, without human intervention, to reduce the toxicity or concentration of contaminated sediment. *The most common form of natural recovery is the natural deposition of a layer of clean sediment over an area of contaminated sediment resulting in burial of contaminated sediment below the biologically active zone. The natural process of sediment mixing, and degradation of some contaminants, such as polycyclic aromatic hydrocarbons, can also contribute to natural recovery.*"

To avoid confusion over what processes constitute natural recovery, please consider making it more inclusive by deleting everything after the first sentence (indicated in italics above).

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VI. Use of Tissue Analysis in Compliance Monitoring

WAC 173-204-560(6)(b) provides for the use of tissue analysis to "identify and screen chemicals of concern in sediment during remedial investigation/feasibility study and to evaluate compliance with sediment cleanup standards." While tissue analysis can, in some circumstances, provide a more direct measure of risk and risk reduction, it should be used only in circumstances where a site-specific determination has been made that the sediment associated with the specific site or sediment cleanup unit is the significant contributor to tissue concentrations. That is, there must be a site-specific demonstrable connection between sediment concentrations and tissue concentrations. As has been observed at many sites, fish tissue concentrations can be influenced by a number of factors unrelated to the remediated sediments at a particular site. WAC 173-204-560(6)(b) should be revised to incorporate a requirement that such a site-specific determination be made prior to the use of tissue analysis.

VII. Delisting Should be Expanded from Site to Sediment Cleanup Units to Expedite Cleanups

695 The ability of the Department of Ecology to delist a site should be expanded to include the ability to delist partial sites (i.e., sediment cleanup units). WAC 173-204-530(6). Delisting partial sites would encourage early actions within discrete areas of the site (i.e., sediment cleanup units), which in turn, would accelerate progress in achieving risk reduction goals for the overall site. This would fulfill one of the stated purposes in designating sediment cleanup units, which is "expediting cleanups." WAC 173-204-200(47). Additionally, to further encourage expediting sediment cleanups, consider entering into consent decrees with covenants not to sue for cleanup actions at discrete sediment cleanup units when those actions are considered the final remedy (exclusive of long-term monitoring, if necessary). This could greatly aid in brownfield redevelopment in upland areas adjacent to the completed sediment cleanup units.

***

The SMWG would be pleased to answer any questions about its comments on the Proposed Amendments to the Sediment Management Standards Rule. For further information, please feel free to contact the SMWG's Coordinating Director, Steven C. Nadeau, c/o Honigman Miller Schwartz and Cohn LLP, 2290 First National Building, 660 Woodward Avenue, Detroit, MI 48226, (313) 465-7492, snadeau@honigman.com.

Respectfully submitted,

By:

Steven C. Nadeau, Coordinating Director
Sediment Management Work Group

c. Ted Sturdevant, Director, Department of Ecology
Polly Zehm, Deputy Director, Department of Ecology
Jim Pendowski, Toxics Cleanup Program Manager, Department of Ecology

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October 15, 2012

Toxics Cleanup Program
Adrienne Dorrah
PO Box 47600
Olympia, WA 98504-7600

RE: The Spokane Tribe's Department of Natural Resources Comments on the Proposed Amendments to the Sediment Management Standards (sent via email: RuleUpdate@ecy.wa.gov)

Dear Ms. Dorrah:

Please accept these comments on behalf of the Spokane Tribal Natural Resources Department ("Department"). The Department wishes to thank the Washington Department of Ecology ("DOE") for the opportunity to provide comment on these consequential proposed amendments to the State of Washington's Sediment Management Standards ("SMS").

Background

The health and well-being of the waters that flow through the Spokane Tribe's reservation are a paramount interest of the Tribe. The Tribe is concerned not only with the health of the Rivers and creeks within its Reservation, but also with the entirety of these waters as they flow through the Tribe's ancestral lands. The Tribe's Reservation was established in 1877, after the Tribe was removed by force from its domain. *Northern Pac. Ry. Co. v. Wismer*, 246 U.S. 283, 288 (1918). The Tribe's ancestral lands include the entirety of the Spokane River within what is now Washington State. *Spokane Tribe of Indians v. United States*, 163 Ct. Cl. 58, 2 (1963). The Reservation's southern boundary is set to the south bank of the Spokane River, the Western Boundary is set by the West Bank of the Columbia River and the Eastern Boundary is set to the East Bank of Tshimikain Creek, the borders were set in this manner to protect the Tribe's subsistence and cultural uses of these waters.

Unfortunately, for many decades the Tribe's subsistence use of its waters have been thwarted by upstream pollution, raised water temperatures, and during certain times of the year portions of the River are uninhabitable for aquatic life due to depressed oxygen levels and high levels of total dissolved gas ("TDG"). Additionally, PCBs and other toxins make fish consumption potentially dangerous to human health and negatively affect the Tribe's use of the River's fishery. In response to the infringement on the Tribe's fishing, cultural, and agricultural rights in its waters, the Tribe applied for and received treatment in the same manner as a state status ("TAS") under the Clean Water Act ("CWA"), 33 U.S.C. § 1377, on July 23, 2002. The Tribe's first water quality standards were approved on April 22, 2003. However, projects to improve water quality and control water pollution within the Reservation have not been successful in bringing its waters back to health due to upstream pollution and hydropower facilities within its waters. The State of Washington's Sediment Management Standards have the potential to greatly affect the Tribe's waters because several significant current and future clean-up projects are upstream from Reservation waters.

Improvements in the Tribe's water quality depend almost entirely on improvements upstream. Low dissolved oxygen during the summer months in portions of the lower arm of the Spokane River and elevated levels of PCBs and other toxins violate the Tribe's EPA approved water quality standards. Additionally, once fish passage is achieved at Grand Coulee Dam it will be critically important for the waters to be clean and safe for the return of anadromous fish. The Tribe's goal of preparing Tribal waters for the return of anadromous fish to the Spokane and Columbia Rivers becomes more and more difficult as water quality continues on a downward trend due to upstream pollution. The State's proposed amendments to its Sediment Management Standards could cause further degradation to the Tribe's waters. Below are the Department's specific concerns regarding these amendments.

COMMENTS

696 **1.) Lack of Default Fish Consumption Rate**

The proposed SMS fail to establish a default Fish Consumption Rate (FCR), despite Ecology's public commitments to set a default FCR by rule. Similarly, the proposed SMS decline to establish key exposure parameters, for example, a default Fish Diet Fraction (FDF) of one. Instead, Ecology leaves these numbers up for argument at each cleanup site. This "site-specific" approach guarantees that actual cleanup will be delayed. Responsible parties will maneuver and potentially litigate to have low FCRs, and lenient interpretations of Ecology's guidance applied to their respective cleanup sites. Moreover, scarce Ecology time and money will be devoted to rehashing the science and policy debates at every site. This will leave the Spokane Tribe in a position where they have to spend limited resources to ensure Ecology is doing its job and protecting the public from toxic pollution and ensuring the Tribe's standards are being honored at every cleanup site in the watersheds that affect the Tribe and its membership. The State could remedy this environmental injustice by setting an appropriate default FCR in the SMS that does not include methods for the reduction of the default rate at each site.

697 **2.) Application of Federal, State, Local and Tribal Cleanup Requirements.**

Federal CERCLA (Superfund) cleanup law provide for recognition and incorporation of governmental requirements as relevant to a particular cleanup site that are "applicable, relevant, and appropriate requirements," (ARARs) which can include tribal governments. By contrast the proposed Draft SMS only list "local, state, and federal laws", the Draft SMS does not recognize the duly enacted requirements of tribal governments, such as the Spokane Tribe, that have promulgated otherwise applicable Sediment Management Standards and Water Quality Standards. To exclude tribal governments from the list of recognized governments is an affront to tribal sovereignty and incompatible with the promises inherent to the Centennial Accord. The SMS should be changed to include "tribal governments."

698 **3.) Sediment Cleanup Levels based on Human Health Risk**

Ecology withdrew its initial commitment to establish a default FCR in the SMS, and instead Ecology proposes that FCRs will be established on a site-by-site basis. At the same time, 698 cont. several key exposure parameters in the denominator of the equation used to calculate human health risk based cleanup levels including Fish Diet Fraction (FDF) and Site Use Factor (SUF) are introduced in the Draft SMS with default values of 1.0, meaning any site-specific application of these poorly defined variables will have the effect of decreasing the effective FCR and consequently driving human health risk based cleanup levels towards less protective scenarios.

In general, there is no justification for applying a Fish Diet Fraction (FDF) when most or all of the fish and shellfish in an individual's diet is obtained or has the potential to be obtained in the future from waters affected by a contaminated site - such is the case for tribal fish consumers. While tribes at present obtain most or all of their fish from local sources, it is important to recognize that at the time treaties and executive orders establishing reservations were promulgated, Indian people obtained all of their fish from local waters. Furthermore, tribes' reserved rights under treaties and other legal agreements entitle them to do so in perpetuity. The SMS guidance too narrowly defines the sphere of influence of a contaminated site, referring to fish "from the site or the general vicinity of the site." But clearly, contamination at a site will often have impacts on fish resources beyond the site boundaries. A diet fraction that is selected by reference to Ecology's narrow definition will exclude fish that are adversely affected by contamination at the site, resulting in less protective sediment cleanup standards.

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699 Similarly, use of the Site Use Factor (SUF) introduced in the SMS may effectively diminish the Reasonable Maximum Exposure (RME) scenario by assigning a value of less than 1.0 to the equation used to derive risk based cleanup as a function of "the percentage of time that a fish/shellfish is in contact with contaminants at the site." Ecology's application of the SUF is generally not supportable where tribes' right and resources are affected. For the case of salmon, Ecology's propensity to assert that the contaminants in a salmon's tissue are due "primarily" to sources other than a contaminated site suggests a predisposition to resolve the science and policy questions at issue in a manner that favors Potentially Liable Parties (PLPs) and disfavors protection of human and ecological health. Additionally, to the extent that scientific uncertainties remain about the source of contaminants in fish tissue at a given site, a conservative predisposition towards a more rather than less protective cleanup level would guide against reducing the FCR.

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700 **4.) Sediment Cleanup Objective (SCO)**

The proposed SMS should set forth an approach in which the Sediment Cleanup Objective (SCO) is cleaning up contamination in Washington's aquatic environments to levels that no longer pose any risks to human and ecological health. The proposed SMS use the term SCO and set this as the "lower bound" for contaminant concentrations permitted to remain in the sediments following cleanup. That is to say, the SCO is the cleanest that we will aim to get our sediments. Thus, an SCO would be expected to equal a level that is protective of human and ecological health – the goal of our cleanup efforts. But the proposed SMS recalibrate this goal, by defining the SCO as the *highest* (i.e., least protective) of a risk-based level; "natural" background (described below), or the Practical Quantitation Limit (PQL), i.e., the level of contaminants detectable with present technology. This removes the goal. As a consequence, not only will PLPs be able to walk away from the contamination they have caused without full cleanup, but the citizens of Washington and affected tribes will be deprived of the means to discover that this is so, as dangerous amounts of contamination left in place will be deemed to be clean. Such lack of transparency is poor governance. It bears emphasis that the PQL, in particular, has no business serving as the *objective* for sediment cleanup; yet, the PQL will in many cases drive the cleanup standards, given the proposed SMS framework's instruction that the *highest* of the options be deemed the SCO.

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701 **5.) “Natural” and “Regional” Background**

The proposed SMS allow the Sediment Cleanup Objective to be set equal to “natural background,” if this turns out to be the least protective among the options for SCO (see discussion above). Ecology then defines this term to incorporate contamination that is anything but natural, for example, PCBs, potent carcinogens that are the result of human-caused pollution. The proposed SMS state that “‘natural background’ means the concentration of a hazardous substance consistently present in the environment that has not been influenced by localized human activities.” For example, several metals and radionuclides naturally occur in the bedrock, sediment, and soil of Washington state due solely to the geologic processes that formed these materials and the concentration of these hazardous substances would be considered natural background. Also low concentrations of some particularly persistent organic compounds such as polychlorinated biphenyls (PCBs) can be found in surficial soils and sediment throughout much of the state due to global distribution of these hazardous substances. These low concentrations would be considered “natural background.” While it makes sense to refer to substances that “naturally occur” “due solely to the geologic processes that formed these materials” as natural background, the remainder of Ecology’s definition redefines the word “natural.” Moreover, if Ecology is permitted to redefine natural background in this manner, it will alter our environmental baseline forever. If the “new natural” includes PCBs and other human caused and created pollutants, all future cleanups will aim, at best, to reduce contamination to this new (contaminated) baseline.

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702 The proposed SMS, as noted above, will permit greater concentrations of contaminants to be left in place than would be protective of human health, by allowing adjustments upward from the SCO, up to the *highest* of three levels, one of which is the level of current contamination present in the area – a concept called “regional background.” “Regional background” is defined as “the concentration of a contaminant within a department-defined geographic area that is primarily attributable to diffuse nonpoint sources, such as atmospheric deposition or storm water, not attributable to a specific source or release.” This definition is unsettling for its indeterminacy, leaving the relevant geographic area to be defined by Ecology at some point and by some means it deems appropriate (the SMS guidance leaves considerable detail regarding this key concept to be filled in at a later date, containing, as it does, a “placeholder”). Unfortunately, experience suggests that Ecology is prepared to consider areas that harbor significant contamination to serve as reference points for determining this sort of regional “background.” Moreover, the remainder of the definition incorporates significant ongoing contamination (e.g., from nonpoint sources, from storm water), rather than assuming a future in which source control is taken seriously.

The Department has significant concerns that Ecology is already on the wrong path regarding “regional background” in the waters that affect the Tribe’s waters. For example, in a recent report, <u>Background Characterization for Metals and Organic Compounds in Northeast Washington Lakes, Part 2: Fish Tissue</u>, Ecology characterizes the waters of the study as, “[t]he study focused principally on lakes whose quality was not believed to be influenced by notable human-oriented activities that are known to jeopardize environmental quality.”[1] The study utilizes samples taken from Sullivan Lake. The use of Sullivan Lake raises serious doubts about Ecology’s methods and motivations for attempting to define “regional background” as a cleanup standard. A simple web search reveals that the area around Sullivan Lake indicates that it has obviously been “influenced by notable human-oriented activities that are known to jeopardize

[1] Available at https://fortress.wa.gov/ecy/publications/publications/1103054.pdf (Last visited October 10, 2012).

702 cont. environmental quality."[2] This redefinition of what natural is causes the Tribe serious concerns. This potential method of defining what clean is not only leaves open far too many avenues for manipulation by PLPs and Ecology when the political will for cleanup is lacking. Accordingly, the Tribe requests that the regional background be deleted as a method of measuring cleanup standards.

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703 **6.) Practical Quantitation Limit (PQL)**

The proposed SMS recognize that, for some pollutants, concentrations that are protective of human health and the environment are at levels lower than the limits of current detection capabilities. Having recognized as much, Ecology inappropriately substitutes our current limitation in this respect for our ultimate cleanup objective (the SCO). The cleanup levels would then be set at not what is safe, but what we can detect. For example, under the Tribe's WQS PCBs in the water column are set to a level of 3.37 part per quadrillion. Current, testing methods are unable to detect to this level, but this current limitation is absolutely no excuse to set cleanup standards or WQS to the current PQL. If a safe level of a toxic pollutant is zero then cleanup levels should be set to zero. If this creates regulatory uncertainty for PLPs so be it, regulatory certainty for the entities and individuals that create the pollution problems should not be a priority or goal of the SMS, cleaning up toxic pollution must be.

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704 Ecology compounds this unacceptable move by using a method to determine PQL that aims for mediocrity and fails to harness market forces to encourage improvements in detection technology. Ecology's PQL guidance inappropriately equates PQL with levels detectable by the mid-performing labs, jettisoning the results of the best-performing labs. Ecology also commits to reevaluate the PQL only every 3-5 years, removing incentives for more rapid improvements in detection technology by private labs. While it is appropriate to recognize current limitations on our ability to detect contaminants in the environment, Ecology's approach forsakes technological innovators and permits our cleanup standards to lag what is actually achievable – to the detriment of human and ecological health.

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705 **7.) Separation of SMS from Water Quality Standards**

The separation of the sediment management standards from water quality standards is unprecedented. The standards are inconsistent and lead to arbitrary procedures and fail to protect human health in freshwater and marine environments. The SMS should be reviewed as and cross referenced to state water pollution control standards. The applicability of both the Clean Water Act and Model Toxics Control Act should be specified. These SMS amendments and changes should be reviewed as water quality standards, as has been done in the past. Additionally, the SMS rule should cite specific sections where WQS and requirements apply, including sections 300 and 500. At the beginning of the SMS rule they cite the state Water Pollution Control Act generally, but they split out section 500 as MTCA only. Rule language should add CWA requirements in Section 500, or copy 500 to 300. Freshwater tables in the SMS rule are not being promulgated as WQ standards, but Ecology may use them and is not calling them standards. In contrast, marine and estuarine waters are promulgated as WQ standards. This is just one example of the need for consistency between freshwater and marine/estuarine environments as WQ standards so that Ecology can add areas to the 303d list of impaired water bodies and take action as necessary. Given that rivers are sources of sediment for marine and estuarine areas, the freshwater numbers should apply as WQ standards. Unlike freshwater, marine/estuarine site

[2] http://www.historylink.org/index.cfm?DisplayPage=output.cfm&file_id=9216 (Last visited October 10, 2012).

705 cleanup standards are determined based on ecological risk. Under the proposed standards,
cont. freshwater environments are evaluated for aquatic life, but not for human health. This approach is inconsistent. If standards apply to insects and benthic organisms then they should apply to fish and human health. The differences in the applicability of standards inappropriately put the burden of proof on those who are seeking to protect human health.

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706 **8.) Reasonable Maximum Exposure (RME)**

The proposed SMS changes state that cleanups will be set to protect residents that will be most exposed and impacted by the site by measuring present and future "uses" of a site. This level of protection is captured by the concept of Reasonable Maximum Exposure (RME) in Section 561. The proposed SMS correctly recognize that tribal members are likely to be the most exposed among us. However, as various fish consumption reports suggest many population segments in the State are high consumers of fish and shellfish from waters that are within what is now Washington State. Regardless, the proposed SMS defines RME by reference to tribal exposures which is reasonable given that the Tribes of the State have the most current and accurate data on fish consumption in their respective fishing, collecting, and hunting grounds.

The RME is to be determined by reference to "historical, current, and future tribal use of fish and shellfish," which appropriately recognizes the relevance of tribes' historical practices and future aspirations for more robust consumption in a context of tribal health and well-being. But the proposed SMS then provide myriad ways to undermine protection for the actual people represented by this exposure scenario, and thus to depart from a true RME. First, the proposed SMS allow Ecology to substitute an "alternate" exposure scenario for the RME, by reference to a process that makes no mention of the word "tribal." This leaves tribes to fight to secure appropriate levels of cleanup at each site. Second, Ecology's SMS guidance undermines the intended protectiveness of the RME concept by suggesting that an RME scenario is reasonable because it is comprised of a mix of high-end and average or median values for the various exposure parameters. This formulation misstates the derivation and of point RME. An RME scenario is reasonable when it reflects actual exposures of real people, under realistic present or future conditions. For tribes and their members, actual exposure is described by very high-end values for most exposure parameters. Actual tribal people live here and harvest and consume fish here – and do so for their entire lives. Additionally, for the Tribe's future conditions include restoration of the anadromous fish and shellfish resources on which they historically depended and that Tribe's membership will once again be able to consume fish at unsuppressed, historical rates, as they are legally entitled to do. Third, the proposed SMS go on to provide numerous tools for whittling away at those high-end values that are employed as part of the RME scenario. Thus, even if Ecology were to select a relatively protective FCR for a site, it could potentially slash this number by means of the Fish Diet Fraction (FDF) or the Source Use Factor (SUF). Ultimately, by these means, the supposed protectiveness of the RME concept in theory stands to be undermined at each site in practice.

CONCLUSION

Ecology's proposed changes to the SMS will threaten the Tribe's ability to protect its waters from upstream and off-Reservation pollution sources. Furthermore, these proposed changes will make the Tribe's goal of preparing its waters for the return of anadromous fish more difficult. The Department sincerely hopes that Ecology will take a hard look at the Department's comments and make the appropriate changes to close the damaging loopholes created in the State's SMS proposed changes. If you have any questions, feel free to contact me at (509)-626-4427.

Sincerely,

BJ Kieffer

B.J. Kieffer
Director
Spokane Tribal Natural Resources Department

Cc: Rudy Peone, Chairman, Spokane Tribal Business Council
Dennis McLerran, EPA Region 10 Administrator

SQUAXIN ISLAND TRIBE

26 October 2012

Adrienne Dorrah
Toxics Cleanup Program
Department of Ecology
PO Box 47600
Olympia, WA 98504-7600
[RuleUpdate@ecy.wa.gov]

RE: Comments on amendments to Sediment Management Standards

Dear Ms Dorrah,

707 The Squaxin Island Tribe concurs fully with all the details in the comment letter being submitted
by the Northwest Indian Fisheries Commission to Director Sturdevant./We also fine the "Dirty
708 Dozen" list compiled by Catherine O'Neill in a letter from Seattle University's Center for Indian
Law and Policy a compelling analysis of the failures in the proposed amendments.

In the commission's conclusion, they state what is true for Squaxin Island: that at treaty times, Squaxin members consumed all of our fish from local waters and still continue to obtain most of our fish from local sources. Squaxin Island reserved rights under the Medicine Creek Treaty and other legal agreements entitle us to continue to do so in perpetuity. Our Tribal members would consume more fish and shellfish than we do at present, were these resources not depleted or contaminated. Squaxin Island is working toward a future with restored ecosystems that support fisheries resources in abundant levels, with a variety of species that are safe to eat. Squaxin thus has the intent, potential and legal right to consume a mix of species of fish in the future.

709 The proposed amendments to the Sediment Management Standards fail to fully incorporate the considerable, definitive science documenting high fish consumption among our Tribal members, and leave Treaty-reserved resources and Tribal health at extremely unacceptable levels of risk. Reasonable maximum exposure is a time consuming, inefficient, and terrible surrogate for doing what really is right: adopting 175 grams/day or higher as the default fish consumption rate in Sediment Management Standards. And furthermore, tinkering with the fish dietary fraction, site use factor, and definitions of background as proposed only makes the protection of Tribal health far, far more inadequate.

Natural Resources Department / 2952 S.E. Old Olympic Hwy. / Shelton, WA 98584
Fax (360) 426-3971 / Phone (360) 426-9781

709 cont. The Squaxin Island Tribe advocates that a definitive fish consumption rate be adopted and all the other factors amended in such a way that absolutely minimizes the risk to our members' health. That is the only way to fulfill the promises made in the Medicine Creek Treaty.

Sincerely,

John Konovsky
Environmental Program Manager

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

Name of Commenter:	Tom Newlon
Version of Document Reviewed: 8/15/2012	**X** Review Version (Reader Friendly) ___ Official Version
Date:	October 29, 2012

	Page Number	Line Number	Comment
710	34	389 - 393	Edit to definition of Regional Background: Delete "nonpoint" in line 390. The term "point source" has a very specific meaning under the Clean Water Act that includes any "discrete conveyance." Diffuse sources that may be conveyed in a ditch or other discrete conveyance can easily be the kinds of sources that are not readily controlled and make up part of the overall background levels in an area. Also, using the terms "diffuse nonpoint sources" together implies that any diffuse sources that are conveyed through a point source should be taken out of any calculation of Regional Background ("RB"). For example, samples used to determine RB are not to include those taken in the depositional area adjacent to a stormwater discharge outfall, or otherwise be in an area disproportionately influenced by such an outfall. However the contaminants contained in the stormwater may well be part of RB and make up a small portion of what's detected in sediments at further afield locations. The provision as written gives the impression that any contamination that came out of a point source outfall should be backed out of all RB calculations, leaving only contamination that came from "diffuse nonpoint sources" such as atmospheric deposition. I don't believe that is Ecology's intent, so the words should be adjusted to ensure that RB is calculated using samples that are not strongly influenced by individual outfalls, but do reflect what is generally present in that region's sediment.
711			Edit to line 392: Delete "or equal to" so that sentence says that RB is "generally expected to be greater than ~~or equal to~~ natural background, and less than area background…." It is certainly true that RB will "generally" be greater than natural background, as the whole concept (as presented to the various advisory committees) is that it provides some relief from the stringency of the MTCA natural background requirement, but does not go all the way to area background. The qualifier "generally" is still there, so if Ecology is calculating RB in a relatively pristine area (which would not be what Ecology would "generally" be doing), and comes up with a RB that = natural background, that will not appear to be contrary to the regulations, even if "or equal to" is deleted. As written, it leaves the impression that RB, even in urban areas, may not necessarily be greater than natural background. This is clearly not Ecology's intention and not what was discussed with the advisory committees.
712	36	430 - 434	The definition of "sediment quality standard" is fine, but now does not match up with Part III of the regulations, which also appear to define what the SQS are, and also include human health criteria. No changes to Part III are proposed, which is surprising given that the framework for human health sediment criteria is currently located in that Part.

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712 cont.			For instance, WAC 173-204-300 states that the SQS include "human health criteria" and "correspond to no significant risk to humans." Another example is section 320(a), which definitively states that the SQS "shall correspond to a sediment quality that will result in no adverse effects, including no acute or chronic adverse effects on biological resources and no significant health risk to humans." Provisions of this type, which unequivocally say that the Part III SQS are protective of human health, will now be matched up with a new Part which also addresses human health criteria. If the text currently in Part III is not changed, this will create a logical inconsistency within the regulations where one portion of the regulations says that the Part III standards address human health concerns, but the new sections also address human health concerns using an entirely separate framework. Part III of the regulations needs to be amended so that it is clearly limited to ecological criteria, or Ecology will be leaving itself open to an argument that the regulations are so internally inconsistent as to be arbitrary. That would delay implementation of needed changes. Alternatively, the rules could be simplified by retaining the current structure and moving the human health criteria into the current framework. This would avoid the proliferation of new acronyms that the draft regulations creates. Rather than a human health "sediment cleanup objective," the SQS would simply the be lower of the calculated human health criterion or the eco criterion. Those could be referred to as the human health SQS and the ecological SQS, but the actual SQS would simply be the lower value and the current structure and terminology (that we all understand) would be retained.
713	xcv	1494 - 1499	My experience is that "expectations" sections in Ecology regulations morph over time into something very close to firm requirements that are unnecessarily used to limit the range of solutions to a problem. Regulations should regulate. Expectations and Ecology statements about what "generally" should happen are usually better suited for guidance documents because those statements of expectations are in actuality guidelines rather than regulations.
714			In the case of sediment cleanup units, however, promulgating Ecology expectations in the regulations is necessary because Ecology lacks the authority in MTCA to state definitively how and when settlements with PLPs will be agreed to. That is the province of the Attorney General, not Ecology. Because the Attorney General's office has at times interpreted MTCA in an unnecessarily constrained fashion when it comes to settling with a PLP for a smaller area than an entire "site," establishing Ecology expectations for how settlements will occur for "sediment cleanup units" should be beneficial. So, for once, stating expectations in the regulations seems appropriate. However, I have concerns with some of the expectations that are presented in this section of the

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		draft regulations. Those concerns primarily revolve around the basic reason why sediment cleanup units are a good idea – PLPs and project proponents need to be able to perform a cleanup of a portion of a larger site and then be done. If that option is seen as realistically available, significantly more sediment cleanups will happen. To the extent "unit" cleanups become nearly as onerous as large area cleanups in terms of process and long-term involvement, PLPs and project proponents will not step forward and many fewer sediment cleanups will move forward. A specific example is the set of requirements in -500(4)(b) related to the recontamination that will probably occur at nearly all urban cleanup units. These requirements are too onerous and will disincentivize sediment unit cleanups while providing little additional environmental value at the few that would occur. Subsection -500(4)(b) correctly states that recontamination of cleaned up units may occur. In urban areas, such recontamination is a virtual certainty, as "regional background" will be calculated based on samples from areas that are not as affected by the discharges and movement of sediments that occur at the shoreline in urban areas, and the near-shore sediments near their facilities are what PLPs will be most motivated to clean up as a unit. PLPs should be expected to clean up the identified unit and to control the discharges over which they have authority in compliance with applicable regulations. To the extent PLPs are required to do a great deal more source control than they would for their normal CWA permitting requirements, they will be buying into potentially-extraordinary water collection and treatment expenditures, among additional new requirements, by doing a sediment cleanup. They will realize that whether or not they collect and actively treat their stormwater (for example), their unit will probably recontaminate above regional background anyway. The huge additional expenditures involved with collecting and treating stormwater (again, for example) will make little difference in the sediment unit itself unless the facility involved is huge. And if it is huge, the expenditures to fully control stormwater-based contributions to recontamination above regional background levels would be commensurately huge. In other words, cleaning up the unit will not be an attractive option if it also means they must perpetually do more to control their stormwater or other discharges than they would have to do under applicable regulatory programs. That is, if they're required to now do more than their neighbors and competitors are required to do. The current (4)(b) text in lines 1497-99 should be changed to read "…when the person(s) can demonstrate <u>compliance with all applicable regulatory requirements for discharges that could affect sediment quality, or can demonstrate that any violations were not likely to have contributed significantly to recontamination of</u>

714 cont.

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714 cont.			the unit.” As currently written, the burden is on the party carrying out the cleanup to show why recontamination is occurring. It is, in effect, a requirement to prove a negative – to show that the party’s own discharges were not responsible for the recontamination. This could be an endless scientific exercise. The PLP should be able to count on peace with respect to a sediment cleanup unit if he or she cleans up the unit and then complies with all regulatory requirements with respect to their ongoing operations. To the extent CWA requirements do not match up well with MTCA cleanup levels, the burden of that disconnection should not be placed squarely on the shoulders of the very parties Ecology is trying to incentivize to actually get sediment cleanups moving.
715	xcv	1500 - 1507	-500(4)(c) should be deleted. PLPs have huge cost incentives to complete the active phase of a cleanup in one construction season if that is possible. Mobilization costs and the difficulties of getting cleanup equipment such as large dredges into the NW for our short in-water construction season provide all the motivation that is needed without needing an Ecology expectation written into the regulations. Also, this section is written as if all smaller cleanups should be carried out with 100% dredging or capping, or other active measures. This is an inappropriate weighting of priorities for how to do sediment cleanups, as active sediment cleanup is not necessarily preferable from an environmental perspective. This is discussed further in comments in comments below on how to address the MTCA preference for permanence requirement in sediment cleanups.
716	xcvi	1508 - 1511	If sediment recovery zones are a requirement elsewhere in the regulations, they should not be written in as an “expectation.” Section (4)(d) is essentially saying that Ecology expects that it will comply with its own regulations with respect to establishing sediment recovery zones when they are required by section -590. Are there sections of the regulations that Ecology expects to ignore or otherwise not comply with? If so, putting those forward would provide new information. Saying that Ecology expects to comply with its own regulations adds nothing. (4)(d) should be deleted.
717	xcvi	1516	(4)(e) should be changed to provide more information on when “more intense discharge monitoring” will be required. If Ecology does not have a reason to believe that a facility is a significant source of a recontamination chemical of concern, then surface water discharge testing beyond normal CWA requirements should not be required of parties doing unit cleanups. The temptation is to require those doing cleanups to do full suite testing of their stormwater or other effluent for all hazardous substances. This is vastly more expensive than routine CWA effluent testing and will be a significant disincentive to doing unit cleanups, as discussed above. If there is a reason to suspect a particular contaminant may be in an effluent

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717 cont.			stream at unusually high levels (e.g., source tracing results, contaminated soils on upland property or the nature of facility operations), then additional testing can be warranted. Simply saying that Ecology expects that it may require more intense testing than is needed to comply with discharge permits is too open-ended and will scare away the very parties who can provide the desired cleanup benefits.
718	xcvii	1537 - 1547	The definition of “sediment cleanup levels” should be adjusted to allow for consideration of costs and practicability in determining those levels, just as it is in the current Sediment Management Standards. The text beginning in middle of the sentence on lines 1540 – 1543 should be revised to read “… and shall be adjusted upward as required based on <u>consideration of net environmental effects, cost and technical feasibility</u>.” This language maintains the sensible approach currently provided for in -500(4). Changing that approach to one based on what is “technically possible” will have adverse consequences on the willingness and ability of PLPs to carry out sediment cleanups and will result in fewer such cleanups occurring. “Technically possible” is defined as essentially anything that can actually be done, regardless of cost. Cleaning up even relatively large areas of sediment to below natural background levels is generally technically possible, even at relatively large sites. Isolating sediments from the surrounding environment with sheet pile or by other techniques, then dredging and capping back with clean sediments, could reliably produce a very clean sediment surface, albeit at costs that might rival the national debt. Of course, that sediment surface would soon be recontaminated back up to background levels based on the composition of the sediment that continues to accumulate at that location. In the urban areas where sediment cleanups are most desired, starting with the premise that cleanup should occur to natural background because it is technically possible to achieve that result for at least a brief period of time, will mean that cleanups will never be complete. Cost can be taken into account in remedy selection, but the consequence of defining a cleanup level that cannot be maintained will be that any PLP that carries out a cleanup will be left with 5 year reviews, sediment recovery zones, and the possibility of having to do more work for the indefinite future. Ecology’s desire to have cleanup levels and remedy selection mirror the MTCA approach (costs taken into account only in remedy selection, not in setting cleanup levels) is understandable. Consistency can be a good thing, after all. However, sediment cleanups are fundamentally different than the upland soil and groundwater cleanups for which MTCA was designed. An upland cleanup can be performed with an extremely stringent cleanup standard that is met at a point of compliance and is maintained through institutional controls that limit exposures (e.g., to

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718 cont.			subsurface soils that may contain hazardous substance concentrations far in excess of the cleanup level). This approach does not work for sediment cleanups, as extremely stringent cleanup levels are exceeded by what is deposited out of the water column and cannot feasibly be controlled by the party carrying out the cleanup. It is as if you did an upland soil cleanup involving removal or isolation of contamination and instituted institutional controls, but new contaminated soil rained down out of the sky onto the site every day putting you out of compliance at the point of compliance. Given this fundamental difference between sediment sites and upland soil and groundwater sites, a different approach to setting cleanup levels is warranted. The current regulations provide for costs to be taken into account when setting sediment cleanup levels, and that is a sensible approach that needs to be maintained. Ecology will be sliding backwards into a regulatory approach to sediment cleanups that will make the current slow pace of cleanup even worse if the current ability to consider costs is not maintained in the amended regulations.
719	xcviii	1565 - 1569	-500(5)(b) should be amended to account for interim sediment cleanup actions. The second sentence of that section (beginning on line 1566) should begin as follows: "<u>Final</u> cleanup actions must achieve sediment cleanup standards…." Interim MTCA actions are not required to comply with all ARARs, so the sentence should reflect the fact that some interim cleanups may not achieve cleanup standards throughout an entire unit or site.
720			The last sentence of that section should be changed to reflect the fact that source control measures required of a settling party for a cleanup should be those measures that are reasonably within the control of the settling party. The sentence beginning on 1568 should read: "At sites where there are <u>significant</u> ongoing sources <u>within the control of the party carrying out the cleanup action</u>, the cleanup actions will usually also include source control measures." This change will make it clear that settling parties that are not responsible for discharges that contribute significantly to recontamination of the site or unit will not generally be required to undertake source control measures.
721	xcix	1571 - 1572	The last sentence of this section, beginning at the end of line 1571, should be deleted ("~~Active cleanup actions are preferred over passive cleanup actions~~"). Active cleanup measures are not always preferable to passive cleanup actions in the sediment context. Differences between the sediment and upland contexts result in the possibility that an active cleanup measure could do more harm than a passive one. The cleanup measures that provide the most environmental benefit should be determined on a site-by-site basis

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722	cxiv	1859 - 1861	The draft amendments should not delete the designation of "voluntary cleanups" as one of the administrative options available for achieving sediment cleanups. The current regulations include voluntary cleanups at -540(3)(b), but the amended regulations do not list voluntary cleanups as an administrative option. Their exclusion could be interpreted as meaning that all sediment cleanups must be carried out by Ecology or under an Ecology or EPA order or decree. This is contrary to the MTCA policy of encouraging voluntary cleanups and is also contrary to the express statement in the current SMS regulations that Ecology "shall encourage voluntary cleanup actions whenever possible, and as early as possible, to meet the intent of this chapter." In the various advisory committee meetings, Ecology appeared to recognize that voluntary cleanups are essential for meeting MTCA's goals. Any in-water work must be performed under the terms of various state and federal permits that ensure that the work must be done in an environmentally beneficial fashion. There is no basis to conclude that voluntary option should be removed from consideration for sediment cleanups. Instead, Ecology should re-instate the current SMS voluntary cleanup language in section -540(3)(a).
723	cxv	1883 - 1885	The sentence stating that Ecology "shall consider all requirements in this chapter authorized under [MTCA] to be legally applicable requirements under [CERCLA]" should be deleted. 42 U.S.C. 9621(d)(2)(A)(ii) provides that only state requirements that are "more stringent than any Federal standard, requirement, criteria, or limitation" are to be considered as applicable or relevant and appropriate requirements for a CERCLA cleanup. As such, not all MTCA requirements are necessarily CERCLA ARARs. Ecology's regulations should not include a blanket requirement that Ecology consider all MTCA requirements as ARARs when federal law does not require them to be considered ARARs. This provision could be extremely problematic if EPA validly does not consider a particular MTCA requirement as an ARAR, but Ecology is bound by rule to insist that it is. Ecology's regulations should not be providing interpretations of federal law, especially when the interpretation is so broad as to be incorrect in some instances.
724	cxvii - cxviii	1898-1927	There currently is flexibility in the SMS regulations concerning how a "cleanup study plan and report" can be produced to meet the intent of both MTCA and the CWA. This flexibility should be maintained, as at least some sediment cleanups may concern relatively small units where dredging and/or capping of the entire unit will take place. In these circumstances, every element of a full RI/FS should not be required. Text should be added in -550 clarifying that not all components of a standard MTCA RI/FS need to be provided for smaller cleanup units or simpler sites, at Ecology's discretion. The following text should be added to the end of -550(2):

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724 cont.			"For cleanup units or smaller sites, a streamlined analysis of the nature and extent of contamination, applicable cleanup standards and potential cleanup options may be provided, upon approval of the department. The streamlined approach may not include all of the elements otherwise required by WAC 173-204-550(3) through (7)."
725	cxxxi	2196 - 2197	Upward adjustments from the sediment cleanup objective should be permitted based on the consideration of net environmental effects, cost and technical feasibility, as is permitted in the current regulations, for the reasons given in the comment above concerning page xcvii text. 560(2)(a)(i) should be amended to state: "Upward adjustments. The sediment cleanup level may be adjusted upward from the sediment cleanup objective based on consideration of net environmental effects, cost and technical feasibility." Subsections (A) and (B) for that section can then be deleted.
726			If subsection 560(2)(a)(i)(B) is retained, it should be edited so that both short- and long-term positive and negative impacts and effects are considered. Currently it is written so that long-term positive effects are considered, but not long term negative effects, and short-term adverse impacts are considered, but not long-term adverse impacts. A cleanup action could have long-term adverse impacts or could have short term positive effects, and those should be considered as well. The language beginning on 2199 could be edited as follows: "…aquatic environment, taking into account the short- and long-term positive effects on natural resources and habitat restoration and enhancement and the short- and long- term adverse impacts on natural resources and habitat caused by cleanup actions."
727	cxxxii	2204 - 2208	New subsection 540(2)(b) should be deleted. There is no need for Ecology to give itself open-ended authority to require sediment cleanup levels more stringent than what is determined to be applicable based on the procedures for adjustments between the CSL and the sediment cleanup objective. The procedures in place already provide enough discretion to Ecology to ensure that a protective cleanup level can be chosen.
728	cxxxv	2275 - 2279	A "regional background" definition is already included at lines 389 – 393. This new description of "regional background" is slightly different. Since the term is already defined, it should not be re-defined here. The first sentence of -560(5) should therefore be deleted, as it adds nothing. If it is retained, the definition provided should exactly match the definition at section -200(38) to avoid confusion and any possible differences in interpretation between the two definitions. If retained, the description of "regional background" should be changed as proposed in the above comments on the -200(38) definition.
729	cxxxvi -	2301 -	(6)(b) concerns the possible use of tissue analysis. It is unclear how tissue

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729 cont.	cxxxvii	2304	concentrations could be used "to evaluate compliance with sediment cleanup standards" that are numeric criteria for sediment quality. As such, the last portion of that sentence should be deleted: "…during the remedial investigation/feasibility study. ~~and to evaluate compliance with sediment cleanup standards.~~
730	cxli	2389	The multiple carcinogen total lifetime cancer risk for a site upper bound limit should be one in ten thousand. The limit for single carcinogens has been lowered to one in one hundred thousand to provide for a risk range, but that will do little good at most sediment sites, as multiple contaminants are present at nearly all urban sediment cleanup sites. Because multiple carcinogens will almost always be present, creation of any actual gap between the CSL and the sediment cleanup objective requires lowering the multiple contaminant risk level in addition to the single contaminant level. This would still leave the risk range for multiple carcinogens at the same level as CERCLA and many other environmental programs.
731	clxxiv - clxxvii	2894 - 2938	The MTCA requirement of using permanent solutions to the maximum extent practicable does not easily translate into sediment cleanups. As written, the draft regulations would unnecessarily constrain Ecology and would require selection of cleanup actions that are unreasonable and would sometimes provide no incremental environmental improvements for much greater expenditures. Significant changes are needed to -570(3). Because a truly "permanent solution" that meets sediment cleanup levels and maintains them indefinitely will often not be possible, the regulations should allow Ecology and PLPs a great deal of flexibility in determining the best way to derive a cleanup that meets that requirement "to the maximum extent practicable." A cookie-cutter hierarchy of remedial technologies may make sense in the upland context, but it does not make sense for sediment cleanups. Specific suggestions to ensure there is adequate flexibility to deal with the vagaries of sediment cleanups follow.
732	clxxv	2899 - 2900	The default maximum reasonable restoration timeframes should not be changed to begin when the cleanup begins. It currently begins when active cleanup is completed. PLPs will not be incentivized to perform the cleanup any more quickly due to this change. There is already a tremendous cost incentive to complete the cleanup as quickly as possible once it begins due to the tremendous cost of mobilization and maintaining crews and equipment in the field. There is no valid reason for changing the current default of 10 years from the completion of active cleanup measures. The last portion of -570(3)(e) should be changed as follows: "…site or sediment cleanup unit within ten years from the <u>completion</u> of the <u>active</u> cleanup <u>measures</u>

72645160.1

Draft Sediment Management Standards Chapter 173-204 WAC Amendments
Public Comment Form

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732 cont.		shall be presumed to have a reasonable restoration time frame."
733a clxxv	2906 - 2910	Subsection -570(3)(h) should be deleted as unnecessary and confusing, and because it will potentially result in large expenditures for little or no environmental gain. It is unclear what relying "primarily on monitored natural recovery or institutional controls" means. If it means more than 50% of the site should be addressed with active cleanup measures, this would have profound consequences at large sediment sites where large areas are over the sediment cleanup objective, but smaller "hotspot" areas contain much higher concentrations. Dealing with such sites on a case-by-case basis concerning the appropriate remedy technologies to be applied is the best approach. Having to argue about what constitutes relying primarily on MNR and institutional controls will not advance sediment cleanups./
734		Further, this subsection again uses technical possibility as the basis for requiring more active cleanup. For the reasons stated in comments above, this is not a good approach to sediment cleanups.
733b		If the entire subsection is not deleted, it should be changed as follows: "Cleanup actions shall not rely <u>exclusively</u> on monitored natural recovery or institutional controls and monitoring where a more permanent cleanup action <u>that provides for greater net environmental benefits can practicably be implemented."</u>
735 clxxvi - clxxvii	2920 - 2938	-570(4) should be substantially revised in recognition of the differences between sediment and upland cleanups. Unlike upland cleanups, attempting to completely remove contaminated sediments can result in significant environmental harm. There should be no presumption that certain technologies are more "permanent" than others. The hierarchy of (4)(a) through (k) should be deleted. Instead, each site should be reviewed on a case-by-case basis. The sentence beginning on 2924 should be changed as follows: "However, when assessing the relative degree of long-term effectiveness of cleanup action alternatives, <u>each alternative should be analyzed based on site-specific factors to determine which will provide greater permanence.</u>" The remainder of subsection 4 should be deleted, and no hierarchy should be provided for sediment sites.
736 clxxviii	2962 - 2962	The requirement for establishment of sediment recovery zones should be deleted. Unlike CERCLA, MTCA has no technical impracticability waiver. Sediment cleanup levels will be set at levels at many cleanup sites that the PLP will not be able to maintain, due to factors beyond the control of that PLP. For cleanups in urban areas, the regional background standard will not allow PLPs to maintain cleaned-up sediments at the required levels due to factors beyond the PLPs' control. A requirement that a sediment recovery zone be established if any portion of the area addressed remains over the applicable sediment cleanup standard after 10 years means that those PLPs will be locked into a sediment recovery zone for an

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736 cont.			indefinite time period. That will present a tremendous impediment to parties moving forward with sediment cleanups.
737	clxxxii	3034 - 3035	-590(2)(d) should be deleted. Diffuse, nonpoint discharges are governed by the Clean Water Act, not MTCA. A PLP with a stormwater discharge permit should not be subject to an independent MTCA requirement that all of its discharges to a sediment area be handled in accordance with best management practices. The determination of requirements to be imposed on stormwater or other surface water discharges should be limited to CWA requirements to avoid duplicative and potentially varying requirements between the two programs. To the extent PLPs are subjected to multiple sets of ongoing requirements for stormwater by carrying out sediment cleanups, they will be less likely to come forward with a project that involves a sediment unit or site cleanup.
738	clxxxiii - clxxxiv	3051 - 3075	The requirements related to determining the length of time a sediment recovery zone will be in place are too prescriptive. They are based on an assumption that sediment within the recovery zones will be recovering to meet applicable standards within a discernable period of time, not to exceed 10 years. For most urban sediments, this will not be the case. Standards based on regional background concentrations of bioaccumulative chemicals such as PCBs will be extremely difficult to maintain within shoreline urban areas where multiple outfalls are present. For many, if not most, urban sites and cleanup units, regional background concentrations will not be able to be maintained for the foreseeable future. For reasons given in comments above, sediment recovery zones should not be required for cleanups with lengthy restoration timeframes. If Ecology opts to include them, the criteria concerning evaluations and duration should not be prescriptive, due to the uncertainties and variability in circumstances present in the urban sediment context. As such, the specific requirements contained in -590(4) and (5) should be deleted and more generic requirements inserted.
739			Above all, sediment recovery zones should not be required for every sediment cleanup that may not be able to maintain sediments at applicable cleanup levels over the long term. Once a cleanup unit or site is addressed, and the PLP(s) involved is in compliance with applicable discharge limitations, remaining efforts related to that cleanup unit or site should be the province of source control and discharge limitation efforts under the Clean Water Act. Otherwise, PLPs will not be interested in doing cleanups that would subject them to not only paying for a cleanup, but also being responsible for greater discharge evaluation and analysis (and likely treatment) requirements than would be applicable to them had they not carried out the sediment cleanup.

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October 29, 2012

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RE: Draft Sediment Management Standards (SMS) Rule Proposed Amendments
Chapter 173-204 WAC
August 15, 2012

The Suquamish Tribe ("Tribe") has reserved treaty rights and resources under the 1855 Treaty of Point Elliott that protect the right to safely access and harvest treaty and natural resources throughout the Tribe's federally adjudicated Usual and Accustomed fishing area. Because tribal health and well-being are inextricably linked to the land, air, water and all forms of life within the natural system, the Tribe has an enduring commitment to future generations to preserve, restore, and protect treaty rights and resources that have been degraded or put at risk due to environmental contamination. The Tribe and other treaty tribes devote significant effort to co-managing Washington's finfish and shellfish harvests for conservation and human health concerns, and to supporting the development of environmental rules and standards that are protective of tribal people and resources.

Washington's environmental laws are meant to protect human health and the environment for all citizens, tribal and non-tribal. These laws, however, are not purely state issues and have a direct connection to tribal and federal interests that are focused to improve the protection of human health and the environment. The SMS amendments proposed by the Department of Ecology (Ecology) do not appear to moving in the direction to accomplish these objectives. Instead, they support a back-sliding approach that appears to focus on the status quo and to favor parties who are potentially liable for cleaning up environmental contamination of sediments. Back-sliding of regulatory protection arising from changes in environmental rules and regulations is a form of degradation that erodes the Tribe's treaty rights.

740 As a participating member tribe of the Northwest Indian Fish Commission (NWIFC), the Tribe fully supports the comments submitted by the NWIFC related to the proposed amendments to the Sediment Management Standards (SMS) and incorporates those comments by this reference. The Tribe is providing additional detailed comments on key issues related to the protection of human health that must be addressed before the rule is finalized:[1]

- inconsistencies between the SMS and federal water quality regulations and rules;
- the failure to fully and effectively address human health concerns in the rule, including the failure to adopt a more protective fish consumption rate and the inclusion of exposure parameters that do not protect high fish consumers; and
- the use of inappropriate baselines and metrics such as regional background and analytical quantitation limits to define protectiveness

741 **1. <u>SMS must be consistent with federal rules regulation and policies</u>**

Ecology decided to promulgate Part V of the SMS under MTCA authority only, creating inconsistency both within the rule itself (only Part V is promulgated under MTCA authority only) and with federal water quality regulations. Although the management and quality of sediments, as embodied in the entire SMS rule, are recognized as directly linked to the health of aquatic ecosystems and the protection of designated uses, Ecology's decision separates sediment cleanup standards from the rest of the SMS rule, divorces sediment standards from water quality criteria, and seeks to avoid the federal review and approval process. This is not a purely state issue.

Changes in the SMS propose metrics and baselines for establishing cleanup standards that are not protective of human health and the environment. Rather they are based on background areas that have received some impacts from chemical contamination and quantitation limits that are subject to technical and cost constraints. These proposed metrics may have a negative modifying effect on water quality standards. Under the CWA, EPA is obligated to review those laws and standards which have the effect of modifying water quality standards or undermining implementation of those standards.

1 This letter, however, does not address all of the Tribe's concerns

741 cont. **The SMS, in its entirety, must be harmonized with Washington's Surface Water Quality Standards and receive federal EPA approval in order to ensure that proposed rules protect designated uses and do not undermine the water quality standards or the federal Clean Water Act.**

742 **2. SMS must address human health concerns related to fish consumption**

Ecology has known for years that the current fish consumption rates (fcr) used as the basis for the SMS, and WQS, do not protect Washington residents – and that tribal communities are at particular risk of toxic exposure because of their traditionally high consumption rates. Despite this awareness, and in spite of a commitment to tribes to revise the current rates, Ecology did not recommend a default rate or range of rates and has instead proposed that fish consumption rates be determined on a site-by-site basis, using a Reasonable Maximum Exposure (RME) approach.

Failure to adopt a default rate or range of rates has resulted in proposed amendments that specify numeric standards that are only protective of benthic organisms; they do not include numeric standards related to human health or bioaccumulative contaminants. Without a way to develop even screening level human health criteria, there is no simple method to identify contaminated sites, provide preliminary public health information, screen remedial alternatives, evaluate the need for sediment impact and recovery zones, and monitor progress towards long-term compliance based on human health concerns.

743 By providing only for a site-by-site approach, the proposed amendments ensure that all sites are complex, and expensive. As with the federal Superfund process, the path from site identification to recovery may take decades. By having to reinvent the wheel for every site, the limited resources of tribes and other communities, as well as the Department of Ecology, will be severely strained. Critical decisions regarding cleanup objectives and remediation levels may be decided according to who has the most time and money to spend, rather than what should be done to protect human health and the environment.

An RME approach is appropriate for establishing risk-based levels for complex sites. While the proposed amendments recognize that tribal members are likely to have higher rates of exposure via seafood consumption, and incorporate tribal exposure in the RME approach, they do not go far enough in specifying consultation with impacted tribes to determine risk assessment assumptions and parameters. Numerous studies and surveys, including the August 2000 *Fish Consumption Survey of the Suquamish Indian Tribe Of The Port Madison Indian*

743 cont. *Reservation, Puget Sound Region* and the dietary survey recently completed by the Lummi Tribe, document that site-specific rates may be considerably higher than any default rate or range of rates proposed to date. It must also be recognized that current tribal consumption rates are likely to be suppressed. According to the Suquamish survey, some tribal members have reduced or changed their consumption practices due to pollution and related restrictions and regulations concerning harvesting. As tribes focus efforts to improve sediment and water quality and to restore habitats, it is reasonable and prudent that tribes expect their members to increase fish consumption rates consistent with traditional practices. The RME approach must provide protection for these future as well as current uses and must specify tribal consultation in developing RME scenarios

Although an RME approach incorporating tribal exposures has the stated intent of protecting high end fish consumers, it is undermined by a series of additional considerations and parameter adjustments that can be used to modify the exposure scenarios, resulting in risk calculations that seem less risky. Ecology justifies these modifications as a way to estimate the portion of cumulative risk attributable to a specific site. Given that sediment sites, and the organisms impacted by contamination, are not usually physically separated from the surrounding environment, such modifications seem unwarranted in an RME approach. They serve only to limit the liability of potentially responsible parties. These modifications are not protective of tribal populations who obtain or would like to obtain, most or all of their fish and shellfish from local sources and who have reserved the legal right to do so in perpetuity.

The Suquamish Tribe has submitted two formal letters commenting on human health concerns related to fish consumption. The Tribe again recommends that Ecology establish a default fish consumption rate, or range of rates, based on current data, as a significant step forward in developing human health criteria that are protective of all Washington residents.

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744 **Furthermore, the Tribe recommends that the proposed RME approach be revised to explicitly state that site-specific consumption rates will be determined in consultation with impacted tribe(s) and will be based on tribal surveys that are determined by the tribe(s) to be most representative of current and/or future tribal uses. Other risk assessment parameters and assumptions, such as exposure duration, fraction ingested, site use factors, or exclusion of salmon or other species, should not be used to undermine tribal exposure scenarios within an RME approach. These parameters should be established to be protective of treaty rights and should promote consistent site management decisions. Treaty-reserved rights to safely access and harvest seafood are legal obligations and tribes reasonably expect that harvest will increase as water quality and habitats improve.**

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745 **3. <u>SMS must be protective of human health and the environment</u>**

The stated purpose of the SMS rule is to "reduce and ultimately eliminate adverse effects on biological resources and significant health threats to humans from surface sediment contamination". A sediment cleanup level (SCL) is then defined as the concentration or level of biological effects for a contaminant in sediment that is determined by the department to be protective of human health and the environment. Consequently, how the department defines protectiveness related to SCLs becomes central to the effectiveness of the rule itself.

Unfortunately, although protectiveness may begin as actual risk-based or effect-based standards, the proposed amendments quickly move to "adjust" SCLs upward, if natural background concentrations or the practical quantitation limits (PQLs) are higher. SCLs may be further adjusted upward if the department determines that regional background concentrations are to be considered rather than natural background concentrations. All of these adjustments move away from protectiveness, as defined by a reduction or elimination of adverse biological effects or human health risk.

746 The use of natural background to condition SCLs may appear logical when applied to naturally occurring substances such as metals and radionuclides that naturally occur in the bedrock, sediment and soil of Washington State due solely to the geological processes that formed these materials. The proposed amendments, however, re-define natural to include low concentrations of some particularly persistent organic compounds such as polychlorinated biphenyls (PCBs) that can be found in surficial soils and sediments throughout much of the state due to global distribution of these hazardous substances. By considering current concentrations of contaminants such as PCBs to be "natural", the baseline for remedial decisions shifts upward permanently. In addition, it is important to acknowledge that Ecology does not have an adequate data base to establish current conditions as reflected in sediment or tissue. Given the lack of resources to fund new state projects, it is difficult to imagine that this data will be collected or adequately developed for programmatic use when the revised rule is implemented. This data base will be crucial to the regulatory decision-making process. It must be scientifically sound, comprehensive and regularly updated and validated. It cannot be left to potentially responsible parties as a piecemeal effort.

747 The use of PQLs and the regional background concept as applied to SCLs are even more troublesome. PQLs have nothing to do with environmental conditions; they relate only to the limitations of analytical equipment and methods. It is also worth noting that Ecology's guidance for determining PQLs does not insist that the most accurate methods or the best technologies be used. While it is important to recognize the limitations of our technology, PQLs are not a true metric of protectiveness.

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748 Similarly, regional background is not a true baseline for measuring protectiveness. As defined within the SMS rule, regional background is the concentration of a contaminant within a department-defined geographical area that is primarily attributable to atmospheric deposition or diffuse nonpoint sources. Regional background concentrations are assumed to be higher than natural background concentrations and include substances known to produce harm. Regional background incorporates impaired conditions that may already represent a threat to human health or the environment. Re-setting the baseline does not reduce or eliminate adverse biological effects or human health risks, it obscures them.

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749 The proposed rule language states that sediment cleanup actions that achieve the sediment cleanup levels at the applicable points of compliance are presumed to be protective of human health and the environment. It does not differentiate between sediment cleanup levels that are risk- or effect-based and those that have been "adjusted". The proposed rule language also states that final liability settlements will be made if sediment cleanup levels are attained, whether or not those levels are truly protective of human health and the environment. This back-sliding approach will affect any gains that have been made to restore and improve both sediment and water quality conditions in Puget Sound and other impacted areas that affect not only state interests, but disproportionately affect tribal interests.

The SMS rule language needs to be clarified to distinguish between cleanup levels that are protective, those that are technically achievable or practicable, and those that may be simply expeditious. Natural background needs to be defined as naturally occurring, non-anthropogenically influenced conditions. PQLs and regional background cannot be considered metrics of protectiveness and final liability settlements that meet cleanup levels based on impaired background conditions or analytical limitations cannot be presumed to be protective. Rather than adjusting cleanup levels upward, Ecology needs to demonstrate to the citizens of Washington how it will meet the objective of reducing and ultimately eliminating adverse effects on biological resources and significant health threats to humans from surface sediment contamination.

As a co-manager of natural resources with the State of Washington, the issues raised above are not taken lightly. The Tribe will continue to engage with Ecology on a government-to-government basis to provide additional input as revisions to the SMS rule are made. From a government-to-government perspective, it is the Tribe's expectation that Ecology will give meaningful consideration to these comments, as well as comments submitted by NWIFC and other tribes. If you have any questions, please contact me at 360-394-8449 at your convenience.

Respectfully,

Denice Taylor

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Swinomish Indian Tribal Community

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October 29, 2012

Ted Sturdevant, Director
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ATTN: Toxic Cleanup Program

RE: Comments on proposed amendments to Sediment Management Standards

In order to meet the intent of the Model Toxics Control Act, the Clean Water Act, and other relevant environmental laws, the Sediment Management Standards (SMS) require a fundamental shift from how industry can meet the requirements to protecting the health of Washington State's citizens and natural resources. The proposed amendments would jeopardize Tribal Treaty-reserved fishing rights by promulgating inadequate standards for toxic discharge and cleanup. Our comments here echo comments by many other Tribes and can be categorized in the following manner: 1) failure to include a default fish consumption rate; 2) provisions that undermine protective standards in ways that pose an unacceptable risk to human health, particularly for Tribes; 3) definitions, objectives, and procedures that unacceptably lower cleanup requirements; and 4) inconsistency with other regulatory requirements, such as the Federal Clean Water Act.

750 1. Employ a Default Fish Consumption Rate at or above 175 gpd.

In comments submitted to the record in January 2012 and again on October 26, 2012, Swinomish stated that a state-wide default fish consumption rate (FCR) is necessary in order to protect the health and welfare of all Washington State citizens who eat fish. We recommended, and recommend here again, that Washington adopt 175 gpd, which covers all species of fish and shellfish, including salmon. The Affiliated Tribes of Northwest Indians passed Resolution #12-54 at the 2012 Annual Convention calling for a fish consumption rate of no less than 175 gpd for human health criteria rulemaking in the Pacific Northwest (www.atnitribes.org/sites/default/files/res_12_54.pdf). As a member Tribe of ATNI, we stand by this Resolution. Oregon has taken the lead and approved the 175 gpd rate. In addition, Tribal comments on the 2011 version of the Technical Support Document indicated that the proposed

750 cont. range of 157-267 grams per day, which was recommended by Ecology's technical staff, represented a "step forward"-- even though it did not fully address the suppression of fish consumption from historical levels. Furthermore, Tribes supported the position, put forth by Ecology, that it was important to have a consistent fish consumption rate in the state's SMS and water quality standards for regulatory purposes.

Instead of the step forward, and despite previous commitments, Ecology has taken a leap backwards by retreating from the establishment of a default fish consumption rate in rule. Ecology leaves the FCR and other crucial parameters up for grabs, to be determined at each site. This site-specific approach guarantees that actual cleanup will be delayed while PLPs maneuver for lenient interpretations of the FCR and other exposure parameters.

Ecology will have the burden of rehashing the science and policy debate at every site, thereby wasting significant taxpayer resources, resources that would be more productively used for cleanup. Additionally, the site-by-site approach puts Tribes and small communities at a disadvantage, since they will bear the burden of fighting to secure protective standards for each site that impacts them. The effort is likely to outstrip resources available to the Tribes, leaving less protective requirements in place and perpetuating existing environmental injustice to the Tribes and other groups who consume large amounts of fish. **A state-wide default fish consumption rate of 175 gpd must be included in the SMS in order to adequately protect the health and welfare of all Washington citizens who eat fish, including salmon.**

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751 2. Reasonable Maximum Exposure parameters must protect the health of Tribal fish consumers at historical, current and future levels.

The proposed SMS state that cleanup levels will be set to protect those Washingtonians who are most exposed, given "historical, current, and future tribal use of fish and shellfish." The proposed SMS protections thus incorporate the concept of Reasonable Maximum Exposure (RME). The RME concept in the SMS is correct in recognizing that Tribes have relied on natural resources here for thousands of years, and that Tribal members are likely to be among the most exposed to potential contaminants natural resources. However, the proposed SMS then provide tools to undermine protection of human health by: a) portions of the SMS do not reference Tribes; b) the standards fail to incorporate provisions that protect future users and high consuming Tribal members; c) the Fish Diet Fraction is used to whittle down the fish consumption rate by setting standards site by site; and, d) the Site Use Factor reduces protective requirements by establishing rates for individual species' use of individual sites. **Section 173-204-561 parts A through D must be revised to clearly reference Tribal consumption throughout, including future use, and to ensure that high consumption opportunities for all species throughout all Tribal treaty fishing areas are maintained.**

752
a. The proposed SMS allow Ecology to substitute an "alternate" exposure scenario for the RME, by reference to a process that makes no mention of the word "Tribal." Again, this possibility leaves Tribes to fight to secure their protection at each site. **Any site in a Tribal usual and accustomed area must have an RME based on Tribal exposure scenarios.**

b. Reasonable Maximum Exposure is intended to reflect actual exposures of real people under realistic present or future conditions. Tribal dietary studies of fish consumption are neither hypothetical nor unrealistic—they are scientifically sound, peer-reviewed dietary studies of Tribal members who consume predominantly locally-harvested fish.

752 cont. Ecology intends to establish exposure parameters based on a mix of high-end and average values. An RME for Tribes must reflect high-end fish consumers, as Tribes live here and harvest and consume fish for our entire lives. Moreover, Tribal exposure scenarios must include future, restored conditions of fish consumption at unsuppressed, historical or “heritage” rates, as Tribes are legally entitled to by Treaties with the United States Federal Government. **SMS section 173-204-561 must reference future consumption scenarios as well as current.**

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753 c. Fish Diet Fraction: The proposed SMS and the SMS guidance anticipate that the FCR reflecting a “Tribal RME individual” may effectively be reduced by a regulatory concept called the Fish Diet Fraction (FDF). FDF is the portion of a person’s diet that “is obtained from the site or the general vicinity of the site.” A Fish Diet Fraction is applied to the applicable fish consumption rate; a FDF of 1.0 means no reduction to the FCR. However, Ecology includes provisions to reduce the FCR if the site is small or the habitat will not support sustainable quantities of the species at the determined FCR. Yet this fails to assess the Fish Diet Fraction factor in the context of harvest at multiple sites, exposing Tribal members to potential risk. **There is no justification for the application of a Fish Diet Fraction less than 1.0 in areas where Tribes historically, currently, or potentially harvest fish and shellfish without posing an unacceptable risk of exceeding safe levels of exposure.**

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754 d. Site Use Factor: Another tool that is being used to reduce the protective level of SMS requirements is the Site Use Factor. The SUF refers to the percentage of time that a fish/shellfish is in contact with contaminants at the site based on the species’ life history and home range. Ecology’s proposed standards not only fail to look at consumption in the aggregate of contaminated sites, they attempt to further slice up the required level of site cleanup by separating by species, size of the site, and time of exposure. There is no scientific way to assess how much time a species has spent at a site or how much chemical burden a species has picked up in any specific geographic area, thus a SUF is subjective and variable. Additionally, bioaccumulation varies species to species, life-stage to life-stage, and within the array of life history strategies of a single species, which may or may not migrate beyond the vicinity of the contaminated site. The Site Use Factor also fails to account for situations where contaminants are dispersed, resuspended, or transported to areas beyond the boundaries of a specific site. **In summary, there is no justification for the application of a Site Use Factor less than 1.0 in areas where Tribes historically, currently, or potentially harvest fish and shellfish without posing an unacceptable risk of exceeding safe exposure levels. The concept of applying a Site Use Factor using the concept of a fraction of the home range or the estimated duration of contact with a site should be eliminated from the SMS.**

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755 3. Sediment cleanup objectives, definitions, and standards should be structured toward actually cleaning up contaminated aquatic environments.

The proposed Sediment Management Standards include several provisions that serve to reduce the burden of cleanup for Potentially Liable Persons, through low Sediment Cleanup Objectives. The Sediment Cleanup Objectives are set at the **least** stringent of several potential tests: practicable cleanup levels, the use of “natural” background levels that reflect existing contamination, “regional” background levels, and Practical Quantitative Limits (PQLs) which represent the median level of contaminants detectable with present technology. The low bar set by these definitions and objectives will mean that PLP’s can walk away from contaminated sites without fully cleaning them up, and Washington residents will live with contaminated sites

755 cont. in perpetuity. The cleanup standards are particularly problematic when considering highly potent carcinogens such as dioxin, and high fish consuming people, such as Tribes.

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756 a. Practicable versus possible cleanup levels: The SMS allows Ecology to establish a site-specific cleanup level which permits higher concentrations of contaminants than what would be protective of human and ecological risk. The SMS indicate that the cleanup level be set "as close as practicable to the Sediment Cleanup Objective (SCO) based on technical possibility and adverse environmental impacts." The definition of "practicable" is thus an essential element of cleanup requirements, and unfortunately is not defined in terms of best efforts and technology. " 'Practicable' means able to be completed in consideration of environmental effects, technical feasibility and cost." While it may be appropriate to recognize some basis for permitting contamination to remain at a cleanup site in amounts that exceed the SCO, at least on an interim basis, the proposed SMS authorize inappropriate factors, such as cost, as well, with the result that human and ecological health can be sacrificed in the name of providing cheaper cleanups. **Do not include language in the SMS that allows cleanups to be based on the least expensive option and regardless of the amount of contamination remaining.**

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757 b. Natural Background: The proposed SMS state that " 'natural background' means the concentration of a hazardous substance consistently present in the environment that has not been influenced by localized human activities." For example, several metals and radionuclides naturally occur in the bedrock, sediment, and soil of Washington State due solely to the geologic processes that formed these materials, and the concentration of these hazardous substances would be considered natural background. Also low concentrations of some particularly persistent organic compounds such as polychlorinated biphenyls (PCBs) can be found in surficial soils and sediment throughout much of the state due to global distribution of these hazardous substances. These low concentrations would be considered natural background, as would radionuclides. While it makes sense to refer to substances that "naturally occur" "due solely to the geologic processes that formed these materials" as natural background, the remainder of Ecology's definition warps the word "natural." Moreover, if Ecology is permitted to redefine natural background in this manner, it will alter our environmental baseline forever. If the "new natural" includes PCBs, all cleanups going forward will aim, at best, to reduce contamination to this new (contaminated) baseline. **Natural background definitions should be limited to natural, non-anthropogenic inputs, and not include widespread persistent contaminants introduced by human activities.**

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758 **c.** "Regional Background" refers to the level of current contamination present in the area—a vague geographic definition that is particularly confusing in combination with the unnatural definition of natural background. "Regional background" is vaguely defined as "the concentration of a contaminant within a department-defined geographic area that is primarily attributable to diffuse nonpoint sources, such as atmospheric deposition or storm water, not attributable to a specific source or release." Discretion in applying this definition is left to Ecology with little specific guidance. Unfortunately, experience suggests that Ecology is prepared to consider areas that harbor significant contamination to serve as reference points for determining this sort of "regional background." Moreover, the remainder of the definition incorporates significant ongoing contamination (e.g., from nonpoint sources such as storm water) and raises the possibility that cleanup requirements will spiral continually downward to less stringent levels as the regional background level deteriorates, similar to the definition of natural background. **The difference between natural background, area**

758 cont. **background, and regional background and the need for these distinctions should be clarified and guidance specified.**

Former members of the SMS advisory group indicate that the concept of "Regional Background" was intended to offer incentive for cleanup in an area that has been polluted by multiple sources, instead of waiting until all parties can enact the cleanup at once. However, the regional background definition does not make sense in light of pollution from stormwater and in tidally influenced areas, and further compounds the inconsistencies between SMS and Surface Water Quality Standards. **The SMS should reject the regional background definition, or at least clarify that it is an interim standard to be used only in remediation.**

759 d. Practical Quantitative Limits: The proposed SMS recognize that, for some pollutants, concentrations that are protective of human health and the environment are at levels lower than the limits of current detection capabilities. **However, existing lab capabilities are not appropriate as a standard to use as a Sediment Cleanup Objective.**

760 Ecology compounds this unacceptable use of lab techniques as standards, by determining PQLs as the median of current lab results, rather than the higher levels of detection. This strategy rewards mediocrity and fails to encourage improvements in detection technology, especially when used as a cleanup standard. Ecology also commits to reevaluate the PQL only every 3-5 years, removing incentives for more rapid improvements in detection technology by private labs. While it is appropriate to recognize current limitations on our ability to detect contaminants in the environment, Ecology's approach punishes technological innovation and improvement and permits our cleanup standards to lag behind what is actually achievable – to the detriment of human and ecological health. **PQL is not appropriate as a standard, and should be structured to provide incentive for better testing methodology.** More discussion of the PQL issue is included in the Addendum to this letter.

761 <u>4. Regulatory requirements need to be consistent within the Sediment Management Standards, with State and Federal Surface Water Quality Standards, and with other local and Tribal governments' standards.</u>

a. **The Sediment Management Standards must be reviewed under the provisions of the Clean Water Act**.
The separation of the sediment management standards from water quality standards is unprecedented. The standards are inconsistent and lead to arbitrary procedures and the lack of protection for human health in freshwater and marine environments. The SMS should be reviewed and cross-referenced to State water pollution control standards, and the applicability of both the Clean Water Act and Model Toxics Control Act should be specified. The proposed updates to the SMS constitute an update to water quality standards and as such must be reviewed by the Environmental Protection Agency. Tribes have already asked EPA to consider the SMS standards as WQ standards and that they be subject to EPA approval (letter to Bussell, 9/7/12).

b. **The Sediment Management Standards should specify provisions for applying water quality standards and requirements on a consistent basis.** The preamble of the SMS rule cites the State Water Pollution Control Act as generally applicable, but section 500 is split out as being relevant only to the Model Toxics Control Act. Rule language should add water quality requirements in section 500 or copy 500 to 300 to be consistent.

761 cont. Another inconsistency in the SMS is the applicability of water quality standards between freshwater and marine/ estuarine environments. Freshwater tables in the SMS rule are not being promulgated as WQ standards, but marine and estuarine waters are. Consistency is needed between freshwater and marine/estuarine environments as WQ standards so that Ecology can add areas to the 303d list of impaired water bodies and take action as necessary. Additionally, given that rivers are sources of sediment for marine and estuarine areas, the freshwater numbers should apply as WQ standards. Unlike freshwater, marine/estuarine site cleanup standards are determined based on ecological risk./ Under the proposed standards, freshwater environments are evaluated
762 for aquatic life, but not for human health. This approach is inconsistent—if standards apply to insects and benthic organisms, they should apply to fish and human health. The differences in the applicability of standards put the burden of proof on those who are seeking to protect human health. It is inappropriate to leave it to the discretion of the site manager to choose which standards apply.

763 **c. Federal, State, local and Tribal requirements should be applicable.**
The proposed SMS refer to risk levels for marine and benthic organisms, human health, ecological bioaccumulative health, or standards set by other governmental entities. The last of these are known as "applicable, relevant, and appropriate requirements" or ARAR's. Both MTCA and the federal Superfund cleanup law provide for multiple governmental requirements, but MTCA fails to include the requirements of Tribal governments. This omission is repeated by the SMS, as it states that only local, state, and federal laws are considered applicable. **Tribes, like other governments, can and do enact standards for environmental and human health protection, which should be incorporated in keeping with the intent of the Centennial Accord between the state of Washington and Tribes.**

764 **d. Periodic review and Tribal consultation requirements should be specified in the SMS.**
The proposed SMS make no effort to expand existing provisions for periodic review, and allow for review "if resources permit" five years after the initiation of a cleanup action. The SMS should contain specific review requirements with timelines, consultation requirements, and evaluation of implementation and effectiveness. Periodic reviews should also incorporate review of new technologies and information. The proposed standards provide few assurances that review and implementation of findings will occur on a timely basis.

Concluding Remarks

Tribes are working toward a future with restored ecosystems that support fisheries resources in abundant levels, with a variety of species that are safe to eat. Tribes thus have the intent, potential, and legal right to consume a mix of species of fish in the future. Many Tribal members would consume more fish and shellfish than they do at present, were these resources not depleted or contaminated.

The proposed amendments to the Sediment Management Standards fail to fully incorporate consideration of high fish consumption among Tribal members, and impact Treaty-reserved resources and Tribal health at unacceptable levels of risk. The SMS are primarily directed at cleanup of existing contamination. This is an important goal, but the Tribes remain committed to the prevention of future pollution of fish and shellfish through water quality standards. The Tribes are prepared to work with the Department of Ecology on the completion of toxic cleanup and water quality standards on a government-to-government basis to protect Tribal rights and the health of future generations.

Sincerely,

Brian Cladoosby, Chairman
Swinomish Indian Tribal Community

TransAlta Centralia Generation LLC
913 Big Hanaford Road
Centralia, Washington
USA 98531

(360) 736-9901
www.transalta.com

October 29, 2012

Ms. Martha Hankins
Toxics Cleanup Program
Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Re: Proposed Amendments to the Sediment Management Standards

Dear Ms. Hankins:

Thank you for the opportunity to comment on the Draft changes to the Department's Sediment Management Standards (SMS). These comments are being submitted on behalf of TransAlta Centralia Generation LLC and TransAlta Centralia Mining LLC. The comments presented here are general although some specific comments are referenced by chapter or section number in the draft document.

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765 Default Fish Consumption Rate

TransAlta supports the decision not to add a default fish consumption rate to the SMS rule. A default fish consumption rate is not appropriate to be included in the SMS rule as this rule is typically applied to unique cleanup actions.

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766 SMS Not Part of EPA Approved WQ Standards

TransAlta believes that the revisions to the SMS should be performed under the Washington MTCA rules and not the water quality standards. We support Ecology's decision not to request these changes be approved by EPA as a Water Quality Standards rule.

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767 Cleanup Time Frames

The proposed revisions significantly shorten the maximum restoration time frame for a cleanup. The Sediment Cleanup Advisory Committee considered and rejected the option of changing the rules from the current requirement that cleanup standards must be met within ten years following completion of cleanup, to requiring that cleanup standard must be met within ten years of initiating cleanup. The draft SMS proposal ignores the Committee's recommendation.

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768 TransAlta suggest that the next to last sentence of 173-204-200(46) be revised to read: "…within ten
years after the completion of the cleanup action." /The last sentence of this subsection referring to
769 sediment recovery zones should be deleted. Subsection 173-204-570(5)(b) should also be deleted to
be consistent.

Please feel free to contact me at (360) 807-8031 or at brian_brazil@TransAlta.com if you have any questions related to these comments.

Sincerely,

Brian Brazil
Environmental Manager
TransAlta Centralia Generation

THE TULALIP TRIBES

6406 Marine Dr. TULALIP, WA 98271
Phone (360) 716-4000
FAX (360) 716-0606

The Tulalip Tribes are the successors in interest to the Snohomish, Snoqualmie, and Skykomish tribes and other tribes and bands signatory to the Treaty of Point Elliot

October 26, 2012

Washington Dept. of Ecology
Toxics Cleanup Program
PO Box 47600
Olympia, WA 98504-7600

Dear Sir or Madam,

Sixteen years ago the Tulalip Tribes, together with the Squaxin Island Tribe, published the results of our fish consumption survey, indicating that our tribal members consume, despite diminished and less accessible populations of fish and shellfish, dramatically higher amounts of fish than is assumed under the State of Washington's current rate of approximately 6.5 grams/day. Fish have been an integral part of our traditional diet for a very long period of time. It does not surprise us that modern health experts have become so aware of the importance of fish in contributing to the health of the general public, and recommend that it be consumed in significant quantities by all.

For Tulalip, as with many other tribes across the country, rates of diabetes, obesity and other chronic diseases have become epidemic among our people. In an effort to combat these alarming health trends, we have established several tribal programs aimed at encouraging individual tribal members to return to a healthier diet, including a diet richer in traditional foods -- in our area that means a lot of fish and shellfish. We want to be able to eat fish at levels that are more consistent with our traditional diet and what public health experts recommend.

It is unfortunate that Ecology appears to have bowed to pressure from industry in revising its sediment management standards (SMS). With these proposed amendments, Ecology is failing its mission "to promote the wise management of our air, land and water for the benefit of current and future generations." Ecology fails to establish a default fish consumption rate (FCR) that is consistent for SMS and water quality standards. It arbitrarily separates SMS from water quality standards. Further, the details of these amendments slant definitions and exposure scenarios in favor of Potentially Liable Parties (PLP), to the detriment of tribal individuals and future generations.

770 Two years ago, Ecology asked that tribes wait until a numeric default FCR was established in the state's sediment management standards for toxic cleanup. However with these amendments, Ecology does not include a default FCR in the revised sediment management standards. Ecology steps backwards by allowing a site-specific approach that requires tribes to negotiate fish consumption rates and other critical parameters

770 cont. with PLP's for every contaminated sediment site in their usual and accustomed fishing areas (U&As). Tulalip tribal members fish from Point Roberts down to Seattle, encompassing approximately1800 sq. miles of marine waters influenced by 2,629 sq. miles of freshwater inputs. This piecemeal approach stretches tribal staff and resources, and does not allow for a comprehensive review of impact on individual tribal members, who may fish predominantly in only one or two locations. Their exposure risk is discounted by the "alternate" exposure scenarios, such Fish Diet Fraction and Site Use Factors.

Reasonable Maximum Exposure is intended to reflect actual exposures of real people under realistic present or future conditions. Tribal dietary studies of fish consumption are neither hypothetical nor unrealistic—they are scientifically-designed, peer-reviewed dietary studies of tribal members who consume primarily locally-harvested fish. In these amendments, Ecology includes provisions to reduce the FCR if the site is small or the habitat will not support sustainable quantities of the species at the determined FCR. If an individual fishes at a site within the Tribes' U&A that only produces 10% of the total Tulalip catch and that site has contaminated sediment, the exposure scenario could falsely assume that only 10% of fish that an individual consumes has x grams of PCBs. When in reality, that individually could get 80% of all fish that he or she consumes from that one area. There is no justification for the application of a Fish Diet Fraction less than 1.0 in areas where tribes historically, currently, or potentially harvest fish and shellfish. Any exposure factor less than 1.0 poses an unacceptable risk to individual tribal members.

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771 Another tool that reduces the protective level of SMS requirements is the Site Use Factor (SUF). The SUF refers to the percentage of time that a fish/shellfish is in contact with contaminants at the site based on the species' life history and home range. Ecology's proposed standards not only fail to look at consumption in the aggregate of contaminated sites, they attempt to further slice up the required level of site clean-up by separating by species, size of the site, and time of exposure. There is no scientific way to assess how much time a species has spent at a site or how much chemical burden a species has picked up in any specific geographic area, thus a site use factor is subjective and variable. Therefore, there is no justification for the application of a Site Use Factor less than 1.0 in areas where tribes historically, currently, or potentially harvest fish and shellfish without posing unacceptable risk of exceeding safe exposure levels. The concept of applying a Site Use Factor using the concept of a fraction of the home range or the estimated duration of contact with a site should be eliminated from the SMS.

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772 Ecology must re-examine its definition of "natural background." The very contaminants that tend to bioaccumulate in fish tissue, like PCBs and Mercury, are persistent throughout the environment due to their distribution and deposition. While it makes sense to refer to substances that "*naturally occur* due solely to the geologic processes that formed these materials" as natural background, the remainder of Ecology's definition warps the word "natural." Moreover, if Ecology is permitted to redefine natural background in this manner, it will alter our environmental baseline forever. If the "new natural" includes PCBs, all cleanups going forward will aim, at best, to reduce contamination to this new (contaminated) baseline. Natural background definitions should be limited to natural, not to include widespread persistent contaminants introduced by human activities.

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773 The separation of the sediment management standards from water quality standards is unprecedented. Water quality and sediment quality are inexorably linked together. The SMS should be reviewed as and cross referenced to state water pollution control standards, and the applicability of both the Clean Water Act and Model Toxics Control Act should be specified.

773 Another inconsistency in the SMS is the applicability of water quality standards between freshwater and
cont. marine/ estuarine environments. Freshwater tables in the SMS rule are not being promulgated as water quality standards, but marine and estuarine waters are. Consistency is needed between freshwater and marine/estuarine environments as water quality standards so that Ecology can add areas to the 303d list of impaired water bodies and take action as necessary. Additionally, given that rivers are sources of sediment for marine and estuarine areas, the freshwater numbers should apply as water quality standards./ Unlike
774 freshwater, marine/estuarine site cleanup standards are determined based on ecological risk. Under the proposed standards, freshwater environments are evaluated for aquatic life, but not for human health. This approach is inconsistent—if standards apply to insects and benthic organisms, they should apply to fish and human health. The differences in the applicability of the standards puts the burden of proof on those who are seeking to protect human health. It is inappropriate to leave it to the discretion of the site manager to choose which standards apply.

At treaty times, tribal members consumed all of their fish from local waters and still continue to obtain most of their fish from local sources. Tulalip Tribes' reserved rights under the treaties and other legal agreements entitle them to continue to do so in perpetuity. Many tribal members would consume more fish and shellfish than they do at present, were these resources not depleted or contaminated. We are working toward a future with restored ecosystems that support fisheries resources in abundant levels, with a variety of species that are safe to eat. We have the intent, potential, and legal right to consume a mix of species of fish in the future. Tulalip Tribes are prepared to work with the Department of Ecology on the completion of toxic cleanup and water quality standards on a government-to-government basis to protect tribal rights and the health of future generations.

775 The Tulalip Tribes fully support all the comments submitted by the Northwest Indian Fisheries Commission (NWIFC) regarding the revisions to the SMS/We remain committed to ensuring the revision and adoption of a new Fish Consumption Rate that is protective of our members' health, and again implore you to move forward expeditiously in the establishment and adoption of a new and accurate fish consumption rate for the State of Washington.

Sincerely,

Ray Fryberg, Sr.
Executive Director
Tulalip Tribes Natural and Cultural Resources Department

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NORTHWESTERN DIVISION
PO BOX 2870
PORTLAND OR 97208-2870

REPLY TO
ATTENTION OF

November 2, 2012

CENWD-PDS

Ms. Adrienne Dorrah
Toxics Cleanup Program
Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

Re: Sediment Management Standards (SMS) Rule Revisions

776 The U.S. Army Corps of Engineers (Corps) Northwestern Division is providing this letter in support of Washington Department of Ecology's (Ecology's) effort to promulgate the revised Sediment Standards as part of revisions to Washington's Sediment Management Standards. These comments include input from the Corps' Portland and Seattle District offices.

777 The Corps co-chairs the Regional Sediment Evaluation Team (RSET) with the US Environmental Protection Agency and works with other members including the US Fish and Wildlife Service, National Marine Fisheries Service, Washington Department of Ecology, Washington Department of Natural Resources, Oregon Department of Environmental Quality, and Idaho Department of Environmental Quality. The RSET is very interested in the outcome of the rulemaking process and especially in the development of screening levels for freshwater sediments. Upon completion of the rulemaking process for the Freshwater Sediment Standards (FSS), the RSET is considering incorporating the FSSs into the 2009 *Sediment Evaluation Framework for the Pacific Northwest* (SEF). The SEF guidance is used by the Corps' Portland, Seattle, and Walla Walla Districts and the other RSET member agencies to evaluate the suitability of sediment associated with dredging projects in the states of Washington, Oregon and Idaho to improve consistency between the Corps' navigation, regulatory, and environmental habitat restoration missions.

Application of the SEF guidance to Corps Civil Works and Regulatory projects helps to ensure that the aquatic placement of dredged material complies with federal requirements under §404 of the Clean Water Act (CWA) and §§102 and 103 of the Marine Protection, Research, and Sanctuaries Act. SEF dredged material suitability determinations are also used by the state water quality agencies[1] and the Services[2] to ensure that projects comply with state water quality standards under §401 of the CWA and §7 of the Endangered Species Act, respectively.

[1] In Washington, Oregon, and Idaho
[2] U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS)

777 cont. In 2003, Washington's FSSs were derived from a dataset of 276 paired bioassay-sediment chemistry samples, using the Floating Percentile Method. The 2003 FSSs were incorporated into the 2006 interim final version of the SEF as sediment quality values (SQVs). Since then, the dataset has more than doubled to include 648 paired bioassay-sediment chemistry samples. The State of Washington's FSSs will be greatly improved by using this more robust dataset and the public and peer review process will further strengthen their validity.

In addition, we are providing the attached general and technical comments to strengthen the rule and address some potential weaknesses related to Assessing Adverse Benthic Effects in Puget Sound.

Thank you for the opportunity to provide comment. A copy of this letter is being provided to Mr. James McMillian, Portland District, and Mr. David Kendall, Seattle District. If you have questions regarding this letter of support, please contact Eric Braun by telephone at (503) 808-3721 or email at eric.p.braun@usace.army.mil.

Sincerely,

Lori Rux, PhD, P.E.
Chief, Program Support Division

Enclosure

Corps of Engineers General and Technical Comments – Sediment Management Rule

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778 1) Recommend defining and describing the relationship or required action related to the similar terms used throughout the documents such as sediment cleanup level, sediment cleanup objective, sediment screening level, sediment quality standard, sediment cleanup standard.

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779 2) Recommend providing additional clarification on how the State envisions using the different standards and screening levels for cleanup actions and decisions when evaluating dredged material associated with navigation or other purposes and permit actions.

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780 3) Page 4. Recommend clarifying the discussion "Preliminary Cost-Benefit and Least Burdensome Alternative Analyses", Dredged Material for Marine Sediment. The rule currently states: "Ecology also estimated additional dredging costs for analysis at an average of $373,296 thousand for all proposed dredging projects over 20 years. The analyses supporting these conclusions can be found in section 3.9.1."

a. Is the estimated cost $373,289 thousand or actually just $373,289? The figure $373 (assume it was rounded) is used in another document.

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781 b. Is this an estimated cost for analysis or for dredging (and disposal)? The text in Sect 3.9.1 does not make it clear but the numbers in the tables appear to be associated with analysis costs.

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782 c. What is meant by "average of $373...over 20 years"? Is this the estimated total cost for all projects over that period (if so what is the average from), estimated "average" cost per project or per year or something different?

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783 4) Page 43. The discussion for non-Puget Sound marine sediment quality standards states "Reserved: The department shall determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this chapter." It would be helpful to provide guidance or a sense of how this would be determined or an indication whether they are likely to be drastically different from the Puget Sound numbers.

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784 5) Page 44, line 586-587. When normalizing chemical data on a total organic carbon basis, there should be Total Organic Carbon (TOC) acceptance ranges beyond which normalizing chemistry data on a total organic carbon basis does not make sense. When TOC is below 0.5 % or above 3.5 %, representing data on a carbon normalizing basis inflates contamination concerns, on the lower TOC end (< 0.5%), and masks contamination at the higher TOC concentrations (>3.5%). In those instances, it would be prudent to use dry weight concentrations in lieu of carbon normalized concentrations when evaluating contamination concerns relative to SMS cleanup standards.

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785 6) Page 47, line 622-625. We recommend that Ecology develop a more technically robust endpoint for measuring benthic effects impacts based on the following documented studies which were undertaken to refine the benthic endpoint:

a. Recommendations for Assessing Adverse Benthic Effects in Puget Sound. Prepared for the Washington Department of Ecology by PTI Environmental Services, May 1993.
b. Task 3 Report: Evaluation and Recommendation of Revised SMS Benthic Infaunal Sediment Standards. Prepared for Washington Department of Ecology by WESTON Consultants, December 1995.
c. Development of Reference Value Ranges for Benthic Infauna Assessment Endpoints in Puget Sound. Prepared for the Washington Department of Ecology by Striplin Environmental Associates, Inc., January 30, 1996.

785 cont.

d. Puget Sound Reference Value Project, Task 3: Development of Benthic Effects Sediment Quality Standards. Prepared for Washington Department of Ecology by Striplin Environmental Associates, Inc. and Roy F. Weston, Inc., April 1999.

e. Peer Review of Ecology's Proposed Benthic Assessment Methods and Endpoints for use in Regulatory Decisions, Responsiveness Summary. Prepared for Washington State Department of Ecology/Toxics Cleanup Program by Striplin Environmental Associates, Inc. and MER Consulting, September 2000.

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786 7) Page 62, line 895-896. The reference: Users Manual For Dredged Material Management in Puget Sound, November 1990, prepared by PTI, was never adopted or used by PSDDA now DMMP. The DMMP agencies developed a Users' Manual entitled: Dredged Material Evaluation and Disposal Procedures (Users' Manual), prepared by the Dredged Material Management Office, Seattle District in coordination with the DMMP agencies (http://www.nws.usace.army.mil/Missions/CivilWorks/Dredging/UsersManual.aspx).

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787 8) Page 1XV, line 944, Table 1 – Puget Sound Reference Total Organic Carbon Values. Please verify the value for Total Organic Carbon specified (2.6 % TOC) for the 80-100% Silt-Clay Particles, which appears to be out of line with the other data depicted in table (e.g., 0-20% = 0.5% TOC, 20-50% = 1.7% TOC, and 50-80% = 3.2% TOC).

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788 9) Page clvi, Table V. The inequality sign in the cleanup screening level for the bivalve/echinoderm abnormality/mortality bioassays needs to be changed from greater than (>) to less than (<).

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789 10) Page clvi, Table V. Recommend establishing a performance standard for the reference sediment in the bivalve/echinoderm abnormality/mortality bioassay. DMMP requires that normal survivorship in the reference be at least 65% of that in the seawater control at the end of the test. Reference sediments failing to meet this performance standard are rejected for use in determining the suitability of dredged material for open-water disposal.

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790 11) Page clx, line 2666. Change 'affects' to 'effects'.

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791 12) Page clxvii, Table VIII. For clarity and consistency, the reference performance standard for the *Chironomus* 10-day and 20-day growth tests should be changed from RF/CF to MIG_R/MIC_C.

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792 13) Page clxix, lines 2791 to 2793. The double-negative in this sentence doesn't appear to be correct.

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793 14) Page clxix, lines 2800 to 2802. Recommend revising or adding language to clarify these statements. How can a significant disruption of normal behavior patterns be considered a minor adverse effect? Also, why would a significant disruption be required for T&E species, but only impairment for other species? And what is the difference between significant disruption and impairment?

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794 15) Page clxxvi, line 2935. It's not clear why dredging and disposal at an open water disposal site is an option for a cleanup action, unless there is incidental dredging and disposal of clean material associated with a cleanup action.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
620 SW Main Street, Suite 201
Portland, Oregon 97205-3026

Electronically Filed

October 29, 2012

Adrienne Dorrah
Toxics Cleanup Program
PO Box 47600
Olympia, WA
98504-7600

Subject: COMMENTS – **Washington Department of Ecology Proposed SMS Rule Amendments**

Dear Ms. Dorrah:

The U.S. Department of the Interior (Department) has reviewed the Washington Department of Ecology (Ecology) Draft Sediment Management Standards (SMS) Rule Proposed Amendments - Chapter 173-204 WAC (Dated August 15, 2012); Development of Benthic SQVs for Washington, Oregon, and Idaho (Ecology 2011); and the Review Comment and Responses for the Sediment Management Standards (SMS) Rule Revisions Freshwater Sediment Standards. The Department agrees that it is reasonable and appropriate to establish sediment management standards for freshwater sediments; however, it does not appear that the numerical SQVs that were developed as part of the Proposed SMS Rule Amendments will provide an adequate basis for managing contaminated sediments in Washington State or elsewhere in the Pacific Northwest.

Based on our review, the Department recommends that the following be incorporated or addressed prior to promulgating the Proposed SMS Rule Amendments:

- Revise the freshwater benthic criteria to ensure they are consistent with the narrative intent of the SQVs in that they provide for no adverse effects for the sediment cleanup objectives and minor adverse effects for the cleanup screening levels, as stated in WAC 173-204-563;
- Clarify the ecological bioaccumulation narrative to articulate the need to minimize adverse effects on wildlife species (WAC 173-204-564);
- Establish consistent procedures for developing regional background levels as part of the Proposed SMS Rule Amendments [WAC 173-204-560(5)];
- Eliminate the practical quantitation limit override included in the SMS two-tier framework and develop consistent guidance on the detection limits for chemicals of

potential concern (COPCs) at contaminated sites within the state [WAC 173-204-560(3) and (4)];

- Develop review and approval procedures for upward adjustment of the sediment cleanup level that includes meaningful consultation with affected government agencies; and,
- Include effective provisions for establishing sediment cleanup levels below the sediment cleanup objectives to ensure protection of sensitive, culturally important, and threatened and endangered species).

In addition, given our current understanding of the Proposed SMS Rule, we are concerned that these standards will not be protective of sensitive and federally listed species and their critical habitat. The Department recommends that the protectiveness of these standards to threatened and endangered species and their critical habitat, and other highly sensitive and special status species be assessed and reflected in the final rule. This assessment should address both direct effects to sediment dwelling invertebrates and indirect effects to other aquatic-dependent species exposed to sediments.

795 **Freshwater Benthic Criteria**

Section WAC 173-204-563 of the Proposed SMS Rule Amendments describes two types of sediment cleanup levels based on protection of the benthic community in freshwater sediments, including:

- Sediment cleanup objectives (SCOs); and,
- Cleanup screening levels (CSLs).

According to Section WAC 173-204-563(2a), the SCOs establish no adverse effect levels, including no acute or chronic adverse effects, on the benthic community. By comparison, the CSLs establish minor adverse effects levels, including minor acute or chronic effects, on the benthic community. The numerical criteria established for the SCOs and CSLs, as presented in Table VII of this section of the Proposed SMS Rule Amendments, were developed using a Floating Percentile Model (FPM) applied to matching sediment chemistry and benthic toxicity test data compiled for select sites located in Washington and Oregon. The concept of establishing numerical criteria that define the concentrations of COPCs that represent no and minor adverse effects on the benthic community is reasonable and appropriate; however, the numerical criteria presented in Table VII of the Proposed SMS Rule Amendments do not adequately define the concentrations of COPCs that correspond to no or minor adverse effects levels and therefore do not satisfy the narrative intent of the SCOs or CSLs, as required under Section WAC 173-204-563 of the Proposed SMS Rule Amendments. Accordingly, the proposed SCOs and CSLs will not provide an adequate basis for assessing or managing contaminated sediments in Washington State or elsewhere in the Pacific Northwest. The Department recommends that the freshwater benthic criteria be revised to ensure the criteria are consistent with the narrative intent of the SQVs (i.e., no adverse effects for the sediment cleanup objectives and minor adverse effects for the cleanup screening levels, as stated in WAC 173-204-563).

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796 Floating Percentile Model

The FPM that was used to derive the numerical criteria presented in Table VII of Section WAC 173-204-563 relies on matching sediment chemistry and sediment toxicity data from sites located in Washington and Oregon. The first step in the application of the FPM is determination of whether adverse biological effects are observed in each sample (referred to as a "hit" if toxicity is observed and a "no hit" if toxicity is not observed; Ecology 2011). Table VIII of Section WAC 173-204-563 describes the procedures that were applied by Ecology to determine if individual sediment samples used in the FPM were toxic (a hit) or not toxic (a no hit). These procedures are inappropriate relative to the narrative intent of the SCOs and CSLs for the following reasons:

1. In some cases, test acceptability was evaluated using reference performance standards. While Table VIII indicates that Ecology "shall use the most updated American Society for Testing and Materials and EPA protocols and performance standards", neither ASTM (2012) nor USEPA (2000) describe performance standards for freshwater reference sediment sites. Therefore, it is unclear what performance standards were applied when evaluating data for potential use in the derivation of numerical criteria;
2. The procedures described for normalizing response data for amphipods, *Hyalella azteca*, and midge, *Chironomus dilutus*, are incorrect for the mortality endpoint. Toxicity test results should be control normalized by dividing the response observed for a test sediment sample by the average response for the control treatment(s). Instead, the toxicity data for the mortality endpoint appears to be control normalized by subtracting the response for the control treatment from the response for a test sediment sample. This approach to control normalization biases the designation of sediment samples as toxic or not toxic in a way that results in fewer samples being designated as toxic to benthic invertebrates (see Figure 1). However, it does appear that the weight data for both species were correctly control normalized.

3. The adverse effects levels presented in Table VIII for interpreting the results of sediment toxicity tests are not consistent with the narrative intent of the SCOs in relation to describing no adverse effects (see attached Table 1). Specifically no adverse effects are reported when:

    - Midge survival (10-d toxicity test) <20% decrease compared to control;
    - Midge growth (10-d toxicity test) <20% decrease compared to control;
    - Amphipod survival (10-d toxicity test) <15% decrease compared to control; and,
    - Amphipod growth (28-d toxicity test) <25% decrease compared to control.

    Based on our experience in developing standard methods for toxicity testing (see USEPA 2000 and ASTM 2012), we believe the no adverse effects levels proposed by Ecology are much larger than appropriate for no adverse effects levels (see Ingersoll et al. 2005).

796 cont. 4. The adverse effects levels presented in Table VIII for interpreting the results of sediment toxicity tests are not consistent with the narrative intent of the CSLs in relation to describing minor adverse effects. Specifically minor adverse effects are reported when:

- Midge survival (10-d toxicity test) <30% decrease compared to control;
- Midge growth (10-d toxicity test) <30% decrease compared to control;
- Amphipod survival (10-d toxicity test) <25% decrease compared to control; and,
- Amphipod growth (28-d toxicity test) <40% decrease compared to control.

Based on the Department's experience in developing standard methods for toxicity testing, we believe the minor adverse effects levels proposed by Ecology are much larger than appropriate for minor adverse effects levels (see Ingersoll *et al.* 2005).

As an example of points 3 and 4 above, the Department conducted a comparison of effect values using a case study and presented results in the attached Tables 2 through 4. These tables present the results of toxic/not toxic designations for sediment samples from the Upper Columbia River using the reference envelope approach (the approach recommended by the Department for developing tolerance limits) and the approach that was used by Ecology (identified as the SMS SCO in Ecology 2011). A comparison of the number of samples designated as toxic using the two approaches for four toxicity test endpoints is presented in Table 4. Ecology has not demonstrated that such a magnitude of effect on growth as indicated in the tables represents no adverse effect in benthic invertebrates. The case study also demonstrates that application of the biological criteria for CSLs results in designation of even highly contaminated sediment samples as not toxic. The Departmental analyses presented in Tables 2, 3, and 4 demonstrate that application of such criteria only rarely identify toxic samples, and the sediment management standards proposed by Ecology are not sufficiently protective.

The Department recommends that Ecology revise the proposed SMS Rule Amendments to indicate that the acceptability of freshwater toxicity tests will be evaluated using the test acceptability criteria established by ASTM (2012) and USEPA (2000) for control samples. In addition, Table VIII should be revised to describe the widely accepted procedures for control normalizing toxicity test data. Finally, the adverse effect levels presented in Table VIII should be revised to reflect values that correspond to no adverse effects levels and minor adverse effect levels for benthic invertebrate communities.

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797 <u>Short-Term Toxicity Tests</u>

The results of short-term toxicity tests do not provide a basis for directly establishing numerical criteria consistent with the narrative intent of the SCOs and CSLs.

797 cont. Section WAC 173-204-563 of the Proposed SMS Rule Amendments indicates that the numerical criteria presented in Table VII (i.e., the sediment cleanup levels) were developed using sediment toxicity data. The five endpoints that were used in the FPM included:

- Amphipod 10-d mortality;
- Amphipod 28-d mortality;
- Amphipod 28-d growth;
- Midge 10-d mortality; and,
- Midge 10-d growth.

The data compiled for these five endpoints were used directly to derive the numerical SCOs and CSLs. While such data (if correctly interpreted to identify hits and no hits) are likely to provide some of the information needed to derive numerical criteria for managing contaminated sediments, they do not provide all of the information needed to establish SCOs or CSLs that are protective of the benthic community in freshwater ecosystems. Some of the key limitations of the data used by Ecology to establish the numerical SCOs and CSLs include:

1. The biomass of benthic invertebrates was not considered in the derivation of numerical criteria. Biomass is calculated as the product of survival and growth (weight; i.e., Biomass = Survival x Weight, where survival and weight are expressed as percentages on a control-normalized basis; USEPA 2000; ASTM 2012). Biomass is an important endpoint because one of the ecosystem services that the benthic community provides is food for fish and wildlife species. Therefore, the amount of food available for fish and wildlife is reduced when the biomass of benthic invertebrates decreases. Because biomass integrates the survival and growth endpoints, it frequently provides a more sensitive indicator of effects on the benthic community than does either survival or growth alone (MacDonald *et al.* 2010; 2012). To illustrate the relative sensitivities of the biomass and survival endpoints, matching sediment toxicity data for midge and amphipods for the Upper Columbia River site are presented in Figures 2 and 3 (MacDonald *et al.* 2012). Biomass is a more sensitive endpoint than survival for any sample plotted below the line of unity on these figures. Failure to consider the biomass endpoint indicates that the numerical SCOs and CSLs are likely to be underprotective of the benthic community.
2. The reproduction of benthic invertebrates was not considered in the derivation of the numerical criteria presented in Table VII. For both of the species used by Ecology in the derivation of freshwater SCOs and CSLs, standard methods are available to evaluate reproduction (see ASTM 2012; USEPA 2000). Reproduction is an important endpoint because the results of studies conducted on many invertebrates indicate that adverse effects on reproduction can occur at contaminant concentrations substantially lower than those that adversely affect either survival or growth. Figure 4 shows the relationship between the survival and reproduction of amphipods in 28- to 42-d toxicity tests, conducted with sediment samples from the Anniston polychlorinated biphenyls (PCB) Site in Alabama (Ingersoll *et al.* 2012). Failure to consider the reproduction endpoint indicates that the numerical SCOs and CSLs are likely to be underprotective

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of the benthic community. While it is understood that sufficient data to derive numerical criteria directly for the reproduction endpoint for amphipods or midge are likely not available, an application factor can be used to adjust the SCOs and CSLs in a manner to ensure that they protect against adverse effects on the reproduction of benthic invertebrates.

3. The results of toxicity tests conducted on more sensitive benthic invertebrate species were not considered in the derivation of numerical criteria. Data collected at the U.S. Geological Survey, Columbia Environmental Research Center and elsewhere over the past decade indicate that freshwater mussels can be more sensitive to sediment-associated contaminants than are midge or amphipods (Besser *et al.* 2009). Similarly, sediments contaminated with metals and polyaromatic hydrocarbons (PAHs) associated with coal mining activities were more toxic to mussels than to either amphipods or midge (Wang *et al.* 2012). Therefore, numerical criteria derived using toxicity data for midge or amphipods may not be sufficiently protective of freshwater molluscs or other invertebrates that exhibit similar sensitivities to contaminants. Failure to consider data on the toxicity of contaminated sediments to freshwater molluscs indicates that the numerical SCOs and CSLs are likely to be underprotective of the benthic community. Importantly, it has not been demonstrated that SCOs or CSLs would be protective of threatened and endangered species of fish and invertebrates or other special status fish or invertebrate species. Therefore, the SCOs or CSLs should be applied at any site where special states species occur (or where they ought to occur) with any expectation of protecting those species.

The Department recommends that the sediment cleanup objectives and cleanup screening levels be revised to provide numerical criteria that correspond with no adverse effects levels (for the SCOs) and minor adverse effect levels (for the CSLs). In addition, mussel toxicity testing should be required at the site, where mussels are present or have historically occurred.

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798 <u>Existing Sediment Quality Guidelines</u>

The proposed SCOs and CSLs are not comparable to existing sediment quality guidelines with similar narrative intent.

According to Section WAC 173-204-563, the SCOs establish no adverse effect levels, including no acute or chronic adverse effects, on the benthic community. If the numerical SCOs accurately represent no adverse effects levels, then they should be comparable to other sediment quality guidelines that are intended to represent no adverse effects levels. MacDonald *et al.* (2000) conducted a review of the literature to identify sediment quality guidelines that represent threshold effect concentrations or TECs). The sediment quality guidelines that corresponded with this narrative intent were compiled and used to derive consensus-based TECs (Table 5). Comparison of the consensus-based TECs with the SCOs that are proposed by Ecology in Table VII of Section WAC 173-204-563 indicates that many of the SCOs are comparable (within a factor of three) to the TECs (). However, the following SCOs are substantially higher than the TECs and do not represent no adverse effect levels for these contaminants:

798 cont.

- Copper;
- Lead;
- Mercury;
- Zinc;
- Total polycyclic aromatic hydrocarbons(PAHs);
- Sum DDD;
- Sum DDE;
- Sum DDT; and,
- Endrin.

Moreover there are only a limited number of SCOs compared to TECs provided by MacDonald *et al.* (2000).

Similarly, the CSLs establish minor adverse effect levels including minor acute or chronic adverse effects on the benthic community, as indicated in Section WAC 173-204-563. To accurately represent minor adverse effects levels, the CSLs should be comparable to other sediment quality guidelines intended to represent minor adverse effects levels. Based on a literature review, MacDonald *et al.* (2000) derived probable effect concentrations (PECs) or concentrations of contaminants above which adverse effects are likely to be observed. The sediment quality guidelines that corresponded with this narrative intent were compiled and used to derive consensus-based PECs (Table 6). Comparison of the consensus-based PECs with the CSLs that are proposed by Ecology in Table VII of Section WAC 173-204-563 indicates that many of the CSLs are comparable (within a factor of three) to the PECs, but the following CSLs are substantially higher than the PECs and do not represent minor adverse effect levels for the following contaminants:

- Arsenic;
- Copper;
- Lead;
- Zinc;
- Total PCBs;
- Sum DDD; and,
- Sum DDT.

Moreover there are only a limited number of SCOs compared to PECs provided by MacDonald *et al.* (2000).

Many of the proposed SCOs and CSLs are substantially higher than the sediment quality standards that have been established by the Confederated Tribes of the Colville Reservation and the Spokane

798 cont Tribe of Indians (Table 7). Furthermore, the proposed SCOs and CSLs have not considered the nationally applicable sediment quality benchmarks established by USEPA (2003; 2005). Neither the proposed SCOs nor the proposed CSLs would provide an adequate basis for protecting benthic invertebrate communities on lands where such sediment quality standards apply.

The Department recommends that the SCOs and CSLs be revised to provide numerical criteria that correspond with no adverse effects levels (for the SCOs) and minor adverse effects levels (for the CSLs). In addition, precedence of tribal and other sediment quality standards and other regulations should be explicitly recognized in the Proposed SMS Rule Amendments.

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799 <u>Toxicity Thresholds</u>

The proposed CSLs for certain contaminants are higher than toxicity thresholds based on spiked-sediment toxicity tests.

According to Section WAC 173-204-563, the CSLs establish minor adverse effects levels, including minor acute or chronic adverse effects, on the benthic community. If the numerical CSLs accurately represent minor adverse effects levels, then they should be substantially lower than the toxicity thresholds that have been established based on the spiked-sediment toxicity tests. The reason why they should be lower is that CSLs are intended to be used for assessing field-collected sediments that likely contain mixtures of COPCs, whereas the results of spiked-sediment toxicity tests provide toxicity thresholds (often median lethal concentrations or LC_{50}s) for individual COPCs in sediments. Therefore, toxicity thresholds derived from spiked-sediment toxicity tests are lower when mixtures of COPCs are tested (e.g., see Swartz *et al.* 1988).

While the Department did not conduct a comprehensive review of the literature on spiked-sediment toxicity testing, our review of copper demonstrates that toxicity to benthic invertebrates in spiked-sediment is frequently observed at concentrations of copper below the CSL at 1,200 mg/kg dry weight). Malueg *et al.* (1986) reported a 48-h LC_{50} of 654 to 688 mg copper/kg dry weight for the water flea, *Daphnia magna*. For the midge, *Chironomus dilutus*, a 10-d LC_{50} of 857 mg/kg dry weight was reported for copper (Cairns *et al.* 1984). By comparison, Cairns *et al.* (1984) reported a 48-h LC_{50} of 937 mg copper /kg dry weight for the water flea (*D. magna*) and a 10-d LC_{50} of 964 mg copper /kg dry weight for the amphipod *Gammarus lacustris*. All of these median lethal concentrations are substantially below the levels that Ecology expects to cause minor adverse effects on the benthic community. Therefore, the CSL for copper would not be protective of the benthic community.

The Department recommends that the SCOs and CSLs be revised to provide numerical criteria that correspond with no adverse effects levels (for the SCOs) and minor adverse effects levels (for the CSLs).

<u>Identification of Sediments Causing No Adverse Effects or Minor Adverse Effects</u>

The SCOs and CSLs do not provide a reliable basis for identifying sediments causing no adverse effects or minor adverse effects on benthic communities.

799 cont. According to Section WAC 173-204-563(2a), the SCOs establish “no adverse effect levels”, including no acute or chronic effects, on the benthic community. Accordingly, no adverse effects on benthic invertebrates should be observed when the concentrations of COPCs are below the SCOs. To determine if the SCOs provide a reliable basis for classifying sediment samples as not toxic, matching sediment chemistry and toxicity data from the Upper Columbia River and elsewhere in Washington State were compiled (Table 8). In the resultant database, individual sediment samples were designated as toxic or not toxic using:

- Methods used by Ecology (as described in Table VIII of Section WAC 173-204-563); or,
- Methods more commonly applied by sediment quality investigators (i.e., statistical comparison to negative control or using the reference envelope approach; see Table 8 for an overview of toxicity designation methods by study).

In this analysis, the SCOs were considered to provide a reliable basis for designating sediment samples as not toxic if the incidence of toxicity was <20% when the concentrations of all COPCs were below the SCOs (MacDonald *et al.* 2002; 2009; 2012).

In the first analysis, the reliability of the SCOs was evaluated using the toxicity designations assigned by Ecology. The results showed that the incidence of toxicity was generally low (about 6%) for samples from the Upper Columbia River when the concentrations of all COPCs where below the SCOs and when the results of 28-d toxicity tests with amphipods (survival or growth) were considered (Table 9). While the incidence of toxicity was also low (about 6%) when midge growth was considered toxicity to midge was frequently observed (about 29%) when midge survival was considered for samples from the Upper Columbia River. These results indicate that the SCOs do not represent “no adverse effects levels” in Upper Columbia River sediments. No data from elsewhere in Washington State were available to evaluate the reliability of the SCOs.

In a second analysis, the reliability of the SCOs was evaluated using the toxicity designations assigned by statistical comparison to negative control or using the reference envelope approach. The results of this analysis showed that the incidence of toxicity was generally low (about 5 to 13%) for samples from the Upper Columbia River when the concentrations of all COPCs were below the SCOs and when the growth or biomass of amphipods in 28-d toxicity tests were considered (Table 10). However, about 40% of the samples with COPC concentrations below the SCOs were toxic to amphipods when 28-d survival was considered. The incidence of toxicity to midge was also elevated in sediment samples from the Upper Columbia River with the concentrations of all COPCs below the SCOs (about 23% for midge survival, 40% for midge growth, and 70% for midge biomass). For both 10-d and 28-d toxicity tests conducted with sediment samples from elsewhere in Washington State, the incidence of toxicity to amphipods exceeded 20% when the concentrations of all COPCs were below the SCOs (Table 10).
According to Section WAC 173-204-563(2b), the CSLs establish minor adverse effects levels, including minor acute or chronic adverse effects, on the benthic community. Using the toxicity designations assigned by Ecology, the incidence of toxicity to amphipods or midge was low (0 to about 10%) when the concentrations of all COPCs were below the CSLs (Table 11). However, a

799 cont. different result occurs when sediment samples were designated as toxic or not toxic using statistical comparison to negative control or by using a reference envelope approach. The results of this analysis showed that the incidence of toxicity was generally low (about 8 to 19%) for samples from the Upper Columbia River when the concentrations of all COPCs were below the CSLs and when the growth or biomass of amphipods in 28-d toxicity tests were considered (Table 12). However, about 42% of the samples with COPC concentrations below the CSLs were toxic to amphipods when 28-d survival was considered. The incidence of toxicity to midge was also elevated in sediment samples from the Upper Columbia River with the concentrations of all COPCs below the CSLs (about 19% for midge survival, 43% for midge growth, and 66% for midge biomass). For both 28-d toxicity tests conducted with sediment samples from elsewhere in Washington State, the incidence of toxicity to amphipods exceeded 20% when the concentrations of all COPCs were below the CSLs (Table 12).

The proposed SCOs and CSLs were developed using the results of toxicity tests conducted with field-collected sediment samples that typically contain complex mixtures of COPCs. To determine if the resultant numerical criteria would provide a reliable basis for classifying sediment samples from the Upper Columbia River or elsewhere in Washington State as toxic and not toxic, a supplemental data analysis was conducted. In this evaluation, the incidence of toxicity to amphipods and midge was determined when the concentrations of individual COPCs were below the SCO or CSL. This analysis was conducted using the toxicity designations that were established by statistical comparison to negative control or using the reference envelope approach. The results of this analysis (Tables 13 to 18) indicate that the SCOs for the individual COPCs evaluated should not be used to reliably classify sediment samples from the Upper Columbia River or elsewhere in Washington State as not toxic. That is, the incidence of toxicity below the SCOs for individual COPCs exceeds 20% for one or more of the endpoints considered. Therefore, the SCOs do not define the concentrations of COPCs that represent no adverse effect levels.

These results of these evaluations demonstrate that the SCOs and CSLs do not provide a reliable basis for establishing the levels of COPCs that represent no adverse effect levels or minor adverse effect levels. These results also emphasize the importance of considering the biomass endpoint in assessments of sediment quality conditions. To resolve these concerns, the Department recommends that the SCOs and CSLs be revised to provide numerical criteria that correspond with no adverse effects levels (for the SCOs) and minor adverse effect levels (for the CSLs).

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800 **Ecological Bioaccumulation Narrative**

The ecological bioaccumulation narrative is confusing and will be difficult to effectively implement.

Section WAC 173-204-564 of the Proposed SMS Rule Amendments describes the process for establishing sediment cleanup levels based on the protection of higher trophic level species. More specifically, this section of the document indicates that:

> "Sediment cleanup objectives and cleanup screening levels based on protection of higher trophic level species shall not be established at concentrations that do not have the potential for minor adverse effects."

800 cont. This statement is difficult to understand, but appears to indicate that SCOs and CSLs based on protection of higher trophic-level species shall be established at concentrations that have the potential for minor adverse effects. It is unclear why such SCOs or CSLs would need to be established at levels that result in minor adverse effects on higher trophic level species. A better approach is to require that the SCOs or CSLs be established at levels that are not associated with adverse effects on wildlife species.

The definitions of minor adverse effects contained in Section WAC 173-204-564 of the Proposed SMS Rule Amendments are also problematic. For threatened and endangered or other special status species, minor adverse effects can include "a significant disruption of normal behavior patterns, such as breeding, feeding, or sheltering." Minor adverse effects can also include impairment of growth, reproduction, and survivals of individuals. It is unclear why SCOs or CSLs need to be established at levels that could result in a significant disruption of normal behavior patterns, such as breeding, feeding, or sheltering of threatened and endangered or other special status species. These minor effects may present significant barriers to the recovery of threatened and endangered species, or the stability of current populations.

Bioaccumulation of sediment-associated contaminants is a key concern for the Department. Accumulation of metals, certain PAHs, PCBs, organochlorine pesticides, dioxins/furans, and other substances in the tissues of aquatic organisms has the potential to adversely affect aquatic invertebrates, fish, amphibians, reptiles, birds, and mammals including threatened and endangered species. Therefore, it is essential that the SCOs and CSLs protect against such adverse effects, or have provisions to address bioaccumulation. The proposed ecological bioaccumulation narrative and the numerical criteria listed in Table VII currently are not protective of these species.

The Department recommends that the ecological bioaccumulation narrative be rewritten in clearly understandable language and provide a basis for protecting higher trophic level species, including special status species, from adverse effects associated with exposure to bioaccumulative COPCs (i.e., Section WAC 173-204-564).

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801 **Determination of Regional or Natural Background Levels of Contaminants**

Regional or natural background levels of contaminants should not be determined on a case-by-case basis.

Section WAC 173-204-560 of the Proposed SMS Rule Amendments describes the process for establishing SCOs or CSLs for a contaminant in sediment. More specifically, these sections of the document indicate that the SCOs or CSLs are the highest of:

- The risk-based concentration of the contaminant, based on WAC 173-204-561 to WAC 173-204-564;
- Natural background or regional background; and,
- Practical quantitation limit.

801 cont. While it is reasonable and appropriate to consider background levels of contaminants in the establishment of SCOs and/or CSLs, the Proposed SMS Rule Amendments do not provide sufficient information to ensure that natural background or regional background concentrations of contaminants are determined using consistent and scientifically-defensible procedures. As establishment of background levels of COPCs is of fundamental importance to the sediment quality assessment and management process, other jurisdictions have either determined background levels on an *a priori* basis and/or established formal procedures for determining background levels (see Protocol 4 for Contaminated Sites, promulgated under the British Columbia Environmental Management Act). In contrast to the approach that has been used in other jurisdictions, the Proposed SMS Rule Amendments indicate that Ecology will determine the appropriate statistical analyses, number and type of samples, and analytical methods to establish a regional background level on a case-by-case basis. It is not clear how this approach will ensure the consistent and appropriate application of methods to establish background and, ultimately, the fair application of the SMS Rule.

The Department recommends that the SMS two-tier framework be revised to include regional background concentrations of listed contaminants or detailed guidance for establishing regional or natural background levels of contaminants in sediment. Such procedures for calculating background levels of contaminants in sediment should describe the number and type of samples that need to be collected, the criteria that need to be applied to confirm that a sample qualifies for inclusion in the background calculation, the analytical methods that must be used to generate the required sediment chemistry data, and the statistical analyses that must be conducted to estimate regional or natural background concentrations of contaminants in sediment. These revisions need to be included in Section WAC 173-204-560 of the Proposed SMS Rule Amendments.

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802 **Consideration of Practical Quantitation Limits**

Practical Quantitation Limits should not be considered in the development of SCOs or CSLs.

Section WAC 173-204-560 of the Proposed SMS Rule Amendments describes the process for establishing SCOs or CSLs for a contaminant in sediment. More specifically, these sections of the document indicate that the SCOs or CSLs are the highest of:

- The risk-based concentration of the contaminant, based on WAC 173-204-561 to WAC 173-204-564;
- Natural background or regional background; and,
- Practical quantitation limit.

While it is reasonable and appropriate to consider the risk-based concentration and background concentration of a contaminant in the establishment of SCOs and CSLs, we do not believe it is appropriate to consider the practical quantitation limit in this process. For all of the contaminants explicitly addressed in the Proposed SMS Rule Amendments, analytical methods have been developed that provide detection limits sufficient to assess risks to human health and the environment. This inclusion of a practical quantitation limit override in the Proposed SMS Rule Amendments may inadvertently result in the consideration of sediment chemistry data that does

802 cont. not conform to the requirements for human health risk assessments or ecological risk assessments. Guidance on the detection limits that are required to support sediment quality assessment activities already exists (see for example MacDonald *et al.* 2008) and there is no reason to include a practical quantitation limit override in the Proposed SMS Rule Amendments.

The Department recommends that the practical quantitation limit override included in the SMS two-tier framework be removed and that Ecology develop guidance on the detection limits that must be achieved for chemicals of potential concern that require investigation at sediment contaminated sites within the state.

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803 **Consultation with Affected Federal and Tribal Governmental Agencies and the Public**

Decisions regarding the upward adjustment of SCOs should be made with meaningful consultation with affected federal and tribal government agencies and the public.

Section WAC 173-204-560 of the Proposed SMS Rule Amendments describes the methods for establishing site-specific sediment cleanup levels. In this section, sediment cleanup levels are defined as the concentrations of contaminants in sediments or levels of biological effects determined by Ecology to be protective of human health and the environment. This section also states that the SCO shall be used to establish the sediment cleanup level, unless an upward adjustment from the SCO is necessary because:

- It is not technically possible to achieve the sediment cleanup level at the applicable point of compliance within the site or sediment cleanup unit; or,
- Meeting the sediment cleanup level will have an adverse impact on the aquatic environment, taking into account the long-term positive effects on natural resources and habitat restoration and enhancement and the short-term adverse impacts on natural resources and habitat caused by cleanup actions.

However, the Proposed SMS Rule Amendments do not indicate who would conduct the evaluation of technical feasibility analysis or harm-benefit analysis. This is important because the Department's has experienced that technical infeasibility and cleanup impacts have been used to justify inaction at many other contaminated sites throughout the United States. Inaction or incomplete cleanups at sediment contaminated sites have real implications for individuals and organizations that rely on natural resources, particularly tribal members and other subsistence users. Therefore, it is inappropriate to adjust the SCO upwards without appropriate and meaningful consultation with other affected governments and the public.

The Department recommends that procedures for reviewing and approving upward adjustment of the sediment cleanup objectives that includes meaningful consultation with other affected governments and the public be developed and described in the Proposed SMS Rule Amendments.

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804 **Establishment of Sediment Cleanup Levels**

SCLs should be established below the SCOs.

804 cont. Section WAC 173-204-560(2b) of the Proposed SMS Rule Amendments indicates that Ecology may establish sediment cleanup levels more stringent than those established under Section WAC 173-204-560(2a) when, based on a site-specific evaluation, Ecology determines that such levels are necessary to protect human health and the environment. Section WAC 173-204-560(2a) indicates that:

- "the sediment cleanup objective shall be used to establish the sediment cleanup level," notwithstanding the provisions for upward adjustment.

It is reasonable to include provisions for establishing a sediment cleanup level that is lower than the SCO in those situations where the SCO would not provide the required level of protection for human health or the environment. However, the last sentence in Section WAC 173-204-560(2b) eliminates Ecology's flexibility for establishing more stringent sediment cleanup levels by indicating that:

- "The sediment cleanup level may not be established below the sediment cleanup objective."

The Department believes it is inappropriate to include the last sentence in Section WAC 173-204-560(2b) because the statement eliminates any possibility that Ecology could establish sediment cleanup levels that are more stringent than the SCOs; therefore, we recommend that the last sentence be eliminated from Section WAC 173-204-560(2b) of the Proposed SMS Rule Amendments.

Thank you for the opportunity to comment on the Draft Sediment Management Standards. The Department looks forward to working with Ecology on this effort and would welcome the opportunity to discuss the concerns presented in this letter further. If you have any questions regarding these comments, please direct them to one of the following: Chris Ingersoll with USGS at cingersoll@usgs.gov or (573) 876-1819; Jeremy Buck with USFWS at Jeremy_Buck@fws.gov or (503) 231-6179; or Keith Holliday with NPS at Keith_Holliday@nps.gov or (509) 633-3860 ext. 161. If you have any other questions, please do not hesitate to contact me at (503) 326-2489.

Sincerely,

Allison O'Brien

Allison O'Brien
Regional Environmental Officer

Attachment (1)
USDOI Comments on WDOE SMSs Tables Figure Appendix.pdf

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WASHINGTON
PORTS

October 29, 2012

Washington Department of Ecology
Toxics Cleanup Program
Attn: Adrienne Dorrah
P.O. Box 47600
Olympia, WA 98504-7600

Sent electronically to: RuleUpdate@ecy.wa.gov

Dear Ms. Dorrah:

Thank you for this opportunity to comment on the Department of Ecology's ("Ecology") recent draft rule concerning Sediment Management Standards. Thank you as well for extending the comment deadline by two weeks from October 15 to October 29. For more than two years, port representatives have participated in discussions about the proposed rule change regarding sediment management standards. Ports around the region participate in sediment cleanups and the staff people who manage these projects are experts on this very technical subject matter. The comments herein are meant to compliment the individual comments you will likely receive from specific ports.

Sincerely,

Johan Hellman
Assistant Director

Name of Commenter:	Johan Hellman, Washington Public Ports Association
Version of Document Reviewed:	_x_ Review Version (Reader Friendly) ___ Official Version
Date:	

	Page Number	**Line Number**	**Comment**
805	General Comment	N/A	In reviewing the draft rule, we were encouraged by the following: ▪ The definition of "sediment site unit" (pg. 36-37, lines 443-450) incentivizes cleanup that might not otherwise occur by allowing smaller portions of a site to be expedited. This seems like a helpful and reasonable approach.
806			▪ The "cleanup process expectations" set out in WAC 173-204-500 (pg. xciv-xcvi, lines 1480-1525) provide helpful context, particularly regarding recontamination. However, the use of a sediment recovery zone should only occur if a cleanup cannot achieve cleanup standards within 10 years after the completion of active cleanup as explained later in this document.
807			▪ The concept of "incidental cleanups" is retained in the rule draft. We encourage Ecology to link this section to WAC 173-322-070 in order to allow ports and other local governments to offset the cost of incidental cleanups by using grant funds.
808 & 809	General Comment	N/A	While we appreciate the process and the inclusion of specific measures that may prove helpful to cleanup partners moving projects forward, we remain concerned about larger provisions in the draft rule which inevitably make many cleanups impossibly expensive. In some cases, cost considerations have been specifically removed from rule language. This kind of approach would inevitably create a rule that is theoretically beneficial but fundamentally unworkable meaning that many projects simply would not progress or even begin. An approach that disincentivizes cleanup projects in this way would inevitably result in reduced environmental benefit.
810	11	N/A	Figure 1, illustrating the two-tier framework for establishing cleanup standards, raises the following two issues, which must be resolved: ▪ **"Technical possibility":** the phrase "set as close as practicable to sediment cleanup objective based on technical possibility and adverse environmental impact" introduces significant ambiguity into the cleanup standards framework. Looking to definitions within the document, "practicable" is defined as "able to be completed in consideration of environmental effects, technical feasibility and cost."[1] However, "technically possible" is defined as "capable of being designed, constructed and implemented in a reliable and effective manner, regardless of cost."[2] Given these definitions, the rule creates an extremely broad framework where one of the determining factors in establishing cleanup level is whether a remedy meeting that level can be designed, constructed and implemented <u>regardless of cost</u>. This recasts the framework into one where cleanup level is determined by any number of solutions that are theoretically possible, although wholly impractical. Not only is such an

[1] See Section 173-204-200(34), pg. 33

[2] Section 173-204-200(49), pg. 37

Name of Commenter:		Johan Hellman, Washington Public Ports Association
Version of Document Reviewed:		**_x_** Review Version (Reader Friendly) ___ Official Version
Date:		
Page Number	**Line Number**	**Comment**
		approach fundamentally unworkable in many instances, but it also seems destined to derail discussions away from a consideration of tactics for effectively achieving environmental cleanup into a philosophical discussion of possibility without any realistic consideration of resources. Therefore, the chart should be edited to read "set as close as practicable to the sediment cleanup objectives," and use of this term in other areas of the document (including WAC 173-204-560) should be similarly changed. ▪ **Cost considerations should be factored in when setting cleanup levels**: the original SMS rules and prior drafts of the proposed rule changes allowed explicit cost considerations to be factored in when setting sediment cleanup levels. Factoring in cost considerations when setting cleanup levels provides essential flexibility to ensure that cleanup actions may actually be implemented. The reason is that sediment sites offer few alternatives. They are essentially limited to either: a combination of high cost dredging and/or thick layer capping, or natural recovery (enhanced or monitored). A disproportionate cost analysis will not benefit sediment cleanups in the same way it would benefit upland cleanups because upland site reviews may consider less expensive remedies than the complete excavation of all contaminated materials. In sediment cleanups, alternatives such as isolation under an impermeable cap are simply not available. Therefore, sediment levels set at a low level without explicit cost consideration may create an environment where the only alternatives that would achieve these standards are costly dredging and/or capping. As a result, many potential cleanup partners would have a huge disincentive to move forward on cleanup projects.
36	440	**Change trigger for 10-year clock to achieve cleanup standards:** ports and other cleanup partners are strongly motivated to complete projects as quickly as possible due to the high cost of mobilizing dredge equipment and crews, barges and other infrastructure. Furthermore, the reality of many modern sediment cleanups is that they occasionally span multiple construction seasons due to factors which are absolutely no fault of the entities engaging in cleanups. Unfortunately, the definition of "sediment recovery zone (SRZ)" indicates that such a zone may be established when Ecology determines that selected actions cannot achieve the designated standard "within ten years after the start of the cleanup action." By starting the 10-year clock at the start of the cleanup action, rather than at the completion of active cleanup, the agency may not provide adequate time to allow for unforeseen delays outside the control of entities initiating sediment cleanups. Therefore, we respectfully submit that the trigger should be moved from "the start of cleanup action" to the "completion of active cleanup."

810 cont.

811

Name of Commenter:	Johan Hellman, Washington Public Ports Association
Version of Document Reviewed:	_x_ Review Version (Reader Friendly) ___ Official Version
Date:	

	Page Number	**Line Number**	**Comment**
812	xcvii	1537-1547	As previously stated, the term “technically possible” is extremely problematic. Although the draft rule would allow cleanup levels to be set within a range, this range is essentially meaningless when the determination is based on “technical possibility” regardless of cost. Therefore, we submit that this language should be amended as follows: “The sediment cleanup level shall be the sediment cleanup objective and shall be adjusted upward as required based on what is ~~technically possible~~ practicable and whether meeting the sediment cleanup objective will have an adverse impact on the aquatic environment, including natural resources and habitat.”
813	cxxxi	2196-2197	This is another instance where the term “technically possible” should be removed by editing WAC 173-204-560(2)(a)(i)(A) as follows: “Whether it is ~~technically possible~~ practicable to achieve the sediment cleanup level at the applicable point of compliance within the site or sediment cleanup unit.”
814	cxxxv-cxxxvi	2275-2297	While we appreciate the simplification of the definition for regional background, we remain concerned that the rule does not allow regional background to include low-level contamination from diffuse stormwater collected into a pipe before it is discharged.
815	clxxv	2897-2900	As previously indicated, the timeline for achieving cleanup standards should be ten years from the completion of active cleanup, not from the “start of the cleanup action.”
816	clxxv	2906-2910	This section should be changed to read: “Cleanup actions shall not rely ~~primarily~~ exclusively on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action.”
817	clxxvi – clxxvii	2920-2938	**The hierarchy of cleanup action alternatives should be removed.** This another area where sediment cleanups differ from upland and should be treated accordingly. Variations in what material can be deposited at open water sites determine whether it is even possible to treat certain sediment contamination. Therefore, some remedial alternatives that rank high on the hierarchy will be impractical or cost-prohibitive when applied to sediment cleanups. As a result, some otherwise viable cleanup efforts will be abandoned.
818	clxxxi	3014-3018	As previously discussed, the trigger should be changed to “completion of active cleanup.”

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

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Dept of Ecology
Toxics Cleanup Program

Martha Hankins, Toxics Cleanup Program
Washington State Department of Ecology
P.O. box 47600
Olympia, WA 98504-7600

SUBJECT: Draft Sediment Management Standards

Dear Ms. Hankins:

The Department of Natural Resources (DNR) has reviewed the Department of Ecology's Draft Sediment Management Standards Rule Proposed Amendments, including the Draft Sediment Cleanup Users Manual II, the Draft Environmental Impact Statement, the Draft Small Business Environmental Impact Statement, and the Preliminary Cost-Benefit and Least Burdensome Alternative Analyses./ DNR commends and supports the Washington State Department of

819 Ecology's (Ecology) goal to implement stricter sediment cleanup levels, and the development of region wide cleanup models with individual cleanup units and sites within a region (bay or watershed) to accomplish this goal. This proposal is an important step forward that acknowledges the nature of widespread sediment contamination.

Specific Comments:

820 Page 27, Lines 247-253: DNR requests clarification regarding the "beneficial reuse" definition in relation to the dredge material management program definition regarding "beneficial use." Specifically, DNR does not understand the limitation "to replace another uncontaminated material" used in the definition.

821 Page 31, Lines 330-340: In determining natural background, older data for an area may have a much higher limit of detection of PQL. Statistical bias may be introduced if a significant amount of older data is used to determine the PQL. What methods will Ecology use to ensure that bias from higher detection limits in older data will not be introduced?

822 Page 33, Lines 373-378: Since the Practical Quantitation Limit (PQL) goes down as methods improve, and can vary from method to method, when PQL is used to determine cleanup screening level or objectives, it is possible that very different concentrations will be quantifiable in the time between identification of a site and the eventual remedy, especially for contaminants that are toxic at very low concentrations, i.e. dioxin. How will Ecology handle a lowered cleanup screening or objective level in those cases?

AQUATIC RESOURCES DIVISION ▮ 1111 WASHINGTON ST SE ▮ MS 47027 ▮ OLYMPIA, WA 98504-7027
TEL (360) 902-1100 ▮ FAX (360) 902-1786 ▮ TTY (360) 902-1125 ▮ TRS 711 ▮ **WWW.DNR.WA.GOV**
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823 Page 59, Lines 818-825: DNR is concerned that sediment testing is rarely, if ever, required for water quality standards, and that effluent is not necessarily tested for sediment management standards chemicals of concern, even under industrial and stormwater permits. Will Ecology use the sediment impact zone requirements to better coordinate sediment management and water quality standards, especially NPDES standards?

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824 Page CXXI, Lines 1989-1992: As part of the RI/FS, the site boundary map should also display ownership boundaries in relation to delineations for concentrations of contaminants.

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825 & 826 & 827 Page CXXIII, Lines 2030-2032: As part of the land use characterization in the RI/FS, the information collected should also include state/DNR use authorizations, as well as information relating to the state land classifications at a site that determine the present and proposed land uses that DNR may allow under its statutory authorities. DNR is concerned that the impacts to SOAL management have not been addressed in the rule, in the Draft Sediment Cleanup Users Manual II, and in the Environmental Impact Statement. The Legislature recognizes that the state owns these aquatic lands in fee and has delegated to DNR the responsibility to manage these lands for the benefit of the public, finds that water dependent uses will be important into the future, and that "revenues derived from leases of state-owned aquatic lands should be used to enhance opportunities for public recreation, shoreline access, environmental protection, and other public benefits associated with the aquatic lands of the state." DNR is directed by statute to manage these lands in a sustainable manner in order to provide a balance between public use and access, water dependent uses, environmental protection and utilizing renewable resources.

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828 Page CXXIII, Lines 2034-2038: As part of the RI/FS, it should be noted that DNR manages many of these natural resources and habitat under statutory requirements. These requirements should be recognized as applicable local, state, and federal laws, or ARARs.

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829 Page CXXXV, Lines 2275-2287: The establishment of a regional background based on older data for an area may have a much higher limit of detection of PQL. If a significant amount of older data is used to make the determination, it could introduce statistical bias. What methods will Ecology use to ensure that bias from higher detection limits in older data will not be

829 cont. introduced? Once Ecology defines a regional background area, will Ecology have a process to amend regional background areas due to either increasing atmospheric deposition worldwide or decreasing due to improved source control of non-point sources i.e. storm water?

830 Page CLXXV, Lines 2905-2912: The state/DNR will require use authorizations for active cleanup actions where institutional controls will be located on SOAL managed by DNR. Port Districts may require authorizations for active cleanup actions that occur on state-owned aquatic lands that they may manage under a Port Management Agreement. Additionally, DNR, as any other landowner, may be required to enter into an environmental covenant, and record that covenant with the appropriate County of jurisdiction, for any active cleanup action that requires controls to ensure long-term integrity.

831 Page CLXXVII, Lines 2948-2949: Any cleanup use will have to be made subject to these existing authorizations.

832 Page CLXXXIV, Lines 3086-2093: DNR is concerned that a permit authorizing Sediment Recovery Zones issued by Ecology for the state may conflict with the legislative land classifications under which DNR manages state-owned aquatic lands and resources, and state use authorizations issued by DNR. Ecology and DNR should meet to resolve any potential conflicts.

833 **Conclusion:**
DNR recognizes that this amended rule provides Ecology with much discretion in implementing the cleanup process. The revised sediment management standards propose expanded land use controls for cleanup actions. These land use controls may conflict with existing state aquatic land laws, as well as existing state authorizations for uses on those lands. DNR recommends that Ecology and DNR meet to revise the 1992 Memorandum of Understanding between Ecology and DNR to resolve any such potential or actual conflict between the revised Sediment Management Standards and state aquatic land laws. Such areas of coordination could include information sharing, bay wide planning, source control, sediment impact zones, sediment recovery zones and liability.

Thank you for the opportunity to comment. If you'd like to discuss these comments, please contact John Bower at john.bower@dnr.wa.gov or at (360) 902-1084.

Sincerely,

Kristin Swenddal, Manager
Aquatic Resources Division

WSWRA
WASHINGTON STATE WATER RESOURCES ASSOCIATION

EXECUTIVE OFFICE - 606 COLUMBIA STREET N.W. - SUITE 211 - OLYMPIA, WA 98501 - (360) 754-0756 - FAX (360) 586-4205 - E-mail: wswra@wswra.org

SENT VIA E-MAIL

October 29, 2012

Ms. Martha Hankins
Department of Ecology
Toxics Program
Olympia, Washington

Dear Ms. Hankins:

I appreciate the opportunity to comment on Ecology's *Sediment Management Standards (SMS) Rulemaking Document: WDOE Publication no. 12-09-054,* The Washington State Water Resources Association (WSWRA) is the coordinating agency for irrigation districts in Washington State. WSWRA represents more than 100 irrigation districts providing water to over 1.1 million acres of irrigated agriculture in Washington State. These districts operate and maintain thousands of miles of canals and laterals with return flows to rivers and streams across the state.

General Comments

834 WSWRA members have concerns regarding the proposed SMS rule and its potential impacts on herbicide use under the National Pollutant Discharge Elimination System (NPDES). The SMS document outlines comments on behalf of WSWRA members on current and proposed Sediment Quality Standard (SQS) values and the alternatives proposed for establishing freshwater sediment standards. It is understood that contamination of water and sediment correlate with chemical contaminant body burdens of salmonids and humans, thereby posing a consumption and human health problem.

Copper sulfate is an important aquatic herbicide to Washington irrigators and it is one of four active ingredients regulated under the Washington State Department of Ecology (WDOE) Irrigation General NPDES and SWD permit that is commonly used in irrigation canals for the control of aquatic algae and macrophytes. Copper sulfate is applied to canals and laterals in order to maintain water flow for efficient delivery of water to agricultural areas, and it is the

834 cont. most commonly used copper product; however, liquid chelated formulations are also available and are becoming more widely used.

Alternatives to copper products include mono-amine endothall formulations and acrolein. The mono-amine formulation of endothall is not a substitute for copper in large canals and laterals due to its great expense, high toxicity to fish, and its limited distance of efficacy (approximately 10-15 miles).

Copper is also one of several inorganic metals of primary interest at both State and Federal levels, as it has been listed as a persistent, bioaccumulative and toxic (PBT) chemical contaminant of concern in the Puget Sound (WDOE: *Fish Consumption Technical Support Document*, 2011). In addition, it is also a chemical of concern by US EPA (US EPA: *Framework for Metals Risk Assessment*, 2007). Washington State irrigators take necessary and prudent measures to abide by state NPDES requirements under the Federal Clean Water Act (not exceeding WDOE's maximum daily allowable discharge concentration of 25 ug/L) as a source control method to avoid contamination of water and sediment in natural water systems by aquatic herbicides, such as copper sulfate. In addition, irrigation districts employ a number of best management practices to limit the discharge of copper. Engineering controls are often utilized to reduce or eliminate the outflow of copper before reaching a discharge point of compliance. Additionally, internal mixing and of treated and untreated water and on farm deliveries are used to reduce discharge limits below permit limitations prior to being discharged. We ask that WDOE consider the potential impacts of the SMS rule on the successful operation of Washington irrigation districts, including canal/lateral maintenance and efficient water delivery.

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835 We have two primary concerns:

1. The current and proposed SQVs may not be directly applicable to irrigation districts in central and eastern Washington because SQVs were derived from highly contaminated areas in urban and industrial locations.

2. The fish consumption technical support document and SMS rule should not impact currently allowed levels of herbicide discharge under NPDES.

We recommend the following:

1. Do not assume applicability of SQVs and TEC/PEC values to evaluate sediments of concern in irrigation districts. Instead, that evaluation should be done on a site-by-site basis, accounting for the unique characteristics of the districts' water chemistry, regional background levels, and historical and current discharges.

2. Weigh operational and economic impacts of increasing limitations on copper sulfate discharge before proposing an NPDES change that, in our opinion, would not be supported by available fish tissue and sediment data from central and eastern Washington.

Specific Comments

Alternatives for Freshwater Sediment Standards

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836 The proposed SMS rule provides alternatives to establish freshwater sediment quality standards for the protection of the benthic community since the current SMS provides only basic guidelines.

Under Alternative 1 (Current rule, the No Action Alternative) sediment cleanup standards for freshwater sediment in central and eastern Washington would rely on the current SMS narrative standard, where potential toxicity evaluations will be compared with existing chemical guidance values established by MacDonald et al (2000). There are limitations to consider when utilizing the threshold effects concentrations (TEC) and probable effects concentrations (PEC) to evaluate the potential for benthic impacts at freshwater sites in irrigation districts. Listed below are the limitations:

The TEC and PEC values incorporate mixture effects of other contaminants present in the sediment when determining the predicted toxicity. These mixture effects may not be applicable to sediment at points of discharge from irrigation systems. Other persistent, bioaccumulative, and toxic (PBTs), such as PCBs and PBDEs, are not present at similar levels observed in industrial/urban areas, and the additive or synergistic effects accounted for in these values may overestimate toxicity of sediment found in or near irrigation districts. This limitation should be considered if Alternative 1 is chosen.

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837 Water chemistries vary significantly within each irrigation district. For example, water hardness is significantly higher in the Columbia Basin Project compared with water found in the Wenatchee River, and total dissolved copper within the water column significantly decreases as water hardness decreases (WDOE, 2007). Therefore, unique environmental chemistries should be carefully considered when evaluating sediment affected by copper discharge. The US EPA has recently adopted a method when estimating risk associated with copper exposure (US EPA, 2007; Santore et al, 2001; Peters et al 2011). This biotic ligand model (BLM) considers water chemistry (e.g. pH, alkalinity), metal speciation, and cationic completion on metal toxicity in fish (Paquin 2002; US EPA 2007). Further, this model predicts toxicity to the same benthic vertebrates (De Schamphelaere, 2002, 2004) also considered in SQG values generated for toxicity evaluations under the current SMS rule (Michelsen, 2003) and Alternative 2 under the proposed changes for Freshwater Sediment Standards. This type of model should be considered when evaluating copper toxicity in irrigation districts since it would provide a much more rigorous evaluation of copper toxicity.

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838 If DOE evaluates freshwater sediment toxicity for central and eastern Washington using SQGs (datasets complied by Michelsen [2003], current SMS, and Michelsen [2011], Alternative 2) we ask that the following be considered:

The SQS values were formulated to provide a reference for certain PBT chemicals in order to help identify sediment cleanup sites or areas of concern in Washington State. The SMS provides SQS values from the *most impacted sediment located in productive and nearshore and estuarine*

838 cont. *areas where they pose risks to human health and the environment*, including the Puget Sound and lower Columbia River. Generation of these values was based on sites primarily west of the Cascades, although some sites were considered in eastern Washington (e.g. Spokane River and Lake Roosevelt, both listed under 303[d]). Most of the canals and laterals supporting agriculture are located in central Washington (Yakima Basin and the mid-Columbia Basin), outside the areas targeted for SQS sampling. Additional sampling is needed in central Washington before establishing reference values for this region.

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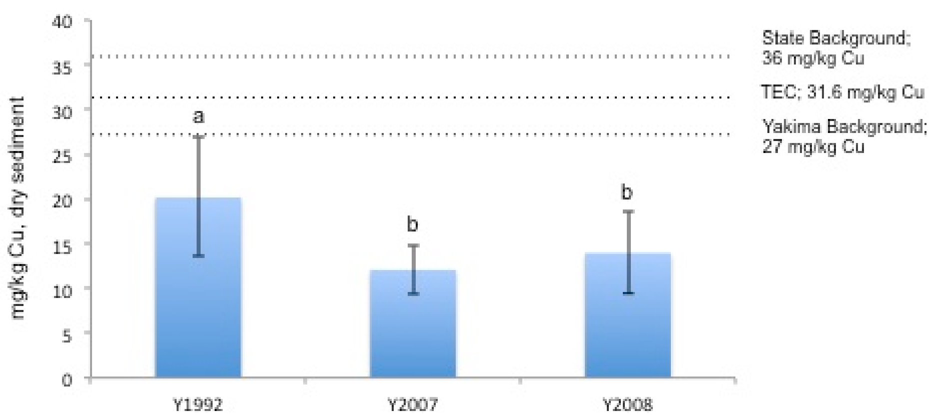
839 & 840 *Current Copper Use*

According to data gathered from WDOE's Environmental Information Management (EIM) database, copper concentrations in sediment collected from Columbia Basin Project Irrigation Districts between 1992-2008 did not exceed TEC and SQVs (**Figure 1**). Further, copper concentrations fell below background levels identified for Washington state (36 mg/kg), Yakima (27 mg/kg) and nationally (25 mg/kg; Buchman 2004). It should be noted that the Columbia Basin Project irrigation districts are the largest users of copper sulfate of all irrigation districts, and that other districts, such as Sunnyside and Roza, apply little to no copper to their canals and laterals. In 2012, the Columbia Basin Project irrigation districts used approximately 30,000 lbs of copper sulfate for the control of algal species (C. Gyselink, personal communication).

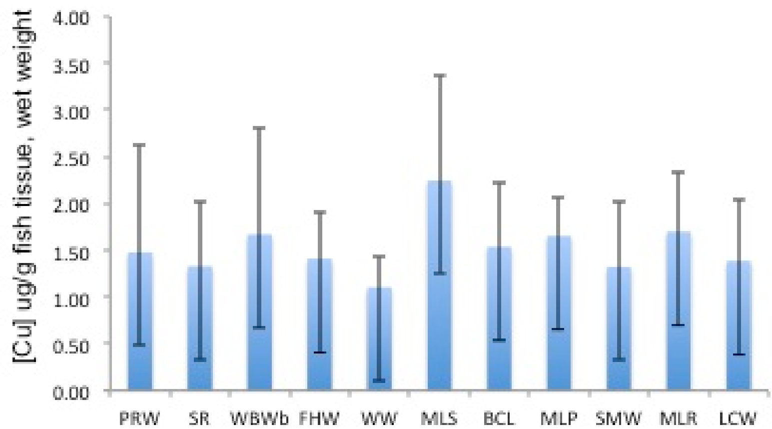


[a] WDOE Study ID COL5N92124: *Columbia Basin Irrigation Project Survey*
[b] WDOE Study ID CBUR0007: *A Study of Copper Discharge from Irrigation Canals*
TEC: threshold effect concentration; MacDonald et al, 2000

Figure 1. Mean copper concentrations in rivers surrounding the Columbia Basin Project, 1992-2008. Dry sediment from various locations in waterways in the Columbia Basin Project were tested for copper levels following the irrigation season. Copper concentrations fell below the TEC (31.6 mg/kg Cu) and PEC (149 mg/kg Cu) values (MacDonald et al, 2000), and below SQVs set by Michelsen in 2003 and 2011, 80 mg/kg Cu and 320 mg/kg Cu, respectively. Cu sediment concentrations fell below background levels for both Washington state and Yakima (Michelsen, 2011).

In 1992, USGS conducted a survey of waterbodies in Grant County (within the Columbia Basin Project) and found that copper in tissues derived from bottom-feeding fish (e.g. suckers, carp) (WDOE, EIM database) exhibited levels at or below the threshold of toxic body burden. In addition, consumption of fish with similar copper load under current consumption standards (6.5 g/day; WDOE *Fish Consumption Technical Support Document*) would not exceed maximum

839 & 840 cont. recommended limit 10 mg/kg/day (**Figure 2**; World Health Organization, 1996). This data, in conjunction with the sediment data referenced in Figure 1, suggest that accumulation of copper in fish from the interior Columbia Basin poses a low risk to human health. Additional fish tissue data could be collected to affirm this assertion.



WDOE Study ID USGSCB92

Figure 2. Mean copper concentrations in bottom-feeding fish in various water bodies in Grant County, 1992. Wet tissue samples of sucker, perch or carp collected from various wasteways, reservoirs and lakes in Grant County.

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841 **Concluding Remarks**

WSWRA request's that source-control regulation through the implementation of NPDES permits, specifically to copper sulfate, be approached in a site-specific manner, and we offer our assistance to ensure this analysis is carried out in concert with the most rigorous techniques available. Factors that should be considered when determining copper bioavailability in sediment of irrigation districts that utilize copper sulfate include: a) district-specific water chemistry (e.g. alkalinity), b) regional background levels, c) water flow, d) frequency of application, and e) dissolved organic carbon.

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October 29, 2012

RE: Revisions of Sediment Management Standards (WAC 173-204)

Dear Mr. Bradley, Ms. Hankins and Ms. Conklin:

Waterkeepers Washington represents the four licensed Waterkeeper Alliance programs in the state of Washington who have made it their mission to protect and preserve their respective watersheds and collectively be the voice for the health and sustainability of the state's collective waters.

As licensed members of the international Waterkeeper Alliance, we as the North Sound Baykeeper, Puget Soundkeeper, Columbia Riverkeeper and Spokane Riverkeeper are dedicated to protecting our local waters by patrolling our watersheds, enforcing environmental laws and educating the public. Together as Waterkeepers Washington, we work together on issues of statewide importance and impact concerning water quality, water quantity and rights, climate change and much more.

The Lands Council, based in Spokane, preserves and revitalizes Inland Northwest forests, water, and wildlife through advocacy, education, effective action, and community engagement. The Duwamish River Cleanup Coalition exists to ensure a Duwamish River cleanup that is accepted by and benefits the community and is protective of fish. Wildlife, and human health.

Together as Waterkeepers Washington, The Lands Council, and the Duwamish River Cleanup Coalition, we represent not only 7000 members and 5000 involved persons (Duwamish River Cleanup Coalition) but all of the citizens of the state of Washington who wish to exercise their right to swimmable, fishable, and drinkable waters. On the behalf of these citizens we submit these comments on Ecology's revisions to the Sediment Management Standards (WAC 173-204).

We genuinely appreciate the effort that Ecology staff has taken revising the Sediment Management Standards (SMS). We recognize substantial changes have occurred and have identified several sections of improvement, such as, multiple improvements in the public participation process, removal of the finances of the potentially liable person from determination of the scope of the cleanup study, and the provision of more specific instances when the sediment cleanup objective can be adjusted upward.

There are, however, still significant deficiencies remaining in the proposed update. To that end, we submit the following comments on the August 2012 revision of the Sediment Management Standards.

842 **New Cleanup Concepts:**

Two new concepts include regional background and sediment cleanup unit. Both are problematic. In fact, regional background is alarming. Using a regional background approach, the cleanup standard would be set at a new normal of contamination, reflecting government and industry resistance to cleaning up local air emissions, storm water and other source. Under this approach, sediments in contaminated areas and entire regions could simply increase in toxicity on an incremental basis, and no one would be accountable. Ecology should seek to reduce toxicity and contamination to levels that are environmentally sound and based on accepted science.

Overall, we know that as Puget Sound gets cleaned up and restored, the concentration levels in the sediment will gradually decline. The target for cleanups, therefore, should be natural background, even if it will take some years before we get there. Further, Ecology does not have the staff or resources to properly create “regional” background numbers and likely the project responsible parties will use their consultants to propose regional background numbers which will be slanted towards their client’s interests. We already see this approach under the current cleanups. Moreover, the sanctioning of lesser regional standards will disproportionately affect lower income citizens who reside in more polluted areas and species which are already struggling due to habitat encroachment and stormwater contamination (the coho in Longfellow Creek, for example).

Our organizations are opposed to the concept of “regional background” and we ask for it to be stricken from the rule.

	Line #	Comment
	1555	The following cleanup standards language is not protective: “If a risk-based concentration is below the regional background level or level that can be reliably measured, then the cleanup screening level is established at a concentration equal to the practical quantitation limit or regional background, whichever is HIGHER.” To be protective of human health and biota, especially for bioaccumlative toxins, we ask that the word higher be changed to ***lower***, if the regional background concept is to remain in code.
843	1488	The cleanup strategy using sediment cleanup units will likely be developed on a case by case basis. We have not seen, however, an outline of how sediment cleanup units fit into a strategy. For example, how will cleanup of a unit expedite the overall cleanup? What will prevent a developer or land-owner from expediting the cleanup in unit and gaining from it financially, while the other parts of the cleanup languish? We are also concerned that tax payers will end up paying for inadequate cleanups, especially in areas next to the units.

843 cont.

	We believe the following approach should be taken to ensure cleanup of the entire site. There should be a legal agreement will between the PLP and Ecology to ensure that the cleanup process is completed and that the PLP is held financially responsible. The PLP should be obliged to either meet agreed upon incremental goals regarding the cleanup of the entire site or donate to a fund for cleanup of the site. If the PLP fails to meet these conditions, future earnings of the PLP should be garnished to cover the cost of the cleanup

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844 **<u>Source Control</u>**

Source control measures and the standards for meeting them should be made explicit by Ecology. Prescribing source control methods and testing is necessary in order to avoid re-contamination of sites, as witnessed in the Duwamish River cleanup. As well, a more stringent approach to stormwater will help alleviate the gradual degradation of our waters.

Line #	**Comment**
1493	The rule contains the following language: "Use of source control measures to minimize future contamination." Without specificity, the rule language is almost meaningless. We suggest Ecology add the following verbiage: all potential sources of contamination will be identified and stormwater pollutants will be controlled by accepted BMPs, through source reduction strategies, or by a capture and treat technology. Pre- and post- treatment stormwater samples will be taken to assure that reduction of contamination was successful.
1813	Add the following sentence to this section: If source control has not been analyzed and implemented for a cleanup site, then that site will be relisted until the source control component is completed.

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845 **<u>Standards</u>**

Further explanation must be provided why Ecology has set sediment cleanup objectives at such high levels. The cleanup objectives for copper, lead and zinc are especially concerning. It is our opinion that Ecology should establish levels at or similar to consensus-based threshold effect concentrations (TECs) established in MacDonald et al. (2000). These standards have been adopted widely adopted across the country in states including but not limited to: Minnesota, Ohio, and Massachusetts. Ecology should either provide sufficient evidence as to why Washington merits higher standards or adopt standards more consistent with consensus-based TECs.

The high level for the sediment cleanup objective (SCO) of copper is especially concerning considering the potential effects to salmon. Significant resources have gone into protecting salmon and salmon habitat in Washington, leaving SCOs for copper at current levels will jeopardize any progress. While copper is vital to healthy growth of fish, it is also toxic and can cause irreversible damage at concentrations even slightly above those required for healthy growth (Hall et al. 1988, Eisler 2000, Baldwin et al. 2003).

845 cont. Copper can result in a variety of health issue in salmon, such as, impaired sense of smell, impaired ability to fight disease, impaired ability to sense vibrations (identify predators), delayed or accelerated salmon hatch rate, as well as reducing salmon food sources. Impaired sense of smell for salmon is particularly devastating, as salmon use their sense of smell to identify mates, predators and prey alike, confusing these relations could be fatal. In addition an impaired sense of smell will interfere with salmon migration; salmon will not be able to identify chemical signatures and will spawn in non-natal habitats. In these habitats to which they're not adapted, the survival rate will drop (Woody, 2007).We therefore ask Ecology to strongly consider revising the SCOs to provide more adequate protection for salmon, as well as all aquatic species.

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846 Standards should be set allowing the upper and lower sediment cleanup screening levels, cleanup screening levels (CSLs) and sediment cleanup objective to be determined by regional and background is not protective of the health of aquatic species. The establishment of SCOs and CSLs should be based on risk-based concentrations, in order to protect both human and aquatic species health, even if the concentrations are below regional backgrounds. As well, we continue to believe that the use of bioassayoverrides are not protective of human health and biota (see below).

845

Line #	**Comment**
2690	Chemical standards are significantly higher than other national and state standards, especially with regard to copper, lead, and zinc. An explanation should be provided as to why these elevated levels are necessary in Washington or standards more in line with consensus-based TECs should be adopted.
2488	How the biological criteria are used is unclear. In practice we have seen that bioassay passes can override the MCL. Is this proposed to still be the case? Please be clear about how these tests are used. For example, in Whatcom Waterway, bioassay passes overrode chemical tests for mercury, a bioaccumulative toxin. To Ecology's credit, a further standard called the "biological screening level" was established specifically for this site, although we argue that this level was set too high.

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	In the practice of protecting human health and safety, bioassay over-rides should not be allowed. Bioassays rely on test organisms only and cannot be said to account for the variability and sensitivity of the wide diversity of organisms found in Puget Sound. While it is true that bioassays did inform the selection of the SQS and MCL values, these values rely on average expectation in the area; they will not be predictive of every site, just as bioassays with test organisms will not be predictive of every site. Thus, with two inexact measures, it is more conservative and prudent; to neither disallow bioassay or chemical overrides of one another.

Public Participation

Public participation in the sediment cleanup process is essential. The public is affected in a variety of ways, including but not limited to: health concerns related to proximity, public access concerns regarding future use of contaminated sites, and concerns regarding contamination of food sources. Ecology should make very clear when and how information regarding the public participation in the cleanup process can be accessed. In addition deadlines for public comment should be made explicit and should be set at minimum of 30 days, to allow for full participation. More detailed comments are listed below in table format.

	Line #	Comment
847	1754, 1788	Ecology should provide the name of the list of contaminated sediments sites as well as its location and the frequency of updates. Providing such information will help the public stay involved in the cleanup process.
848	1961	The public notice period should be at least 30 days for small cleanups, and longer for larger or more complicated cleanups. This will allow for full public participation
849	1956	Public Participation Plan: The elements required in the plan focus on getting information from the public and pushing out information to the public. There is no actual dialogue with the public or discussion. These shortcomings in the code are reflected in actual practice. The public, represented by our groups and others, experience a disconnection between public concern and agency action and response. Add a requirement for public stakeholders, PLP, and agency discussion that occurs at early intervals during RI/FS and work plan development. We find that the initial decisions made between the PLP and Ecology prior to the issuance of the RI and FS, are really quite solid before the public ever gets to weigh in. Thus, the public really does not get to meaningfully participate in decisions. At a minimum, the proposed biologically active zone and the proposed sediment cleanup standards should be made available to the public before the RI/FS is issued- such that the public can provide early feedback about whether they believe these standards are acceptable. In addition, the public should have a role in the alternatives discussion and the choosing of a preferred alternative ***before*** the official draft RI/FS comes out for official public comment. Required discussion sessions between all of the stakeholders, including the public, may be the only way to make this happen.
850	2911	Under the section “Minimum Requirements for Cleanup Actions,” mention of public comment and review is made, but no specifics are given. This section should be linked back to section 173-204-550, such that public participation is formalized.

CLEANUP PROCESS

The below detailed comments will provide more clarity and protectiveness to the cleanup process.

851	1512	In regard to cleanup process expectations, please include underlined wording in code: Monitoring will typically include analysis of sediment chemistry at a minimum, but may also include bioassays, tissue chemistry, pore water and surface water testing, <u>especially where these initially exceeded cleanup standards</u> and more intense discharge monitoring than would normally occur under a discharge permit where circumstances warrant.
852	1518	Also, in regard to cleanup process expectations and scope of information, please require that characterization include the full lateral and vertical extent of contamination for each site. In the absence of this information, a site unit cannot be defined and inadequate cleanup will ensue. Lack of complete characterization upfront at contaminated sites has led to inefficient decision making processes and a therefore a more costly cleanup process at numerous sites. It is much more cost-effective and scientifically valid to do a full characterization at the beginning of an investigation.
853	1570	Enhanced Natural Recovery (ENR) is not appropriate in many areas as a cleanup action. This action simply dilutes the contamination that is present. It should only be potentially considered in an area that is already depositional, to speed up the natural sediment deposition process. In an area that is neither depositional nor erosional, the thin layer cap used as ENR will not be sufficient to suffice as cleanup. In an area that is erosional, ENR should not be contemplated at all. The code should be amended to: Sediment contamination may be addressed by active cleanup actions such as dredging, capping, treatment, and enhanced natural recovery, <u>the latter in depositional areas only.</u>
854	1588	We believe that it is essential that Ecology retains its right to protect human health and the environment through its ability to amend cleanup actions. How will the department make the determination that the previous cleanup action is no longer sufficiently protective of human health and the environment?
855	2896	A reasonable restoration timeframe is said to be 10 years from the start of cleanup action. This is not reasonable. This standard should be 5 years or less, especially because this is measured only from the start of the cleanup action, itself. An additional measure of restoration timeframe should include the time from which a cleanup site is identified to when it is cleaned. Please institute enforceable timelines for ***each*** of the steps associated with cleanup, from discovery to final cleanup.

856 **Sediment Impact Zones and Sediment Recovery Zones**

It is not clear how a polluting activity can be in the public interest engendering the necessity of sediment recovery zones and sediment impact zones, whereas the minimization of pollution

856 cont. below sediment standards is not in the public interest. Please see Table below for comments on sediment recovery zones and sediment impact zones.

857	1508	A sediment recovery zone should not be an option for a cleanup action. This simply allows pollution to remain in place and is an unacceptable solution.
	3064	Notwithstanding our opposition to sediment recovery zones, the ability to declare a contaminated area a sediment recovery zone, with mere review and re-approval every 10 years is impermissible. Review should occur every 5 years and a cap of 20 years should be the maximum allowed.
858	1013	In regard to a sediment impact zone, how will cost be used in the process of determining the minimum practicable chemical contamination and biological effects levels? While cost is obviously a factor in the ability to implement a plan, it should not be given the same weight as other considerations such as: environmental effects, short/long term viability and technical feasibility. The section goes on to say, "Adverse effects to biological resources within an authorized sediment impact zone shall not exceed a minor adverse effects level as a result of the discharge, as determined by the procedures of subsection (4) of this section." Subsection (4) however, does not ensure compliance, however.
	1116	Subsection (4) delineates many actions and studies, but it does not limit the amount of toxics entering and remaining in the sediment. Within code, describe how these actions and studies will be used to limit the amount of pollutants entering the sediment.

Definitions/Clarification

There are several instances that we feel would benefit from further definition and clarification, to ensure that protective standards and cleanups are upheld.

	Line #	Comment
859	261	While specific metrics for establishing depth of the Biologically Active Zone are appreciated, a minimum of 20 cm in conjunction with a determination by using said metrics would be more acceptable. Changes to the code, make it appear as though BAZ could be less than 10 cm, providing less protection than the previous draft of the SMS.
860	1606	Clearer and more specific definitions of station and station cluster are needed. Since sampling of stations and station clusters are the identified mechanisms to list sites, these need to be understood in practical terms. For example, how far apart can individual stations be for them to be part of one station cluster, how big is a station, etc.
861	1957	How is "cannot practicably achieve" defined. Cleanups of over 10 years are significant, there should not be any ambiguity regarding this exception.
862	3025	"Practicable" should be more clearly defined when dealing with cleanups of such great length.

Thank you for the opportunity to comment on the Sediment Management Standards. We would be happy to meet with you in person about the SMS rule to discuss our concerns.

Sincerely,

Matt Krogh, North Sound Baykeeper, RE Sources
Bart Mihailovich, Spokane Riverkeeper
Mike Petersen, Executive Director, The Lands Council
James Rasmussen, Coordinator, Duwamish River Cleanup Coalition
Heather Trim, TAG Boardmember, Duwamish River Cleanup Coalition
Brett VandenHeuvel, Executive Director, Columbia Riverkeeper
Chris Wilke, Puget Soundkeeper and Executive Director Puget Soundkeeper Alliance

WSPA

Western States Petroleum Association

Credible Solutions • Responsive Service • Since 1907

Patty Senecal
Manager, Southern California Region and Infrastructure Issues

VIA ELECTRONIC MAIL

October 29, 2012

Adrienne Dorrah
Department of Ecology
Toxics Cleanup Program
PO Box 47600
Olympia, WA 98504
RuleUpdate@ecy.wa.gov

Subject: Comment Letter- State of Washington's Proposed Sediment Management Standards (SMS) Rule Amendments

Dear Ms. Dorrah,

Western States Petroleum Association (WSPA) is a non-profit trade association representing twenty-seven companies that explore for, produce, refine, transport and market petroleum, petroleum products, natural gas and other energy supplies in California, Arizona, Nevada, Oregon, Washington and Hawaii. WSPA appreciates the opportunity to comment upon Ecology's proposed SMS Rule Amendments.

WSPA recognizes and appreciates efforts that Ecology staff has put into the development of the proposed SMS Rule Amendments. As detailed below, WSPA supports certain aspects of the proposed Rule Amendments, but has concerns with other portions.

WSPA supports several key clarifications in the proposed SMS Rule amendments and would like to provide recommendations for further strengthening those clarifications, as follows.

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863 1. WSPA supports Ecology's clarification that sediment cleanup standards should not be used as sediment quality standards in WAC 173-204-500 (a)[1].

[1]"Sediment cleanup standards and the other cleanup criteria of WAC 173-204-500 through 173-204-590 are not sediment quality standards and shall only be used for purposes specified in chapter 70.105D RCW [Hazardous waste cleanup — model toxics control act]]. Sediment quality standards are established under Part III of this

863 cont. Recommendation: WSPA recommends that these clarifications be strengthened by adding language to specify the sediment cleanup standards shall not be used for the development of effluent limitations in NPDES permits.

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864 2. WSPA supports the continuous use of the two-tier framework for establishing site specific cleanup standards, especially as it includes consideration of regional background and natural background levels.

Recommendation: WSPA recommends that Ecology conduct special studies to establish regional and natural background levels that are representative and scientifically sound. WSPA also recommends that the term "area background" (which appears in the definition of regional background) be defined within the proposed SMS Rule Amendments.

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865 3. WSPA supports Ecology's clarification that a person or party conducting an initial cleanup action will not be responsible for cleaning up recontamination by others in WAC 173-204-500 (b)[2].

4. WSPA supports Ecology's emphasis on source control. WSPA believes source controls can be just as important as cleanup of sediments, depending upon the pollutant(s) at issue. WSPA would like to emphasize that source control efforts should be based on sound science; for instance, sediment fate and transport modeling should be conducted in order to identify other sources and to estimate loading from these sources to a site. Without this type of analysis or a modeling effort, the appropriate role of source control measures cannot be defined. WSPA recommends adding language specifying this.

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866 5. WSPA supports Ecology's definition of sediment recovery zones, which clarifies that a sediment recovery zone should be determined using sediment cleanup standards and not sediment quality standards.[3]

WSPA also has serious concerns regarding issues, and requests that Ecology modify the proposed amendments to address these concerns, as follows.

chapter [Sediment Quality Standard in Chapter 173-204 WAC] under the authority of chapters 70.105D [Hazardous waste cleanup — model toxics control act] and 90.48 RCW [Water pollution control]." [WAC 173-204-500 (a)]

[2]"(b) Recontamination. Recontamination of sediment at remediated sites or sediment cleanup units may occur from ongoing discharges. It is the department's expectation that further cleanup of recontamination will not be required by the person(s) conducting the initial cleanup when the person(s) can demonstrate, upon department approval, that the recontamination is caused by a source or a permitted release not under the authority or responsibility of the person(s) conducting the initial cleanup." [WAC 173-204-500 (b)]

[3]"(46)"Sediment recovery zone" means an area established by the department within a site or sediment cleanup unit where the department has determined cleanup actions cannot achieve the applicable sediment cleanup standards within ten years after the start of the cleanup action." [WAC 173-204-200 (46)]

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867 6. WSPA believes that cost should be incorporated into the definition of "technically possible." The proposed definition of "technically possible" in the proposed SMS Rule Amendments is "capable of being designed, constructed and implemented in a reliable and effective manner regardless of cost" [WAC 173-204-200(49)], and technical possibility is one of the factors that can be used to adjust a cleanup level.[4]The degree of risk reduction and the cost of achieving a specified degree of risk reduction should always be considered in the determination of cleanup levels and selection of cleanup alternatives.

Recommendation: WSPA recommends that the phrase "regardless of cost" be removed from the definition of "technically possible."

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868 7. WSPA believes proposed requirements of use of tribal fish consumption patterns as a maximum exposure scenario is too broad and overly protective. The new sediment cleanup standards for the protection of human health do not contain fixed fish consumption rates for sediment cleanup, but they do require the use of tribal fish consumption patterns as a default maximum exposure scenario in calculating sediment cleanup standards for the protection of human health.

Tribal consumption rates can be found in a recently released new fish consumption rates technical support document[5], and the rates are higher than rates for the general public and for recreational fishers (see **Table A**). The requirement to use tribal fish consumption rates appears to be overly protective. Even though the proposed SMS Rule Amendments would allow consideration of an alternative maximum exposure scenario other than tribal fish consumption patterns[6], WSPA believes that it is highly unlikely that alternative maximum exposure scenarios would be allowed because the new standards require consideration of "historic, current, and potential future tribal use of fish and shellfish from the general vicinity of the site" for the human health risk assessment (emphasis added). The requirement to consider "historic and potential future" tribal use is overly broad. Further, only current use is relevant to the risk assessment.

Recommendation: WSPA recommends replacing "historic, current, and potential future tribal use of fish and shellfish …" with "current tribal use of the fish and shellfish…". Any extension of tribal use areas for future conditions should be determined on a case-by-case basis. WSPA also recommends revisions of the new standards to include more site-specific consideration offish consumption rates.

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[4] "The sediment cleanup level shall be adjusted upward as required based on what is technically possible and whether meeting the sediment cleanup objective will have an adverse impact on the aquatic environment, including natural resources and habitat." [WAC 173-204-500(5)(a)(i)]

[5] WSPA is referring to fish consumption rates proposed by Ecology in a new technical support document currently out for public review. See http://www.ecy.wa.gov/toxics/fish.html.

[6]"The department may approve an alternate reasonable maximum exposure scenario for the site in accordance with WAC 173-340-708 [human health risk assessment procedures] and 173-340-702 (14) through (16) [general policies – burden of proof, new scientific information, criteria for quality of information]."

Table A. Reproduced from Table 1 at p. xvi in Fish Consumption Rates Technical Support Document – Public Review Draft August 27, 2012 Version 2.0.

Table 1. Summary of Fish Consumption Data, All Finfish and Shellfish (g/day)

Population	Source of Fish	Number of Adults Surveyed	Mean	Percentiles		
				50th	90th	95th
General population	All sources: EPA method	2,853	56	38	128	168
	All sources: NCI method	6,465	19	13	43	57
Columbia River Tribes	All sources	464	63	41	130	194
	Columbia River	–	56	36	114	171
Tulalip Tribes	All sources	73	82	45	193	268
	Puget Sound	71	60	30	139	237
Squaxin Island Tribe	All sources	117	84	45	206	280
	Puget Sound	–	56	30	139	189
Suquamish Tribe	All sources	92	214	132	489	797
	Puget Sound	91	165	58	397	767
Recreational Fishers (compilation of multiple studies)	Marine waters, WA State	–	11–53	1.0–21	13–246	
	Freshwater, WA State	–	6.0–22	–	42–67	

Sources: Adapted from Polissar et al., 2012, Table E-1. Data for recreational fishers is from Table 3, Technical Issue Paper: *Recreational Fish Consumption Rates* (Ecology, 2012).

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869 8. The proposed biological criteria in the new numeric freshwater sediment cleanup standards for benthic community protection are based on insufficient science. The proposed new numeric freshwater sediment cleanup standards, consisting of chemical and biological criteria, would replace the current narrative standards. Unlike the biological criteria in the marine sediment standards, which are based on a comparison to reference sediment, the biological criteria in the freshwater standards are based on a comparison between test sediment and laboratory control sediment "… because of the lack of established reference sites in Washington and the highly variable responses observed in reference sediments."[7] Because the biological test results of test sediment could be affected by "natural physical and chemical characteristics, e.g., grain size, organic content,"—i.e., by factors other than contaminants in the sediment—the marine biological criteria are based on a comparison to reference sediment.[8] In other words, test sediment from a clean, reference site may show more adverse biological responses than would be observed in clean control sediment prepared in a laboratory.

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[7] p. 3-26 of the draft sediment cleanup user manual II: guidance for implementing the sediment management standards, Chapter 173-204 WAC.

[8] "Reference sediment sample" means a surface sediment sample which serves as a laboratory indicator of a test animal's tolerance to important natural physical and chemical characteristics of the sediment, e.g., grain size, organic content." (p. 34 of the proposed SMS Rule Amendments)

Additionally, according to Michelsen 2011[9] Ecology requested a review of the method and draft report from four national-level scientific peer reviewers. To our knowledge, the reviewers' comments have not been made available for public review.

Recommendation: WSPA believes that the biological criteria are not sufficient for the intended purpose and recommends that the proposed biological criteria not be included in the proposed amendments until adequate freshwater reference sediment conditions are established.

WSPA also requests that the peer reviewers' comments and Ecology's responses to the comments be available for public review.

870 9. The chemical criteria in the freshwater sediment cleanup standards for benthic community protection should be used, along with adequate confirmatory procedures, in the determination of cleanup sites. WAC 173-204-520 contains a procedure to determine a cleanup site. According to WAC 173-204-520(3)(b), (freshwater/marine sediment) biological criteria would be used as a confirmatory test if a site exceeds (freshwater/marine sediment) chemical criteria. If the site exceeds both chemical and biological criteria, the site would be considered to be a cleanup site. As discussed above,
871 the biological criteria in the freshwater sediment cleanup standards for benthic community protection are based on insufficient science and are not reliable to be used for the cleanup determination.

Recommendation: WSPA recommends that Ecology develop new confirmatory procedures as an alternative to the use of biological criteria in the confirmatory test.

As detailed below, WSPA also identified portions of the proposed amendments that appear to be ambiguous or contradictory, and WSPA believes that the proposed rule would be improved by addressing these concerns, which are detailed below.

872 10. Human health targets for non-carcinogens are summarized in Figure 1 (p. 11 of the proposed SMS Rule Amendments), but these targets appear not to match WAC 173-204-561(3)(b)(i) and WAC 173-204-561(2)(a)(ii). In Figure 1, a hazard index (HI) ≤1 for total site risk is proposed for cleanup screening level (CSL), and a hazard quotient (HQ) ≤1 is proposed for individual substances for the sediment cleanup objective (SCO). However, the text in both WAC 173-204-561(3)(b)(i) and WAC 173-204-561(2)(a)(ii) does not match Figure 1. WSPA recommends that the figure and accompanying text of these sections be reconciled.

873 11. The biological tests presented as part of the biological criteria in WAC 173-204-562 are for marine sediment. There is no mention of biological criteria for low salinity sediment. WSPA recommends that Ecology clarify if the biological criteria for low salinity

[9] Michelsen, 2011.Development of benthic SQVs for freshwater sediments in Washington, Oregon, and Idaho. Report to Washington Department of Ecology and Oregon Department of Environmental Quality. Publication No. 11-09-054. Prepared by Avocet Consulting.

873 cont. sediment would be determined on a case-by-case basis or would be the same as the biological criteria for low salinity sediment.

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874 12. WAC 173-204-520 contains procedures to determine a cleanup site, but insufficient detail is provided to understand what type of tests should be conducted for the cleanup site determination. Further, if biological test results trump chemical test result according to WAC 173-204-520(3)(b), there is no apparent reason to require chemistry tests as part of the cleanup site determination. WSPA recommends Ecology provide further clarification on this.

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13. WSPA recommends that tables be revised/re-organized to match the corresponding text. Information summarized in newly added Tables V and VIII for marine and freshwater sediment biological criteria do not appear to match the corresponding text, with examples provided here as follows:

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875 • Biological tests that are defined in the text mostly overlap with those in Table V of the current SMS; however, the microtox test is not included in the text (but is included in Table V), while the benthic abundance test is included in the text but not included in Table V.

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876 • In Tables V and VIII, information presented for ‘Sediment Cleanup Objective for each biological test’ and ‘Cleanup Screening Level for each biological test’ is neither the SCO nor the CSL itself, but rather the method of determination to be used to assess an exceedance of the SCO or CSL for each biological test.

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877 • In Table V, WSPA suggests that the entry ‘$N_T/N_R > 0.70$’ in CSL for bivalve or echinoderm abnormality/mortality should be ‘$N_T/N_R < 0.70$’.

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878 • Table VIII specifies only a mean difference between a test and a reference for each biological test. However, neither the table nor the corresponding text specifies the additional requirement of a statistical test. The legend to Table VIII simply states “[a]n exceedance of the sediment cleanup objective and cleanup screening level requires statistical significance at p= 0.05,” which implies that a statistical test is required. Ecology should revise both the corresponding text and the table to clarify that a statistical test is required.

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879 • Table VIII contains a column for a performance standard for reference even though no reference conditions for freshwater sediment have been identified for use with the biological criteria, and the biological criteria are based on the comparison between control sediment and site sediment in the proposed SMS Rule Amendments. Ecology should revise the table by removing the column for reference to avoid confusion.

14. Minor edits are required for the following;

880 • In Table VII, a CSL for endrin ketone is zero, but WSPA believes that this value should be higher than the SCO value of 8.5 in Table 5.

881 • In WAC 173-204-564, “SCO and CSL based on protection of higher tropic levels species shall not be established at concentrations that do not have the potential for minor adverse effects.” (#2791-2793). This sentence should contain single not.

In summary, WSPA supports many of the key clarifications in Ecology’s proposed amendments. WSPA recommends revisions to the sediment cleanup standards for human health protection, especially to the requirement to use tribal fish consumption patterns. WSPA also recommends that Ecology defer adoption of the freshwater sediment cleanup standards until issues regarding the biological criteria are adequately addressed.

Please contact me if you have any questions regarding the comments provided in this letter.

Sincerely,

Patty Senecal
Manager, Southern California Region & Infrastructure Issues
Western States Petroleum Association (WSPA)
970 West 190th Street, Suite 770, Torrance, CA 90502
Office: 310-808-2144, Cell: 310-678-7782

Weyerhaeuser

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October 26, 2012 Sent by Electronic Mail to: RuleUpdate@ecy.wa.gov
Ador461@ecy.wa.gov

Adrienne Dorrah
Toxics Cleanup Program
Washington Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Dear Ms. Dorrah:

Included below are the Weyerhaeuser NR Company comments on proposed Sediment Management Standards amendments (review version August 15, 2012), the *Preliminary Cost-Benefit and Least Burdensome Alternative Analyses* (Publication no. 12-09-051, August 2012), and the *Draft Sediment Cleanup Users Manual II* (Publication no. 12-09-057, August 2012).

These work products represent the culmination of several years of intense Department of Ecology staff effort. Throughout this activity Ecology staff have been committed to open engagement with the various interest groups and have conducted themselves in a highly professional manner. This should be recognized and commended.

Sediment Management Standards proposed amendments (WAC 173-204)

882 1. General comment - "The Department shall determine" or "At the Department's discretion" appear many times throughout this regulation. This positions Ecology as the ultimate (and perhaps unilateral) decision-maker on regulation implementation matters. While the agency has a history of good-faith interactions with PLPs and would undoubtedly point to the *Sediment Cleanup Users Manual II* as the guide book for informing on technical and some policy implementation, it is a bit disconcerting to constantly see this "Department shall determine/Department discretion" language in rule.

   The agency should acknowledge that experienced, knowledgeable professionals, who are not state employees, can contribute much on the technical/scientific issues germane to implementing this regulation. We suggest the following language addition wherever the phrase "The Department shall determine" or "At the Departments discretion" appears:

   "The Department shall determine, <u>after considering relevant and credible information,</u>…"

883 2. WAC 173-204-100 <u>Authority and purpose</u> -- Weyerhaeuser supports the decision to adopt Sediment Quality Standards (WAC 173-204-320 and -340) exclusively under Chapter 90.48 RCW Water Pollution Control; and Sediment Cleanup Standards (WAC 173-204-500

883 cont. through -590) exclusively under authority of Chapter 70.105D RCW Model Toxics Control Act.

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884 3. WAC 173-204-200 – Weyerhaeuser supports the addition of the defined terms and regulatory language around *Enhanced Natural Recovery, Natural Background, Natural Recovery, Monitored Natural Recovery, Site Cleanup Units, Nonanthropogenically Affected* and *Regional Background*. These concepts, reasonably applied, should facilitate achievement of Ecology's stated goal "…to achieve better, faster reductions in toxic pollution while avoiding those high-cost/low value scenarios." That said, let's appreciate that these regulatory provisions will initially add to the mystery and complexity of the revised SMS. Ecology (and PLP) aspirations for a confident, compliant cleanup process will be undercut if the agency appears to overreach in the application of these concepts.

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885 4. WAC 173-204-200 – Definitions of *Freshwater*, *Low Salinity* and *Marine* sediments – These current definitions, based on salinity but with no temporal consideration, likely mean that some estuarine sediments will shift between regulatory classifications with tidal cycles or due to seasonal river flow conditions. The definitions of fresh and marine waters in Washington's *Surface Water Quality Standards* regulation, and specifically at WAC 173-201A-260(3)(e), provide for a more definitive (and data-driven) point of physical demarcation between classifications in a river/estuarine system. In the interest of avoiding uncertainty on which set of sediment standards will apply, Ecology should consider the need to reconcile these definitions.

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886 5. WAC 173-204-200(38) *Regional Background* – The last sentence in this definition, referencing the term "area background" from the MTCA regulation, should be deleted. Mention of "area background" adds nothing to the Regional Background concept and its presence could only add uncertainty/confusion.

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887 6. WAC 173-204-200(40) *Sediment* - This definition effectively duplicates "(48) *Surface Sediments*." Is there a need for both definitions?

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907 7. Former WAC 173-204-330 Low salinity sediment quality standards -- Did Ecology intend to delete this section? If so, how/where will the regulatory direction for addressing Low Salinity sediments be provided?

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888 8. Ecology should consider amending proposed WAC 173-204-500 to add

> "Ecology will apply the sediment cleanup unit concept in concert with Chapter 70.105D RCW so that PLPs that conduct remedial action in sediment cleanup units shall obtain the covenant not to sue and contribution protection provided for in RCW 70.105D.040."

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889 9. WAC 173-204-500(4)(b) – Ecology's qualified "expectation" that further cleanup of recontamination sediments will not be required falls short of providing the bright-line legal certainty that would truly encourage early, interim or full remedial cleanups. The rule language should be extended to exempt from "further cleanup," recontamination that might arise from <u>any</u> "person(s)" "permitted release." In short, "permitted releases," presumably

889 cont. authorized under a Clean Water Act NPDES permit, should provide an effective legal shield from the threat of "further cleanup" irrespective of which "person(s)" conducted the initial cleanup. This section should be re-written to accomplish that policy outcome.

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890 10. WAC 173-204-500(4)(c) – The expectation that "cleanup units with limited contamination" will be restored using "active cleanup actions such as dredging or capping" is illogical. This would seem to be the class of units for which "natural recovery" and/or "monitored natural recovery" or institutional controls would be the first choice. Ecology should promote and accept the best response action to accomplish a sediment cleanup level at lowest cost and within a reasonable timeframe (apparently considered to be 10 years). There is no policy basis to favor or expect (or perhaps demand) active cleanup actions over passive cleanup actions, and especially for cleanup units with limited contamination.

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891 11. WAC 173-204-500(5)(a)(i) – Ecology establishes an unnecessary policy objective by demanding the decision on a sediment cleanup level be judged against "what is technically possible." This specification will dampen enthusiasm for "source(s)" conducting sediment cleanups. The current SMS at WAC 173-204-500(4) identifies consideration of "net environmental effects, cost and technical feasibility." These directives are inevitable and rational, and should be retained.

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892 12. WAC 173-204-500(5)(b)(i) and (ii) – Why are "Active cleanup actions" necessarily favored over "Passive cleanup actions"? Ecology should adopt an outcome-based mentality to promote achievement of an appropriate sediment cleanup level while considering "net environmental effects, cost and technical feasibility." Overreach in these subsection -500 provisions will likely discourage voluntary participation in sediment cleanups and/or lead to unproductive higher transaction costs in working toward a cleanup level.

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893 13. WAC 173-204-510(2) Station clusters – Is it understood that the three sampling stations used to define station clusters of potential concern need to be contiguous? The "*Preliminary Cost-Benefit and Least Burdensome Alternatives Analyses*," publication 12-09-051, August 2012, makes that reference on page 12. As a practical matter and to support the subsequent implementation of SMS requirements, an indicator of deficient sediment quality should be based on contiguous sampling locations.

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894 14. WAC 173-204-510(2)(d) – The reference to (b)(i) can be shortened to (b). There isn't a (b)(i). There is a similar reference in -520(3)(a).

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895 15. WAC 173-204-560(1) – Is the SMS regulation really the appropriate regulatory tool to address a "threatened release of contaminants to sediment"? Is this just boilerplate language or are there provisions in SMS that Ecology believes will work better than a Clean Water Act program designed to regulate toxic pollutant discharges through the water column to sediment? Making the same point through a different route, the "sediment cleanup standards" provisions will only be triggered if there is a "station cluster of potential concern" documented. How would a "station cluster" ever be demonstrated based on a "threatened release"?

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896 16. WAC 173-204-560(5) Regional background – The recounting of "Regional background" in this section differs slightly from the definition of this term in WAC 173-204-200(38) (which mentions "or storm water not attributable to a specific source"). It would be best if proposed -560(5) mimics the definition in -200(38).

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897 17. WAC 173-204-561(2)(b) – Reasonable maximum exposure. RME is a critical regulatory concept but the term is undefined in this regulation. A definition should be provided and should clearly announce the states' health protection goal in the derivation of human health-based SCL; i.e., to protect a population/sub-population group/individual who represent exposures at the XXth percentile risk level for carcinogenic/non-carcinogenic pollutants. Specification of the RME goal will then allow for information development to select the most appropriate point values for the explicit and implicit parameters in deriving human health-based cleanup standards.

The definition of RME is one on which public comment should be invited.

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898 18. WAC 173-204-561(2)(b) -- The directive to use Ecology default RME exposure parameters "unless site-specific information indicates that the default RME exposure parameters are inappropriate" is backward. Ecology should expect and encourage use of the best site-specific and science-based information, and only rely upon default values as a second choice.

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899 19. WAC 173-204-561(2)(b)(i) – Which tribal consumption RME scenario will be used for freshwater sites? For example, what default values would be used for a freshwater site on the lower Columbia River?

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900 20. WAC 173-204-561(2)(b)(i)(a) – "Historic" and "potential future" use of fish and shellfish consumption rates. Ecology's choice of a site fish/shellfish consumption rate should be based on a credible consumption survey, not anecdotal remembrances or aspirational hopes.

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901 21. WAC 173-204-561(2)(b)(i) – Weyerhaeuser endorses the comments submitted by the NCASI explaining why salmonids should not be considered in the derivation of a sediment cleanup level[1].

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902 22. WAC 173-204-564(2)(iii)(B) – Weyerhaeuser endorses the comment submitted by the NCASI which cautions against expansion of the definition of what constitutes a bioaccumulative chemical beyond the criteria already codified in WAC 173-333-320(2)(b).

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903 23. WAC 173-204-570(3)(h) – The Ecology demand for a cleanup action which is "technically possible" is unnecessary. An outcome-based posture in which the sediment cleanup level is achieved and with consideration of "net environmental effects, cost and technical feasibility," should be satisfactory to the agency.

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[1] Letter, Jeff Louch, NCASI, to Adrienne Dorrah, Ecology Toxics Cleanup Program, October 25, 2012

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904 Draft Sediment Cleanup Users Manual II

1. Page 1-1. The Purpose statement for SCUM II announces that this "document is to provide guidance to Ecology staff on implementing Part V, Sediment Cleanup Standards…". Will Ecology please confirm that this document is guidance, and not effective regulation, and that to the extent other scientifically-credible or site-specific information is developed, it will be considered by Ecology staff?

2. Pages 9-4 through 9-8. This guidance should announce a preference for utilizing scientifically-credible, site-specific information to calculate risk-based concentrations. WAC 173-204 applies state-wide. The nature of contaminated sediment sites should vary considerably across the state, and each with appropriate site-specific exposure parameter values. Ecology should not lock-in on an arbitrary "tribal consumption" scenario as a starting point or the default for computing risk-based concentrations.

3. The application of the RME concept, as articulated in the Draft *Sediment Cleanup Users Manual II* (Sections 2.2.2 and 9.2.1), will result in an overly protective and unreasonable sediment cleanup levels. The serial reliance on "average and upper-bound estimates" for the explicit and implicit exposure parameters in the standard risk equation should not be the default approach. The concept of "compounded conservatism" is described in a technical assessment titled "*A Review of Methods For Deriving Human Health-Based Water Quality Criteria With Consideration of Protectiveness*," prepared by NCASI staff and independent consultants.[2] As implied by the title, this white paper explains how the selection of "upper-end-of-range" values for multiple parameters in a risk equation will lead to very conservative estimates of risk or, in the case of human health-based water quality criteria (HHWQC) or sediment cleanup standards, overly restrictive criteria (pdf attached).

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905 Preliminary Cost-Benefit and Least Burdensome Alternative Analyses

1. Page 3 and 4 – The presentation of cost numbers is a bit confusing. We assume "$148 thousand" is $148,000; but what about "$60,387 thousand" or "$373,296 thousand." Thousands or millions?

2. Page 10, paragraph 2.4.2 – Is it certain that Ecology will sponsor and pay for the establishment of natural background and regional background values?

3. Page 19, paragraph 3.4.2; and with implications for cost estimates presented in paragraphs 3.6, 3.8 and in various paragraph 4.2 subsections – The sediment sampling/analysis costs (range $1,600 - $4,200 per sample) appear to be significantly understated. What is the project work scope and source for this cost information? As a point of comparison, a recent cost estimate for a Weyerhaeuser sediment sampling/analysis project is enclosed. The $214,962 cost estimate presented is for 18 samples, or $11,942/sample. This was prepared in early 2012 for a Washington SMS estuarine site and by a highly qualified Washington state-

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[2] The National Council for Air and Stream Improvement (NCASI) is an independent, non-profit research institute that focuses on environmental topics of interest to the forest products industry.

905 cont. based environmental consulting firm. It identifies and includes the essential project elements to yield a work product acceptable to the WDOE. The list of analytes, bioassays, equipment rental, etc., are enclosed (and denoted as Attachment 1). Information identifying the site, consultant, individual names has been redacted.

4. This *Preliminary Cost-Benefit and Least Burdensome Alternative Analyses* sidesteps a fundamental evaluation. That is, whether the proposed rule, once implemented, will actually result in a reduction in toxic chemical concentrations in surface sediments, leading to less bioaccumulation/bioconcentration through the various trophic levels, and ultimately in ingestion of less contaminated fish/shellfish tissue, and reduction of carcinogenic/non-carcinogenic adverse human health impacts. <u>In short, will this proposed regulation revision yield improved human health for those consuming fish/shellfish from contaminated areas?</u> While the Preliminary Cost-Benefit analysis speculates on an increase in nearshore/upland property values and reduced property transfer transaction costs, these are subordinate to Ecology's primary goal of protecting human health and the environment.

Thank you for the opportunity to present these comments.

Sincerely,

Ken Johnson

[redacted]

Attachment 1

Work Tasks and Cost Estimates for 18 Sediment Samples

[redacted]

Project Name
Date

DRAFT

Task	Staff:	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]		Total	Subcontractor/Vendors					Total	
	Rate:	$250	$145	$135	$120	$100	$95	$90	$90	$70	$65	ODC $	[redacted]	ARI Analytical	RSS	EcoChem	Newfields	[redacted]	Subcontractor/ Vendor Total	
Task 06000 - Conduct [redacted] ampling		***70***	***16***	***82***	***20***	***254***	***44***	***116***	***28***	***56***	***9***	***2,600***	***$ 83,195***	***$ 36,913***	***$ 12,000***	***$ 9,450***	***$ 61,425***	***$ -***	***$ 119,788***	***$ 214,962***
Project Management and Invoicing		12		12							9		$ 5,205						$ -	*$ 5,205*
Prepare and submit Client Review Draft SAP/QAPP		12		12		60	12	20		16		$ 100	$ 14,790						$ -	*$ 14,790*
Revise and submit Final Draft SAP/QAPP		6		8		20	8	10		8		$ 100	$ 6,910						$ -	*$ 6,910*
Prepare Health and Safety Plan		2		6		20	4			8		$ 100	$ 4,360						$ -	*$ 4,360*
Prepare for and conduct sampling				12		54		54				$ 2,100	$ 14,190	$ 36,913	$ 12,000		$ 61,425		$ 110,338	*$ 135,562*
Data Management, Data Validation and EIM Submittal		8	8		12				16				$ 6,040			$ 9,450			$ 9,450	*$ 16,435*
Prepare and Submit Client Review Data Report		24	8	20	8	60	12	20	8	16		$ 100	$ 21,710						$ -	*$ 21,710*
Revise and Submit Final Data Report		6		12		40	8	12	4	8		$ 100	$ 9,990						$ -	*$ 9,990*
TOTAL		70	16	82	20	254	44	116	28	56	9	2,600	$83,195	36,913	12,000	9,450	61,425	-	119,788	$214,962

Notes:
Assumes no edits to SAP/QAPP or Data Report will be made by Ecology or DNR
Assumes previous HASP will be sufficient with minor edits
Assumes 6 month project time period.
Assumes 3.5-day field event. Includes 3 12-hour days (includes travel) and 12 hours prep for 2 people.
Assumes sediment sampling in former [redacted] will be surface sediment grab samples collected on foot during low tide.
Assumes sediment sampling in area parallel to filled tidelands will be sampled from a boat with Van Veen Sampler. RSS will provide boat and sampler
Assumes samples will be collected using shovels or VanVeen sampler
Assumes locations will be logged using our GPS Trimble
[redacted] for bioassay DV
EcoChem for dioxin/furan DV - $450 per sample based on previous estimates

Analytical Parameter	Sample Matrix	Method Description	No. Samples	TAT (business)	Unit Cost	Total Cost
Former Mill Area - 9 recommended sample locations plus one duplicate						
Total Solids	Sediment	SM2540G	10	15 days	$10.00	$100.00
TVS (Loss on Ignition)	*Sediment*	*ASTM D2974*	*10*	*15 days*	*$35.00*	$350.00
Grain size	*Sediment*	*PSEP*	*10*	*15 days*	*$90.00*	$900.00
Total Organic Carbon	Sediment	Plumb 1981	10	15 days	$38.00	$380.00
Ammonia	Sediment	350.1M	10	15 days	$30.00	$300.00
Total Sulfide	Sediment	376.2	10	15 days	$40.00	$400.00
Zinc and Mercury	Sediment	6010/7471	10	15 days	$95.00	$950.00
SVOCs (short list)	Sediment	8270-PSEP	10	15 days	$200.00	$2,000.00
Select SIM SVOCs	Sediment	8270-SIM	10	15 days	$130.00	$1,300.00
SIM-PAHs (5 ug/kg)	Sediment	8270-SIM	10	15 days	$180.00	$1,800.00
Porewater Extraction	Sediment	USACE	10	15 days	$25.00	$250.00
Porewater Sulfide	Sediment	376.2	10	15 days	$35.00	$350.00
Dioxin/Furans	Sediment	1613B	10	15 days	$635.00	$6,350.00
Bioassays	Sediment		10			$0.00
Subtotal						$15,430.00
Area Parallel to Filled Tidelands - 10 recommended sample locations plus one duplicate						
Total Solids	Sediment	SM2540G	11	15 days	$10.00	$110.00
TVS (Loss on Ignition)	*Sediment*	*ASTM D2974*	*11*	*15 days*	*$35.00*	$385.00
Grain size	*Sediment*	*PSEP*	*11*	*15 days*	*$90.00*	$990.00
Total Organic Carbon	Sediment	Plumb 1981	11	15 days	$38.00	$418.00
Ammonia	Sediment	350.1M	11	15 days	$30.00	$330.00
Total Sulfide	Sediment	376.2	11	15 days	$40.00	$440.00
Metals [a]	Sediment	200.8/6010/7471	11	15 days	$115.00	$1,265.00
SVOCs (standard lis)	Sediment	8270-PSEP	11	15 days	$300.00	$3,300.00
Select SIM SVOCs	Sediment	8270-PSEP	11	15 days	$130.00	$1,430.00
SIM-PAHs (5 ug/kg)	*Sediment*	*8270-SIM*	*11*	*15 days*	*$180.00*	$1,980.00
Aroclor PCBs (10ppb)	Sediment	8082-PSEP	11	15 days	$225.00	$2,475.00
Pesticides (HCB & HCBD)	Sediment	8081-PSEP	11	15 days	$125.00	$1,375.00
Dioxin/Furans	Sediment	1613B	11	15 days	$635.00	$6,985.00
Bioassays	Sediment		11			$0.00
Subtotal						$21,483.00
Analytical Total						$36,913.00

[a] *As, Cd, Cr, Cu, Pb, Ag, Zn by ICP, Hg by CVAA*

Other Analytical Costs

SRMs	*Billed as samples*
Level IV Data Package	*Included*
Level IV Dioxin Package	*$50 per sample*

A REVIEW OF METHODS FOR DERIVING HUMAN HEALTH-BASED WATER QUALITY CRITERIA WITH CONSIDERATION OF PROTECTIVENESS

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(presented in alphabetical order)

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Dr. Paul Anderson is a Vice President and Principal Scientist at ARCADIS and is also an adjunct professor in the Center for Energy and Environmental Studies within Boston University's Geography Department. Dr. Anderson has over 28 years of experience in human health and ecological risk assessment. Dr. Anderson received his B.A. in biology from Boston University in 1978, his M.A in biology from Harvard University in 1981 and his Ph. D. in biology from Harvard University in 1983. He was a postdoctoral fellow in the Interdisciplinary Programs in Health at the Harvard School of Public Health from 1983 until 1986. Dr. Anderson has performed numerous multimedia, multichemical and multipathway risk assessments for federal and state superfund sites throughout the United States including operating and abandoned chemical and manufacturing facilities, landfills, former woodtreating sites, and pulp and paper mills. Dr. Anderson has, on a regular basis, been called upon to review proposed State and Federal regulatory initiatives by a variety of organizations. Dr. Anderson has reviewed and provided comment on general human health and ecological risk assessment guidance, on proposed toxicity factors for several chemicals, on proposed criteria for specific chemicals, on the Great Lakes water quality guidance, and on proposed methods to develop ambient water quality criteria including states in the southeast, mid-Atlantic, northeast, mid-west and northwest. Dr. Anderson has managed the development of a watershed based model that predicts environmental concentrations of pharmaceuticals and related compounds in United States surface waters and overseen a database containing all the information available in the peer-reviewed literature on the aquatic toxicity, fate and removal of active pharmaceuticals ingredients in surface waters. Dr. Anderson is a leading advocate of advanced risk assessment techniques such as Monte Carlo analysis, has written over 30 papers and lectured widely on ecological and human health risk assessment, and has testified throughout the United States on the potential risks posed by dioxin and other chemicals.

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Ms. Ellen Ebert is a Senior Managing Scientist at Integral Consulting in Portland, Maine. She has more than 25 years of experience in managing and guiding human health and ecological risk assessments, designing studies to evaluate site-specific exposure behaviors, participating in regulatory negotiations, and providing comments on environmental policy. She has managed complex, multi-pathway risk assessment projects for a variety of clients throughout the United States and Canada. These projects have included the evaluation of contaminated soils, sediment, groundwater, surface water, air and biota. Ms. Ebert specializes in the area of exposure assessment and has designed and implemented numerous site-specific land use, recreational, and fish consumption studies to help guide the selection of potential receptors and the development of site-specific exposure parameters and assumptions for use in evaluating human exposures to contaminated river systems and floodplains. She has managed or guided multiple investigations of the potential hazards of PCBs, dioxins, furans, PAHs, metals, and pesticides and has provided substantial written input to regulatory proceedings concerning these chemicals. She has worked extensively on industrial and commercial projects under the RCRA, Superfund, and state regulatory programs, and has been instrumental in the development of alternative water quality standards and site-specific fish consumption estimates for use in risk assessment and NPDES permitting for clients nationwide.

Dr. Jeff Louch

Dr. Louch is a Principal Scientist with NCASI. He holds a doctorate in Analytical Chemistry from Oregon State University, and has been with NCASI for 21 years. During this time he has developed and applied multiple analytical methods to a variety of forest products industry matrices, and has designed and implemented a broad range of laboratory and field studies to understand how manufacturing processes impact the release of various chemicals to the environment and how forestry practices affect the runoff of silvicultural herbicides from forestry sites. In addition, he has performed multiple studies evaluating the efficacy of various proposed or promulgated EPA methods, including a screening method proposed for identifying potentially bioaccumulative chemicals in water, sediment, and tissues, and has provided extensive comment to EPA on various analytical issues. He also sat on a Washington State DOE stakeholder committee charged with developing a rule addressing persistent, bioaccumulative, and toxic (PBT) chemicals, and provided extensive comment to WDOE on proposed modifications to the state's Model Toxics Control Act (MTCA). More recently, he has been actively engaged in reviewing and commenting on proposals by WDOE to increase the fish consumption rate(s) (FCR) used in site-specific risk assessments under the MTCA rule and development of state-wide human health water quality criteria (HHWQC).

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Vickie Tatum is a Project Leader with NCASI, working at their Southern Regional Center in Newberry, FL. She holds a B.S. in Animal Science and a Ph.D. in Toxicology, both from the University of Kentucky. She has spent the past 19 years working on a variety of issues related to human and environmental health. Within the specific area of water quality, Dr. Tatum has focused on risk assessments and potential health effects related to pesticides and forest products industry effluent discharges. She has authored or coauthored publications addressing water quality topics such as the toxicity of herbicide mixtures to aquatic organisms, hydrogen sulfide in wastewaters, petroleum spills, wood leachates, and endocrine-active compounds.

Mr. Paul Wiegand

Mr. Wiegand is Vice President, Water Quality at NCASI. He has an M.S. in Environmental Engineering from Oregon State University and over 27 years of experience in process engineering and environmental science research. His work has included various environmental studies including several related to effluent treatment, source reduction, water quality and effects of effluents on receiving waters. He has also conducted and led investigations related to the management of natural resources including ambient water quality and protection of aquatic ecosystems. He is the Environmental Editor for TAPPI Journal and was recently appointed to the U.S. Department of Interior Advisory Committee on Water Information (ACWI) as a member of the Water Resources Adaptation to Climate Change Workgroup.

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AN OVERVIEW OF PARAMETERS USED IN THE DERIVATION OF EPA HUMAN HEALTH AMBIENT WATER QUALITY CRITERIA

1.0 EXECUTIVE SUMMARY

Consistent with the requirements of the Clean Water Act, states are obligated to establish numeric water quality criteria for toxic substances and to periodically consider the need for revisions to those criteria. Toxics criteria are designed to protect both resident aquatic life and humans exposed via drinking water, consumption of fish, and/or dermal contact. Criteria for the protection of human health (i.e., Human Health Ambient Water Quality Criteria, or HHAWQC) are traditionally derived using EPA-recommended equations that include parameters for risk, toxicity, and exposure. The values used for these parameters are revisited and adjusted periodically in response to the availability of new science and shifts in policy.

The material presented in this paper includes an overview of the derivation procedures for HHAWQC, focusing especially on the selection of values for the parametric components in the HHAWQC derivation equations. Particular attention is given to the use of conservative (i.e., over-protective) choices for multiple parameter values and the overall effect of compounded conservatism on the resulting criteria relative to health protection targets established by state and federal agencies.

1.1 Parameters Used in HHAWQC Derivation and Frequently Used Values

The equations used to derive HHAWQC are composed of explicit parameters (i.e., those that are listed and defined), and implicit parameters (i.e., those that are embodied with the application of the explicit parameters). The equations and rationales for selection of specific parameter values were developed by EPA more than twenty years ago and while updates in parameter values have been made periodically, the basic methodology remains unchanged. **Table 1.1** lists the explicit and implicit parameters used in the HHAWQC derivation. Also shown are typical parameter values recommended by EPA. The third column in the table provides an indication regarding whether the typical value reflects a central, upper-end, or maximum in the range of values that could be chosen for each parameter. It is clear from the table that, in nearly every case, the typical values used for explicit and implicit parameters are selected from the upper end of the range of possible values.

It is well-known, and mathematically intuitive, that the practice of selecting “upper end of range” values for multiple parameters in a risk equation will lead to over-conservative estimates of risk or, in the case of HHAWQC, overly restrictive criteria. Indeed, EPA’s Risk Assessment Task Force has suggested that “when several parameters are assessed, upper-end values and/or central tendency values are generally combined to generate a risk estimate that falls within the higher end of the population risk range” and “an exposure estimate that lies between the 90th percentile and the maximum exposure in the exposed population [should] be constructed by using maximum or near-maximum values for one or more of the most sensitive variables, leaving others at their mean values” (EPA 2004). This concept, however, has not been embraced in the current practice for deriving HHAWQC.

Table 1.1 Parameter Values used in HHAWQC Derivation and Location in the Range of Possible Values

Parameter	Typical Value	Location in Range of Possible Values[1] (maximum possible, upper-end, or central tendency)
Explicit Parameters		
substance toxicity	substance-specific	upper-end
body weight of a person	70 kg (actual mean is 80kg)	central tendency
drinking water intake	2 L/day (86th percentile), but assumes drinking water is untreated surface water	(extreme) upper-end
fish ingestion/consumption rate	17.5 g/day (90th percentile of sport fishers)	upper-end
substance exposure from other sources	80%	upper-end
Implicit Parameters		
cooking loss	0% (no loss due to cooking)	maximum possible
duration of exposure	70 years	(extreme) upper end
exposure concentration	at HHAWQC 100% of the time	maximum possible
relative bioavailability	1	maximum possible
bioaccumulation/concentration factor of fish	substance-specific	substance-specific (not evaluated)

[1]"maximum possible" would be the most conservative (over protective) choice possible, "upper-end" a very conservative choice, and "central tendency" a typical or average value for a population. "Extreme" denotes a value that is very near maximum.

1.2 Degree of Conservatism in HHAWQC

Section 6 of this report details the degree of protectiveness, conservatism, and the combined effect of conservative parameter value choices in the derivation of HHAWQC. The information provided shows that the values commonly used for each parameter can have the effect of lowering the calculated HHAWQC by large factors. For example:

- substance toxicity values are commonly reduced by 10 to 3000 times below demonstrated toxicity thresholds as a means of ensuring protection of human health
- assumptions about chemical exposure via drinking water results in some criteria being as much as 30 times lower than needed to afford the degree of protection targeted by most states and EPA

- the assumption that a person lives in the same place and is exposed to the same level of contamination for a 70 year lifetime results in criteria that are up to 8 times more stringent than if a median exposure period were assumed
- the assumption that waters would exist at the allowable HHAWQC for 70 years is in opposition to water management policies in virtually all states and results in criteria values that are 1.5 to 6 times more stringent than would be the case if actual water quality management practices were considered

Each of the factors listed above, and several others discussed in more detail in the following sections, can combine (i.e., compound) when applied in the same calculation, such as that used for deriving HHAWQC. The result is criteria that are many times lower than would be the case if the advice of the Risk Assessment Task Force regarding use of upper range values for one or more sensitive values and leaving others at their mean values (EPA 2004) were followed.

1.3 Comparison of HHAWQC with other Regulatory Mechanisms for Human Health Protection

The summary above, and supporting sections of this report, offer observations suggesting that HHAWQC are considerably more protective (i.e., lower in concentration, or over-protective) than are necessary to achieve the health protection targets described by EPA and many state environmental agencies. Section 7 of this report considers other evidence that might confirm or refute this observation. It contains a comparison of fish tissue concentrations corresponding to EPA recommended HHAWQC with (a) existing fish tissue concentration data, (b) concentrations found in other foods, and (c) allowable concentrations (such as fish consumption advisory "trigger levels") set by other US and international health agencies.

Findings from this comparison support the observation that HHAWQC are over-protective. Specifically:

- For higher assumed fish consumption rates and based on EPA fish tissue data, virtually all surface waters in the US would exceed the HHAWQC for PCB, mercury, and likely a number of other substances. In contrast, for example, health agencies have established fish consumption advisories for PCBs on only about 15% of water bodies (Appendix C) indicating that assumptions used by EPA are more conservative than the assumptions used by state agencies to derive fish consumption advisories.
- A comparison of the daily intake of several example substances for which HHAWQC exist, showed that intakes from other foodstuffs was greater than from fish and was already exceeding the allowable intakes used to establish HHAWQC. Thus, establishment and enforcement of more stringent HHAWQC may not provide a measureable public health benefit.
- Various federal and international agencies have established concentration limits for fish as a food in commerce. Levels set by these agencies (whose goal is to insure the safety of edible fish) show that EPA HHAWQC are limiting fish tissue concentrations to levels substantially (10s to 1000s of times) below those considered to be without significant risk.

1.4 Other Observations

Other observations from this review are noted as follows.

- Target cancer risk levels between 10^{-6} and 10^{-4} have become widely accepted among the different EPA programs, including the derivation of HHAWQC. The HHAWQC methodology document states that a risk level of 10^{-4} for highly exposed populations is acceptable (EPA 2000a). This is sometimes interpreted as meaning that highly exposed populations are not as well protected by the HHAWQC. However, as noted by Kocher (1996) "if only a small population would be at greatest risk, the expected number of excess cancers corresponding to individual risks at the *de minimis* level of 10^{-4} would still be [essentially] zero."

- The fish consumption rates used in calculating HHAWQC can have a significant impact on the resulting HHAWQC. This is because the HHAWQC are proportional to the fish consumption rates - as the rate increases, the HHAWQC decreases, and the decrease is particularly pronounced for high BAF/BCF substances. Potential exposure through the fish consumption pathway is dependent upon a number of different variables including the types of fish consumed, the sources of those fish (particularly anadromous fish such as salmon, see Appendix B), and the rates at which they are consumed, all of which vary widely among the population. The quantification of fish consumption rates is complicated by the methods used to collect consumption information, the interpretation of such data (particularly extremes in the distribution of individual consumption rates obtained from survey data), the availability of fish from regulated sources, and the habits of the targeted population of fish consumers. Without extreme diligence in data interpretation, most of these complications are likely to manifest in overestimations of fish consumption rates.

- The selection of some exposure parameters are unrealistic because, as a practical matter, other environmental management programs would ensure that such conditions did not occur (or would not persist for a person's lifetime). Assumptions concerning ambient water column concentrations (and related fish tissue concentrations) and drinking water concentrations are examples.

Finally, it is noteworthy that the values used for parameters in a health risk equation like that for deriving HHAWQC involve a combination of science and policy choices. And, while evolving science and policy may sometimes indicate that revisiting these choices is warranted, responsible evaluation of risk (and thus protection of health) is best considered in total rather than by simple alteration of a single parameter value without due consideration of the others. The information presented herein suggests that the degree of protection embodied in the current HHAWQC derivation method, using typically applied values for each parameter, exceeds by a large margin the health protection targets expressed by EPA and many states.

2.0 INTRODUCTION

Section 304(a) (1) of the Clean Water Act (CWA) requires the United States Environmental Protection Agency (EPA) to develop and publish recommended numeric ambient water quality criteria (AWQC) for limiting the impact of pollutants on human health and aquatic life. These recommended human health-based AWQC (HHAWQC) are intended to provide guidance for states and tribes to use in adopting their own water quality standards and are meant to "minimize the risk of adverse effects occurring to humans from chronic (lifetime) exposures to substances through the ingestion of drinking water and consumption of fish obtained from surface waters" (EPA 2000a). Water quality criteria recommendations are derived by EPA using equations that express a risk analysis. The value of each parametric component of the criteria equations represents policy choices made by the Agency, though several of those choices are derived from scientific data (EPA 2011a).

In a staff policy paper from the Office of the Science Advisor, EPA discussed the bases for these policy choices (EPA, 2004). They noted that "Congress establishes legal requirements that generally describe the level of protectiveness that EPA regulations must achieve" and that individual statutes identify the risks that should be evaluated and protected against and also mandate the required levels of protection (EPA 2004). The Clean Water Act, which mandates the development of AWQC, simply requires that AWQC must "protect the public health or welfare, enhance the quality of water and serve the purposes of this Act" and "be adequate to protect public health and the environment from any reasonably anticipated adverse effects of each pollutant." In order to meet these requirements, EPA "attempts to protect individuals who represent high-end exposures (typically around the 90^{th} percentile and above) or those who have some underlying biological sensitivity" (but not hypersensitive individuals) (EPA 2004). EPA (2004) notes that "[p]rograms may approach the problem semi-quantitatively (e.g., selecting individual parameter values at specified percentiles of a distribution) or qualitatively (e.g., making conservative assumptions to ensure protection for most individuals), though no overall degree of protection can be explicitly stated."

While EPA is obligated to develop and publish AWQC guidance, adoption and implementation of criteria for most fresh waters in the U.S. is an activity mandated to states. Many states choose to adopt EPA's AWQC guidance values but states are free to depart from EPA's criteria guidance provided that there is a scientifically valid rationale for doing so. Departure from the EPA AWQC guidance values is commonly accomplished by altering one or more of the values used to represent the parametric components of the risk analysis equation used to derive the criteria guidance values.

This document contains a discussion of each parametric component of the risk analysis equation that is used to derive HHAWQC. As noted earlier, selection of parameter values for risk analyses is primarily a policy choice and it is typical that such choices are conservative in favor of protecting public health. The combined degree of conservatism embodied in the final AWQC guidance is not usually expressed quantitatively by EPA. The primary purpose of this document is to provide an exploration of the combined conservatism that may be embodied in AWQC calculated using typically chosen values for the explicit parametric components of the HHAWQC equation and use of implicit assumptions also embodied in the criteria derivation.

3.0 EQUATIONS USED FOR THE DERIVATION OF HHAWQC

In calculating HHAWQC, EPA differentiates between carcinogenic and noncarcinogenic effects. Three risk analysis equations are used, the first for noncarcinogenic effects, the second for carcinogenic effects that are assumed to have a nonlinear dose-response, and the third for carcinogenic effects that are assumed to have a linear dose-response. These are shown in Table 3.1.

Table 3.1 Equations for Deriving Human Health Water Quality Criteria

Substance Category	HHAWQC Equation	Eq. #
Noncarcinogenic effects	$RfD*RSC*(BW/(DI + (\Sigma FI_i*BAF_i)))$	**Eq. 3.1**
Carcinogenic effects (non-linear)	$(POD/UF)*RSC*(BW/(DI + (\Sigma FI_i*BAF_i)))$	**Eq. 3.2**
Carcinogenic effects (linear)	$RSD*(BW/(DI + (\Sigma FI_i*BAF_i)))$	**Eq. 3.3**

where:

HHAWQC = human health ambient water quality criterion (mg/L);

RfD = reference dose for noncancer effect (mg/kg-day);

RSC = relative source contribution factor to account for non-water sources of exposure (typically expressed as a fraction of the total exposure);

POD = point of departure for carcinogenic effects based on a nonlinear low-dose extrapolation (mg/kg-day), usually a LOAEL, NOAEL, or LED_{10};

UF = uncertainty factor for carcinogenic effects based on a nonlinear low-dose extrapolation (unitless);

RSD = Risk-specific dose for carcinogenic effects based on a linear low-dose extrapolation (mg/kg-day) and on the selected target risk level;

BW = human body weight (kg);

DI = drinking water intake (L/day);

FI_i = fish intake at trophic level (TL) i (i = 2, 3, and 4); this is the fish consumption rate (kg/d); and

BAF_i = bioaccumulation factor at trophic level i, lipid normalized (L/kg)

The first portion of each equation in Table 3.1 contains parameters that represent a measure of the toxicity of a substance and are unique to each equation. The latter portion of each equation is common for the three substance categories and describes assumed human exposure to a substance. Implicit, and not obvious, with the practice of using these equations are other assumptions concerning exposure (i.e., a duration of exposure equal to a full lifetime, an average ambient water concentration equal to the HHAWQC, and bioavailability of chemicals from fish and water equal to that observed in the toxicity experiment). Finally, and also not obvious, is that an assumed incremental risk of illness is also part of the overall algorithms. Taken collectively, these explicit and implicit elements yield a risk analysis in the form of an acceptable water column concentration for a substance.

Although the parameters in the risk equations used for deriving a HHAWQC are most accurately represented by a range or distribution of values, it has been typical for EPA to select a single value for each parameter. EPA has recognized that there are elements of both variability and uncertainty in each parametric value but has generally not implemented specific procedures to account for variability and uncertainty. However in some cases, EPA has intentionally chosen parametric values that are conservative (i.e., over-, rather than under-, protective of human health) with respect to the general population.

The sections below discuss the parametric components of the toxicity portion (Section 4) and the exposure portion (Section 5) of each equation in Table 3.1. Section 6 includes discussion of variability and uncertainty in parameter values and, where evident, conservatism embodied in typical choices made for parameter values. Also in Section 6, consideration is given to the combined effect on conservatism of typical parameter value choices in HHAWQC derivation.

4.0 TOXICITY PARAMETERS USED FOR DERIVATION OF HHAWQC

Each of the three equations used to develop HHAWQC contains a factor that represents the toxicity of the substance of concern. Equation 3.1 (Table 3.1), which is used for non-carcinogenic effects, employs the reference dose (RfD), the derivation of which incorporates various uncertainty factors (UFs) and sometimes an additional modifying factor (MF). Equation 3.2 (Table 3.1), which is used for carcinogenic effects that have a nonlinear dose-response curve (i.e., there exists some level of exposure below which no carcinogenic response is expected to occur), employs a factor calculated by dividing the “point of departure” (POD) by UFs. Equation 3.3 (Table 3.1), which is used for substances that are assumed to have a linear dose-response (i.e., some probability of a carcinogenic response is presumed to exist at any level of exposure), employs a Risk-Specific Dose (RSD). It is EPA’s policy to assume that all carcinogenic effects can be described using a linear dose response unless non-linearity has been clearly demonstrated. Typically, if a compound is considered to have both carcinogenic and non-carcinogenic health effects, HHAWQC are calculated for both the cancer and noncancer endpoints and the lower of the two concentrations is selected as the HHAWQC. The derivation of these components is described in the "Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (EPA 2000a) (hereafter referred to as the "HHAWQC methodology document") and its Technical Support Document Volume 1: Risk Assessment" (EPA 2000b).

4.1 Reference Dose (RfD)

A reference dose (RfD) is defined as "an estimate (with uncertainty spanning approximately an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects over a lifetime" (EPA 2000b).

The development of an RfD begins with a review of all available toxicological data. Relevant studies are evaluated for quality and a "critical effect" is identified. The critical effect is defined as "the first adverse effect, or its known precursor, that occurs to the most sensitive species as the dose rate of an agent increases" (EPA 2002a). The underlying assumption is that if the RfD is derived to prevent the critical effect from occurring, then no other effects of concern will occur (EPA 2002a).

The next step is the identification of a POD based on the study in which the selected critical effect has been identified. The POD may be derived from a No Observed Adverse Effect Level (NOAEL), a Lowest Observed Adverse Effect Level (LOAEL) or Benchmark Dose Lower Confidence Level (BMDL). The NOAEL is defined by USEPA as "the highest exposure level at which there are no biologically significant increases in the frequency or severity of an adverse effect between the exposed population and its appropriate control; some effects may be produced at this level, but they are not considered adverse or precursors of adverse effects."[1] If a NOAEL cannot be identified, a LOAEL may be used instead. The LOAEL is defined by USEPA as "the lowest exposure level at which there are biologically significant increases in frequency or severity of adverse effects between the exposed population and its appropriate control group."[2]

When study data are suitable, the Benchmark Dose BMD approach is sometimes used as an alternative to the NOAEL/LOAEL approach. The BMD is the dose at which the critical effect occurs at a rate 5-10% above the rate observed in the control group (other rates could possibly be used, but 5% or 10% are most common). The BMDL, which is typically the lower 95% confidence limit of the BMD, is used as the POD when the BMD approach is used.

Once the POD is identified, the RfD is derived according to equation 4.1:

$$RfD = POD/(UF_i * MF) \qquad \textbf{Eq. 4.1}$$

where:

RfD = reference dose for noncancer effect (mg/kg-day);

POD = NOAEL, LOAEL, or BMDL (mg/kg-day);

UF_i = uncertainty factors for various circumstances (see Table 4.1) (unitless) ; and

MF = modifying factor (unitless)

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[1] Taken from USEPA's online IRIS glossary (http://www.epa.gov/iris/help_gloss.htm#n)
[2] Taken from USEPA's online IRIS glossary (http://www.epa.gov/iris/help_gloss.htm#n)

Uncertainty factors are used to reduce the dose in order to account for areas of scientific uncertainty in the supporting toxicity databases (EPA 2000b). The standard UFs are 1, 3, and 10. A modifying factor further adjusts the dose in order to provide for additional uncertainty not explicitly included in the UFs, such as the completeness of the overall database (EPA 2000b). The MF is a matter of professional judgment and ranges between 0 and 10, with the standard values being 0.3, 1, 3, and 10 and the default value being 1 (EPA 2000b). Table 4.1 defines the various UFs.

Table 4.1 Uncertainty Factors (adapted from EPA 2000b)

Uncertainty Factor	Description
Intraspecies variation (UF_H)	Accounts for uncertainty associated with variations in sensitivity among members of the same species (e.g., differences in age, disease status, susceptibility to disease due to genetic differences)
Interspecies variation (UF_A)	Accounts for uncertainty involved in extrapolating from animal data to humans; used when the POD is derived from an animal study
Subchronic-to-chronic (UF_S)	Accounts for uncertainty involved in extrapolating from studies with a less-than-chronic[1] duration of exposure; used when the POD is derived from a study in which exposures did not occur over a significant fraction of the animal's or the individual's lifetime
LOAEL-to-NOAEL (UF_L)	Accounts for uncertainty associated with the use of a POD derived from a LOAEL rather than a NOAEL or BMDL
Incomplete database (UF_D)	Accounts for uncertainty associated with the use of an incomplete database to derive the POD, for example, the lack of a study of reproductive toxicity

[1] Chronic Exposure: Repeated exposure for more than approximately 10% of the life span in humans (more than approximately 90 days to 2 years in typically used laboratory animal species).

In application, the various UFs and any MF are multiplied to obtain the final factor by which the POD is to be divided. In general, EPA follows a policy that a final factor greater than 3000 indicates that the existing toxicity database is inadequate to support the derivation of an RfD. In this case, no RfD is calculated (EPA 2002a).

Although instructions for calculating an RfD are provided in the documentation for HHAWQC, in actual practice, the RfD is typically obtained from EPA's IRIS database (http://www.epa.gov/iris/).

4.2 Cancer Effects: Nonlinear Low-Dose Extrapolation

In deriving a HHAWQC, a nonlinear low-dose extrapolation may be used for carcinogenic effects when there are sufficient data available to understand the mode of action (MOA) and conclude that it is nonlinear at low doses (EPA 2005). In practical application, this is interpreted to mean that a threshold of exposure exists below which no carcinogenic response will occur.

For nonlinear carcinogenic effects, the factor representing toxicity in Equation 3.2 is calculated by dividing the POD by UFs. The recommended POD is the Lower Limit on Effective $Dose_{10}$, or LED_{10}, which is determined by calculating the lower 95 percent confidence limit on a dose associated with an estimated 10 percent increased tumor or tumor precursor response (EPA 2000b). A NOAEL or LOAEL value from a precursor response may also be used in some cases (EPA 2000b). When animal data are used to determine the POD, the selected dose is converted to a human equivalent dose using a default interspecies dose adjustment factor or a toxicokinetic model. However, as noted above, it is EPA's policy to assume that all carcinogenic effects have a linear dose response unless non-linearity has been clearly demonstrated. Thus, the non-linear low dose extrapolation procedure is rarely used.

The HHAWQC methodology document provides no specific guidance on the selection of UFs (EPA 2000a). Instead, it defers to the "upcoming cancer risk assessment guidelines," which were subsequently released in 2005.

The 2005 Cancer Risk Assessment Guidelines took a somewhat different approach than anticipated by EPA in 2000 when the HHAWQC methodology guidelines were developed. The 2005 guidelines instead recommended that for nonlinear carcinogenic effects, "an oral reference dose…should be developed in accordance with EPA's established practice for developing such values" (EPA 2005). This does not have much practical impact on HHAWQC calculation, as comparison of equations 3.2 and 4.1 reveals that the process for calculating the factor that represents the toxicity of nonlinear carcinogenic effects in HHAWQC derivations is essentially the same as that for calculating an RfD.

Given that (1) the documentation for HHAWQC derivation does not provide complete guidance on the calculation of the POD/UF factor, and (2) the 2005 Cancer Risk Assessment Guidelines took a somewhat different approach than anticipated by the HHAWQC methodology guidelines, in actual practice, the POD/UF factor will be typically be replaced by an RfD for some noncancer endpoint (e.g., a cancer precursor event) obtained from EPA's IRIS database (http://www.epa.gov/iris/).

4.3 Cancer Effects: Linear Low-Dose Extrapolation

In deriving a HHAWQC, a linear low-dose extrapolation is used for compounds that are believed to have carcinogenic potential when the chemical has direct effects on DNA, the MOA analysis indicates that the dose-response relationship will be linear, human exposures or body burdens are already near the doses associated with key events in the carcinogenic process, or there is an absence of sufficient data to elucidate the MOA.

The RSD, which is used in Equation 3.3 (Table 3.1), is derived according to Equation 4.2:

$$\text{RSD} = \text{Target Incremental Cancer Risk}/m \qquad \textbf{Eq. 4.2}$$

where:

RSD = Risk-Specific dose (mg/kg-day);

Target Incremental Cancer Risk = Typically a value ranging from10^{-6} to 10^{-4}; and

m = cancer potency factor $(\text{mg/kg-day})^{-1}$

The HHAWQC methodology document (EPA 2000a) states that the Agency will calculate recommended HHAWQC using at a Target Incremental Cancer Risk level of 10^{-6}. However, in deriving their own HHAWQC, states and authorized tribes may choose a risk level as low as 10^{-7} or as high as 10^{-5}, as long as the risk to more highly exposed subgroups (e.g., sport or subsistence anglers) does not exceed 10^{-4}. (The rationale for this is discussed further in Section 6.1.3.)

The cancer potency factor may be calculated by first modeling the relationship between tumor incidence and dose and then selecting a POD (generally the LED_{10}). When animal data are used to determine the POD, the selected dose is converted to a human equivalent dose using a default interspecies dose adjustment factor or a toxicokinetic model. Finally, a straight line is drawn between the POD and the origin (zero). The slope of that line, which will be "m" in Equation 4.2, is calculated. If the LED_{10} is used as the POD, m is equal to $0.10/LED_{10}$ (EPA 2000b).

Instructions for calculating m are provided in the documentation for HHAWQC. In actual practice, however, the value of m is typically obtained from EPA's IRIS database (http://www.epa.gov/iris/). Note that EPA terminology has changed somewhat since the HHAWQC methodology document was released and what was referred to as "m" or "cancer potency factor" in the methodology document is more commonly identified as "slope factor" in the IRIS database.

5.0 EXPOSURE PARAMETERS USED FOR DERIVATION OF HHAWQC

As noted above, both explicit and implicit elements are used to yield a risk analysis in the form of an acceptable water column concentration for a substance. This section summarizes each of these elements and the manner in which they are used for deriving HHAWQC.

5.1 Relative Source Contribution (RSC)

When deriving a HHAWQC for noncarcinogenic or nonlinear carcinogenic effects, a factor is included in the equation to account for non-water sources of exposure to a substance. For example, a particular chemical may be found not only in water sources, but also in some food items or in ambient air (from which it could be inhaled). This factor is known as the Relative Source Contribution (RSC) and it acts to reduce the amount of the RfD that is apportioned to water and fish consumption. The rationale for using the RSC factor in calculating a HHAWQC is to ensure that an individual's total exposure does not exceed the threshold level (EPA 2000a).

The HHAWQC methodology document (EPA 2000a) creates an "Exposure Decision Tree" procedure to be used in the selection of an RSC. In the absence of sufficient data to support the use of the Exposure Decision Tree, EPA uses 20% as a default RSC (EPA 2000a). The methodology also sets 80% as the maximum allowable RSC and 20% as the minimum (EPA 2000a). EPA encourages states and authorized tribes to develop alternate RSC values based on local data (EPA 2000a). Although the Exposure Decision Tree approach does theoretically allow for the use of an RSC other than the 20% default, in actual practice, use of values other than the default is very rare.

Note that while the methodology (EPA 2000a) specifies that the RSC value must be between 20 and 80% and states that "EPA intends to use 20 percent of the RfD (or POD/UF), which has also been used in past water program regulations, as the default value," the current EPA HHAWQC are calculated using RSCs ranging from 20 to 100%. This is because many of the HHAWQC remain unchanged from earlier years or have been updated to reflect changes in fish consumption rates or RfD, but were not recalculated using the 2000 methodology.

The RSC factor is not used in the derivation of HHAWQC for carcinogenic effects with linear low-dose extrapolation. For these substances, the only sources considered are drinking water and fish ingestion. This is because for these substances, the HHAWQC is being determined with respect to the *incremental* lifetime risk posed by a substance's presence in water, and is not being set with regard to an individual's total risk from all sources of exposure (EPA 2000a). Thus, the HHAWQC for any substance represents the concentration of that substance in water that would be expected to increase an individual's lifetime cancer risk by no more than the target risk level, regardless of any additional lifetime cancer risk contributed by potential exposures from other sources (EPA 2000a).

5.2 Body Weight (BW)

The HHAWQC methodology document (EPA 2000a) recommends using a default body weight of 70 kg for calculating HHAWQC. This is considered to be a representative average body weight for male and female adults, combined. Adult values are used because the HHAWQC are intended to be protective over the full lifespan. The methodology also notes that 70 kg is used in the derivation of cancer slope factors and unit risks that appear in IRIS and advocates maintaining consistency between the dose-response relationship and exposure factors (EPA 2000a).

5.3 Drinking Water Intake (DI)

EPA recommends using a default drinking water intake rate of 2 L/day, which is believed to represent a majority of the population over the course of a lifetime (EPA 2000a).

The basis for the drinking water intake rate is the 1994-96 Continuing Survey of Food Intake by Individuals *(*CSFII) conducted by the U.S. Department of Agriculture (EPA 2000a). The CSFII survey collected dietary intake information from nationally representative samples of non-institutionalized persons residing in United States households (EPA 2000a). Households in these national surveys were sampled from the 50 states and the District of Columbia (EPA 2000a). Each survey collected daily consumption records for approximately 10,000 food codes across nine food groups (EPA 2000a). This included the number of fluid ounces of plain drinking water consumed and also information on the household source of plain drinking water, water used to prepare beverages, and water added during food preparation (EPA 2000a).

The results of the 1994-96 CSFII analysis indicated that the arithmetic mean, 75th, and 90th percentile values for adults 20 years and older were 1.1, 1.5, and 2.2 L/day, respectively (EPA 2000a). The 2 L/day value selected by EPA represents the 86^{th} percentile for adults (EPA 2000a).

5.4 Fish Ingestion Rate (FI)

Because the level of fish intake in highly exposed populations varies by geographical location, EPA suggests a four preference hierarchy for states and authorized tribes to follow when deriving consumption rates that encourages use of the best local, state, or regional data available (EPA 2000a). The four preference hierarchy is: (1) use of local data; (2) use of data reflecting similar geography/population groups; (3) use of data from national surveys; and (4) use of EPA’s default intake rates (EPA 2000a).

EPA’s first preference is that states and authorized tribes use the results from fish intake surveys of local watersheds within the state or tribal jurisdiction to establish fish intake rates that are representative of the defined populations being addressed for the particular waterbody (EPA 2000a). EPA also recommends that the fish consumption rate used to develop the HHAWQC be based only on consumption of freshwater/estuarine species (EPA 2000a). In addition, for noncarcinogens and nonlinear carcinogens, any consumption of marine species of fish should be accounted for in the calculation of the RSC (EPA 2000a). States and authorized tribes may use either high-end values (such as the 90th or 95th percentile values) or average values for the population that they plan to protect (e.g., subsistence fishers, sport fishers, or the general population) (EPA 2000a).

If surveys conducted in the geographic area of the state or tribe are not available, EPA’s second preference is that states and authorized tribes consider results from existing fish intake surveys that reflect similar geography and population groups (e.g., from a neighboring state or tribe or a similar watershed type) (EPA 2000a). As with the use of fish intake surveys of local watersheds, consumption rates based on data collected from similar geographic and population groups should be based only on consumption of freshwater/estuarine species with any consumption of marine species accounted for in the calculation of the RSC (EPA 2000a).

If applicable consumption rates are not available from local, state, or regional surveys, EPA's third preference is that states and authorized tribes select intake rate assumptions for different population groups from national food consumption surveys (EPA 2000a). The HHAWQC methodology document (EPA 2000a) references a document titled "Estimated Per Capita Fish Consumption in the United States" (EPA 2000c) as the source for this information, however, there is a more recent document, "Exposure Factors Handbook: 2011 Edition" (EPA 2011b) that provides more current regional and subpopulation data and is also useful for this purpose. Again, EPA recommends that fish consumption rates be based on consumption of freshwater and estuarine species only and any consumption of marine species of fish should be accounted for in the calculation of the RSC (EPA 2000a).

As their fourth and last preference, EPA recommends the use of a default fish consumption value for the general adult population of 17.5 grams/day (EPA 2000a). This default value is used by EPA in its derivation of HHAWQC. This represents an estimate of the 90th percentile per capita consumption rate for the U.S. adult population based on the CSFII 1994-96 data (EPA 2000a). EPA believes that this default value will be protective of the majority of the general population (EPA 2000a). If a state or authorized tribe identifies specific populations of sportfishers or subsistence fishers that may represent more highly exposed individuals, EPA recommends default fish consumption rates of 17.5 grams/day and 142.4 grams/day, respectively, though in such cases a subpopulation risk level may also be appropriate (EPA 2000a) as explained in Section 6.1.3.

5.5 Bioaccumulation Factors (BAF) and Trophic Level

Bioaccumulation is the process in which aquatic organisms accumulate certain chemicals in their tissues when exposed to those chemicals through water, their diet, and other sources, such as sediments. In order to account for potential exposures to these chemicals through the consumption of fish and shellfish, EPA uses national bioaccumulation factors (BAFs) in the derivation of HHAWQC. The HHAWQC methodology document (EPA 2000a) defines BAF as the ratio (in L/kg tissue) of a concentration of a chemical in the tissues of commonly consumed aquatic organisms to its concentration in the surrounding water in situations where the organisms and their food are exposed and the ratio does not change substantially over time (i.e., the ratio which reflects bioaccumulation at or near steady-state).

The HHAWQC methodology document (EPA 2000a), the "Technical Support Document Volume 2: Development of National Bioaccumulation Factors" (EPA 2003a), and the "Technical Support Document Volume 3: Development of Site-Specific Bioaccumulation Factors" (EPA 2009) describe procedures for deriving national and site-specific BAFs. Separate procedures are provided for different types of chemicals (i.e., nonionic organic, ionic organic, inorganic and organometallic) (EPA 2000a). Also, EPA states that national BAFs should be derived separately for each trophic level because the concentrations of certain chemicals may increase in aquatic organisms of each successive trophic level due to increasing dietary exposures (e.g., increasing concentrations from algae, to zooplankton, to forage fish, to predatory fish) (EPA 2000a). In addition, because lipid content of aquatic organisms and the amount of organic carbon in the water column have been shown to affect bioaccumulation of nonionic organic chemicals, the national BAFs should be adjusted to reflect the lipid content of commonly consumed fish and shellfish and the freely dissolved fraction of the chemical in ambient water for these chemicals (EPA 2000a).

Even though the 2000 Methodology (EPA 2000a) and subsequent Technical Support documents (EPA 2003a, 2009) provide directions for the derivation of national BAF factors, EPA has, as yet, not calculated any BAFs for individual chemicals. Instead, when calculating national HHAWQC, EPA has replaced the factor "$\Sigma FI_i * BAF_i$" with the factor "FI*BCF," where BCF is the bioconcentration factor. A BCF is defined in the HHAWQC methodology document (2000a) as the ratio (in L/kg tissue) of the concentration of a substance in tissue of an aquatic organism to its concentration in the ambient water, in situations where the organism is exposed through the water only and the ratio does not change substantially over time. Like the BAF, the BCF represents a ratio that relates the concentration of a chemical in water to its expected concentration in commonly consumed aquatic organisms, but unlike the BAF, it does not consider uptake from the diet or potential sources such as sediments. BAFs are intended to be reflective of real environmental exposures and thus also reflect factors such as bioavailability and biodegradation. Thus, BAFs can be higher or lower than BCFs.

The factor FI*BCF is a single calculation rather than the summing of multiple trophic levels. In the most recent National Recommended Water Quality Criteria: 2002, Human Health Criteria Calculation Matrix tables, the BCF values used are accompanied by a footnote that reads, “The fish tissue bioconcentration factor (BCF) from the 1980 criteria documents was retained unless otherwise noted” (EPA 2002b).

States are free to calculate their own site-specific BAFs or follow the current EPA practice of using BCFs.

5.6 Implicit Elements in the Derivation of HHAWQC

The derivation of HHAWQC incorporates assumptions about exposure that are not explicitly recognized in the formal equations shown in Table 3.1. These include bioavailability, cooking loss, exposure duration, and exposure concentration.

5.6.1 *Relative Bioavailability*

Bioavailability may be defined as the degree to which a substance contained in water, food, soil, air, or other media can be absorbed by living organisms. Bioavailability is an important component of toxicity assessment since absorption is an essential prerequisite to systemic toxicity and the degree of bioavailability is an important determinant of the ultimate exposure level. EPA’s recommendations for the derivation of HHAWQC do not account for the bioavailability of substances and thus implicit is the assumption that the bioavailability of chemical substances in drinking water and fish tissue obtained from regulated waterbodies is the same as the bioavailability of those chemical substances in the studies from which the toxicity parameters (RfD, POD, cancer potency factor) were derived.

5.6.2 *Cooking Loss*

Chemical substances that may be present in fish tissue can be lost as part of the cooking process. Many substances that accumulate in fish tissues are associated with the lipid (i.e., fatty) content in the tissues. Most cooking practices result in partial loss of lipid and associated chemical substances. Other substances may be volatilized during the cooking process.

EPA’s recommendations for the derivation of HHAWQC do not account for chemical loss during cooking. Thus implicit is the assumption that 100% of chemical substances present in raw fish remain in edible portions of fish tissue after cooking.

5.6.3 *Exposure Duration*

EPA’s intentions for HHAWQC are to “minimize the risk of adverse effects occurring to humans from chronic (lifetime) exposures to substances through the ingestion of drinking water and consumption of fish obtained from surface waters” (EPA 2000a). Lifetime exposure is assumed to be 70 years. Thus the derivation of HHAWQC implicitly assumes that exposure to the criteria substance occurs continuously over 70 years.

5.6.4 *Exposure Concentration*

The combination of explicit toxicity and exposure elements as typically used in the HHAWQC derivation equation act to form an implicit assumption that the average concentration of regulated substances in water and fish tissue exist in the environment at their maximum allowed concentrations at all times over the course of a person's lifetime (presumed to be 70 years).

6.0 PROTECTIVENESS, CONSERVATISM, AND THE COMBINED EFFECT OF CONSERVATIVE PARAMETER VALUE CHOICES IN DERIVATION OF HHAWQC

The Clean Water Act, from which authority for the designation of HHAWQC is derived, specifies, in a very broad sense, the level of protectiveness that should be embodied in the HHAWQC. The Clean Water Act includes language such as "protect the public health and welfare," "protect public health… from any reasonably anticipated adverse effects of each pollutant," and "[not] pose an unacceptable risk to human health."

In its HHAWQC methodology document, EPA provides another fairly broad description of its desired level of protectiveness: "Water quality criteria are derived to establish ambient concentrations of pollutants which, if not exceeded, will protect the general population from adverse health impacts from those pollutants due to consumption of aquatic organisms and water, including incidental water consumption related to recreational activities" (EPA 2000a). They also note that HHAWQC are usually derived to protect the majority of the general population from chronic adverse health effects and that they consider their target protection goal to be satisfied if the population as a whole will be adequately protected by the human health criteria when the criteria are met in ambient water (EPA 2000a).

In order to derive HHAWQC that are "adequately protective," EPA states that they have selected default parameter values that are "a combination of median values, mean values, and percentile estimates [that target] the high end of the general population" (EPA 2000a). EPA (2000a) "believes that this is reasonably conservative and appropriate to meet the goals of the CWA…"

The term "conservatism," in the context of derivation of HHAWQC, is used to describe the use of assumptions and defaults that are likely to overstate the true risks from exposure to substances in drinking water and fish tissues. The policy choice to use such overstatements is rooted in EPA's approach to dealing with uncertainty and variability in the data upon which defaults and assumptions are based.

Uncertainty is an inherent property of scientific data and thus of the process of risk assessment and the derivation of HHAWQC. Since uncertainty is due to lack of knowledge, it can be reduced by the collection of additional data, but never eliminated completely. Variability is an inherent characteristic of a population because people vary in their levels and types of exposures and their susceptibility to potentially harmful effects of the exposures (NRC 2009). Unlike uncertainty, variability cannot be reduced but can be better characterized with improved information (NRC 2009).

In a staff paper[3] on risk assessment principles and practices, EPA (2004) discussed its approach to dealing with uncertainty and variability:

> Since uncertainty and variability are present in risk assessments, EPA usually incorporates a "high-end" hazard and/or exposure level in order to ensure an adequate margin of safety for most of the potentially exposed, susceptible population, or ecosystem. EPA's high-end levels are around 90% and above…

[3] Staff paper prepared by the Risk Assessment Task Force through the Office of the Science Advisor at EPA. The document presents an analysis of EPA's general risk assessment practices.

> …EPA's policy is that risk assessments should not knowingly underestimate or grossly overestimate risks. This policy position prompts risk assessments to take a more "protective" stance given the underlying uncertainty with the risk estimates generated. Another framing policy position is that EPA will examine and report on the upper end of a range of risks or exposures when we are not very certain about where the particular risk lies… Further, when several parameters are assessed, upper-end values and/or central tendency values are generally combined to generate a risk estimate that falls within the higher end of the population risk range.
>
> [The] issue regarding the appropriate degree of "conservatism" in EPA's risk assessments has been a concern from the inception of the formal risk assessment process and has been a major part of the discussion and comments surrounding risk assessment…

Given the attention focused on the issue of "the appropriate degree of conservatism," it is not surprising that many researchers have studied ways in which uncertainty and variability can be better characterized and reduced, with the ultimate goal of developing risk estimates that better achieve EPA's stated goals of neither underestimating nor grossly overestimating risk without the use of highly conservative default assumptions. The sections below summarize some of these efforts and, where data are available, attempt to quantify the level of conservatism embodied in EPA's current policy choices related to the selection of parameters for use in calculating HHAWQC.

As means of examining the implications of conservatism embodied in the HHAWQC derivation process, several examples are presented in the following sections. The example substances, which include mercury, arsenic, methyl bromide, chlordane, bis (2-ethylhexyl)-phthalate (or BEHP), and polychlorinated biphenyls (PCBs), were chosen for illustration purposes because they represent broad chemical categories (e.g., metals and organics), current and legacy substances, and substances with low and high bioconcentration factors.

6.1 Toxicity Factors

Derivation of an RfD, selection of a POD and UFs, modeling the dose-response for carcinogens, and calculating the slope factor (m) are based on science, but also involve a variety of policy decisions. These policy decisions all embody some degree of conservatism. This section addresses in greater detail the conservatism associated with the lack of consideration of bioavailability and the selection of default values for uncertainty factors and cancer risk levels.

6.1.1 *Relative Bioavailability*

As noted in Section 5, an implicit assumption in the HHAWQC derivation equation is that the bioavailability of chemical substances in drinking water and fish tissue obtained from regulated waterbodies is the same as the bioavailability of those chemical substances in the studies from which the toxicity parameters (RfD, POD, cancer potency factor) were derived. However, a RfD is often based on an animal toxicity study in which exposures occurred via drinking water and for some substances, the bioavailability from fish tissue will be different from that from drinking water. In some cases, bioavailability from foods might be reduced by, for example, the formation of indigestible complexes with other food components or conversion to ionized forms that cannot pass through biological membranes and thus cannot be absorbed. For example, arsenic in drinking water is primarily inorganic arsenic, which is absorbed well, but almost all of the arsenic in fish tissues is organic arsenic, which is not highly bioavailable. Arsenic may also form insoluble complexes with, for example, iron, aluminum, and magnesium oxides, which limits bioavailability. For these substances, any particular dose consumed in fish tissue would result in a lower absorbed dose than the same dose consumed in drinking water. Thus, a RfD based on a drinking water study would be lower than a RfD based on a dose administered in fish tissue. Use of this lower RfD will overestimate the potential hazards associated with the ingestion of fish tissue and will yield a lower HHAWQC (see, e.g., EPA 2000b).

EPA rarely provides information on the potential impacts of bioavailability on their RfDs and does not typically calculate alternative RfDs that might be used when expected exposures are via a route that is likely to result in reduced bioavailability. For example, most inorganic contaminants, particularly divalent cations, have bioavailability values of 20 percent or less from a food matrix, but are much more available (about 80 percent or higher) from drinking water (EPA 2000b). The Technical Support Document Volume 1: Risk Assessment (EPA 2000b) for the HHAWQC methodology document (EPA 2000a) does allow for the selection of an alternative RfD in cases where there is lower bioavailability of the contaminant when ingested in fish than when ingested in water and the existing RfD is based on a study in which the contaminant was administered through drinking water. However, in actual practice, this has not been done.

6.1.2 *Uncertainty Factors*

The UF methodology, which has its origins in the concept of "safety factors," has been the subject of discussion among scientists in many forums over the years. One of the most common issues of discussion is the scientific basis for the default factor of 10. It is generally accepted that selection of the first safety factors was based on qualitative judgment (Nair et al. 1995). Subsequently, however, attempts were made to justify the use of 10-fold factors based on data collected to characterize the uncertainty and variability associated with parameters such as intra- and interspecies differences.

One commonly accepted justification for the selection of 10 as the standard default uncertainty factor is that for any given chemical, the dose at which the endpoint of concern will be observed in the population of concern (e.g., the most sensitive subpopulation of humans) will be less than 10 times higher than the dose at which the endpoint of concern will be observed in the population that serves as a surrogate (e.g., average humans) for the purposes of deriving an RfD (Dourson et al. 1996).

The degree of conservatism embodied in the use of default factors of 10 has been examined by researchers who have summarized published data and determined the actual distributions of these ratios. Dourson et al. (1996) noted that "there is growing sentiment that …routine application [of 10-fold UFs] often results in overly conservative risk assessments."

For example, Nessel et al. (1995) were interested in the scientific basis for the application of an uncertainty factor of 10 when using a sub-chronic study instead of a chronic study to derive the RfD. The underlying assumption is that for any given chemical, the NOAELs and LOAELs of sub-chronic studies will be within a factor of 10 of the NOAELs and LOAELs of chronic studies. So, Nessel et al. (1995) compared NOAELs and LOAELs from 23 different sub-chronic oral toxicity studies to the NOAELs and LOAELs of chronic studies that were identical except for the study duration. The mean and median $NOAEL_{subchronic}/NOAEL_{chronic}$ ratios were 2.4 and 2.0, respectively. Twenty-two of the 23 studies had NOAEL ratios of 5 or less; only one had a ratio of 10. The LOAEL ratios' mean and median were also 2.4 and 2.0, with all 23 studies having $LOAEL_{subchronic}/LOAEL_{chronic}$ ratio of 5 or less. So, based on this study, an uncertainty factor of 5 is sufficient to account for differences between sub-chronic and chronic studies in 98% of studies. Kadry et al. (1995) reported similar findings as did the review conducted by Dourson et al. (1996).

Similarly, differences between LOAELs and NOAELs are typically less than 10 fold. Ninety-six percent of all LOAEL-to-NOAEL ratios in one study were 5 or less and 91% were 6 or less in another (summarized by Dourson et al. 1996). Kadry et al. (1995) reported similar findings.

The decision to use conservative default UFs has particular significance on the overall conservatism of the RfD that is derived using the UFs. Gaylor and Kodell (2000) examined this issue and quantified the increasing degree of conservatism as the number of default UFs applied increases.

When ratios are calculated for UFs as described in the two previous paragraphs, the distributions of these ratios are lognormal, with the value of 10 typically representing the 95th percentile (Swartout et al. 1998). Gaylor and Kodel (2000) calculated the uncertainty factors that would be required to maintain an overall 95th percentile level when multiple default uncertainty factors are applied. They found that for the use of any two UFs, for which the current default total UF would be 100, the UF required to maintain the 95th percentile level ranged from 46 to 85. For the use of any three UFs, for which the current default total UF would be 1000, the UF required to maintain the 95th percentile level ranged from 190 to 340. Swartout et al. (1998) conducted a similar analysis using a different technique and reported similar findings, concluding that default UFs of 100, 1000, and 3000, for application of two, three, and four UFs, respectively, can be replaced with UFs of 51, 234, and 1040, while maintaining the 95th percentile level.

If a composite UF calculated to maintain the desired 95th percentile level is used instead of the default values of 100, 1000, and 3000, the resultant RfD and subsequently calculated HHAWQC could be as much as 5x higher. For example, if the RfD for methyl bromide was calculated using an UF of 340 (the top of the range calculated by Gaylor and Kodel (2000)) instead of 1000, the RfD would be 0.0041 mg/kg/day rather than the existing value of 0.0014 mg/kg/day. This would yield a HHAWQC of 139 µg/L rather than 47 µg/L.

6.1.3 *Cancer Risk Levels*

EPA chose to use the one-in-one-million (10^{-6}) risk level as the default value when calculating HHAWQC because it believes this risk level “reflects an appropriate risk for the general population” (EPA 2000a). However, EPA (2000a) also notes that risk levels of 10^{-5} for the general population and 10^{-4} for highly exposed populations are acceptable.

The frequent use of the 10^{-6} risk level to represent “an appropriate risk for the general population” appears to be simply a policy choice with no solid scientific basis. In a paper[4] presented at the 84th Annual Meeting of the Air & Waste Management Association in 1991, Kelly reported that:

> …despite its widespread use: no agencies we contacted could provide documentation on the origins of 10^{-6}; its origin was determined to be a completely arbitrary figure adopted by the FDA as an “essentially zero” level of risk for residues of animal drugs; there was virtually no public debate on the appropriateness of this level despite requests by the FDA; this legislation stated that 10^{-6} was specifically not intended to be used as a definition of acceptable risk; 10^{-6} is almost exclusively applied to contaminants perceived to be of great risk (hazardous waste sites, pesticides); and 10^{-6} as a single criterion of "acceptable risk" is not and has never been in any EPA legislation or guidance documents.

The decision of which cancer risk level to use in any particular circumstance is, for the most part, something that has evolved over many years through policy positions put forth in various EPA reports and legislation, but the idea that cancer risk levels between 10^{-6} and 10^{-4} are acceptable have become widely accepted among the different EPA programs. For example, the 1990 Clean Air Act Amendments endorse a 1989 EPA assessment for benzene in which EPA identified 1 in 10 thousand (10^{-4}) as being an "acceptable" risk level and 1 in a million (10^{-6}) as representing "an ample margin of safety.” An EPA Region 8 superfund site discussion[5] stated that:

> In general, the USEPA considers excess cancer risks that are below about 1 chance in 1,000,000 (1×10^{-6} or 1E-06) to be so small as to be negligible, and risks above 1E-04 to be

[4] Available online at http://www.deltatoxicology.com/pdf/10-6.pdf
[5] http://www.epa.gov/region8/r8risk/hh_risk.html

> sufficiently large that some sort of remediation is desirable. Excess cancer risks that range between 1E-06 and 1E-04 are generally considered to be acceptable, although this is evaluated on a case-by-case basis and EPA may determine that risks lower than 1E-04 are not sufficiently protective and warrant remedial action.

Jones-Otazo et al. (2005) compared screening level risk assessment practices among different regulatory agencies and found that most have adopted acceptable risk levels in the same range as EPA. The European Union (EU) and World Health Organization (WHO) both identify risks in the range of 10^{-6} to 10^{-4} as acceptable, while Health Canada uses 10^{-5} as their acceptable risk level (Jones-Otazo et al. 2005). With respect to cancer risks associated with pollutants in drinking water, WHO uses a 10^{-5} risk level: "In this and previous editions of the Guidelines [for Drinking Water Quality], an upper-bound excess lifetime risk of cancer of 10^{-5} has been used, while accepting that this is a conservative position and almost certainly overestimates the true risk" (WHO 2008).

Population Risk - One factor that has a significant effect on the magnitude of acceptable risk is the size of the affected population. Exposure of a population of 1 million to a carcinogen at the risk level of 1 in a million theoretically results in one additional case of cancer among those 1 million people over the course of 70 years. If the size of the population of concern is decreased to 100,000 instead of 1 million, the theoretical additional cases of cancer among those 100,000 individuals decreases to only 0.1 case over the course of 70 years. Population risk is an important consideration in selecting a fish intake rate for use in developing AWQC because as the size of the exposed population decreases, the population risks also decrease when the same target risk level is used. The higher the FI rate selected for a particular population, the smaller the population to which that rate applies. For example, if the FI rate selected is a 95th percentile rate, it is assumed that it is protective of all but 5 percent of the exposed population or 50,000 of the 1 million people provided in the example above. Thus, if the same target risk level of 1E-06 is used with this reduced population, the resulting population risk is 0.05 excess cancers within a population of 1 million people. In other words, in order to reach the target risk of 1 excess cancer, it would be necessary for a population of 20 million people to have lifetime exposures equivalent to the estimated exposure conditions. This topic is discussed in much greater detail in Appendix A, Section 4.0 Population Risk.

This concept is particularly relevant to HHAWQC derivation because very small populations of fish consumers with high intake rates are frequently identified as being of special concern during the HHAWQC derivation process. The HHAWQC methodology document states that a risk level of 10^{-4} for highly exposed populations is acceptable (EPA 2000a). This is sometimes interpreted as meaning that highly exposed populations are not as well protected by the HHAWQC. However, as noted by Kocher (1996) in a discussion of cancer risks at hazardous waste sites, "if only a small population would be at greatest risk, the expected number of excess cancers corresponding to individual risks at the *de minimis* level of 10^{-4} would still be [essentially] zero." Travis et al. (1987) reviewed 132 federal regulatory decisions and concluded that in actual practice, for small population risks, the *de minimis* lifetime risk was considered to be 10^{-4}.

Given that the 10^{-4} risk level has been identified as an acceptable/*de minimis* risk level for highly exposed populations, it may be useful to consider exactly what that risk level represents in terms of FI. If the default FI of 17.5 g/day represents a 10^{-6} target risk level, then a highly exposed population that eats as much as 1750 g/day will still be protected at a 10^{-4} risk level.

6.2 Explicit and Implicit Exposure Factors

The specific exposure factors that EPA uses in the derivation of HHAWQC include human body weight, drinking water consumption rates, and fish ingestion rates. In the HHAWQC methodology document, EPA states that the selection of specific exposure factors is "based on both science policy decisions that consider the best available data, as well as risk management judgments regarding the overall protection afforded by the choice in the derivation of AWQC" (EPA 2000a). This section addresses the levels of conservatism represented by the default values selected by EPA for individual explicit and implicit exposure factors.

6.2.1 *RSC*

The RSC determines what portion of the RfD will be allocated to the consumption of water and fish from regulated waterbodies. For example, if the RfD for a particular substance is 1 mg/kg/day and the RSC is 20%, then the HHAWQC must be set such that exposures to that substance via water and fish can be no more than 0.2 mg/kg/day. Thus, the lower the RSC, the lower the HHAWQC that will be derived.

Although EPA (2000a) does provide a decision tree methodology for calculating chemical- or site-specific RSCs, the lowest allowable value, 20%, is specified as the default RSC by EPA in its calculations of HHAWQC. EPA explains this in the HHAWQC methodology document (EPA 2000a) with the statement that "[the default value of 20%] is likely to be used infrequently with the Exposure Decision Tree approach, given that the information [required to calculate a chemical-specific RSC]…should be available in most cases. However, EPA intends to use 20 percent…" This statement clearly indicates that for most chemicals, an RSC greater than 20% is appropriate, but EPA has chosen to use the most conservative 20% default value. Use of an RSC of 20% when data indicate that a larger percentage is more appropriate can result in as much as a 4-fold reduction in the HHAWQC.

The California Office of Environmental Health Hazard Assessment (OEHHA) concluded that the default use of an RSC of 20% is "unreasonably conservative for most chemicals" (Howd et al. 2004). For 22 of the 57 chemicals listed by Howd et al. (2004), a RSC value greater than 20% was used in the calculation of California Public Health Goals for those chemicals in drinking water. Howd et al. (2004) also noted that "[a] default RSC of 0.2 is based on tradition, not data."

A recent Government Accountability Office report (GAO (2011) calculated the effect of using different RSC factors on the determination of drinking water health reference levels (HRLs) for a hypothetical chemical with an RfD of 0.5 µg/kg/day. While holding all other variables constant, RSC values of 20%, 50%, and 80% were inserted into the equation. The corresponding HRLs were 3.5 ppb (20%), 8.8 ppb (50%), and 14 ppb (80%).

A RSC may be calculated in two ways. The subtraction method allocates 100% of the RfD among the various sources of exposure. So, the daily exposure from all exposure routes other than drinking water and fish consumption are first subtracted from the RfD, then the remainder of the RfD is allocated to drinking water and fish consumption. The percentage method does not attempt to quantify exposures from other sources, but rather simply allocates a percentage of total exposure to drinking water plus fish consumption and to other sources.

EPA has chosen to use the percentage method as the default approach. EPA states that in most cases, they lack adequate data to use the subtraction method and that the percentage method is more appropriate for situations in which multiple media criteria exist (EPA 2000a). The GAO report (GAO 2011) notes that the percentage method is considered to be the more conservative option and generally yields a lower water quality criteria value. The GAO illustrated the difference in outcome by using the data for a hypothetical chemical to calculate drinking water health reference values (HRV) using both methods. Using the subtraction method, the HRV was 12.3 ppb. Using the percentage method, the HRV was 8.8 ppb, a 1.4-fold reduction.

6.2.2 *Body Weight*

The HHAWQC methodology document (EPA 2000a) recommends using a BW of 70 kg. This number was chosen in part because it is in the range of average values for adults reported in several studies and in part because it is the default body weight used in IRIS calculations. However, in 2011, EPA released an updated edition of the Exposure Factors Handbook (EPA 2011b). Based on data from the National Health and Nutrition Examination Survey (NHANES) 1999-2006, the new handbook recommends a mean BW value of 80 kg for adults.

The RfD is defined as "an estimate (with uncertainty spanning approximately an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects over a lifetime" (EPA 2000b). The RfD expresses this daily exposure as a function of body weight (mg of chemical per kg of body weight), so the daily exposure that is likely to be without appreciable risk will be lower for an individual with a lower body weight than for an individual with a higher body weight. Thus, the lower the body weight used in the calculation of the HHAWQC, the lower the resulting criteria. For this reason, the choice to use 70 kg as the default body weight adds to the conservatism of the HHAWQC and yields criteria values approximately 12.5% lower than those calculated using the more accurate population mean of about 80 kg BW recommended by EPA in the latest Exposure Factors Handbook (EPA 2011b).

6.2.3 *Drinking Water Intake*

EPA (2000a) cites several reasons for including the drinking water exposure pathway in the derivation of HHAWQC:

(1) Drinking water is a designated use for surface waters under the CWA and, therefore, criteria are needed to assure that this designated use can be protected and maintained.

(2) Although rare, there are some public water supplies that provide drinking water from surface water sources without treatment.

(3) Even among the majority of water supplies that do treat surface waters, existing treatments may not necessarily be effective for reducing levels of particular contaminants.

(4) In consideration of the Agency's goals of pollution prevention, ambient waters should not be contaminated to a level where the burden of achieving health objectives is shifted away from those responsible for pollutant discharges and placed on downstream users to bear the costs of upgraded or supplemental water treatment.

These reasons make it clear that 2 L/day was selected as the default water consumption rate in support of larger goals related to pollution prevention and maintenance of designated use and does not represent a consideration of actual direct risk of adverse effect to any individual consumer. As EPA itself noted, it would be rare for anyone to use untreated surface water as a source of drinking water. The only direct consumption of untreated surface waters that might be considered to be routine is incidental ingestion during swimming, for which the EPA (2011b) recommended upper percentile default rates are 120 mL/hr for children and 71 mL/hour for adults. Using the 95^{th} percentile estimate for time spent swimming each month (181 minutes) (EPA 2011b), annual daily average water consumption rates of 0.012 L/day (children) and 0.007 L/day (adults) can be calculated.

The default water consumption rate of 2L/day represents reported consumption of water from "community water," which is defined as tap water from a community or municipal water source. It does not represent a realistic level of consumption of untreated surface waters, which is likely to occur only as an incidental event of water-related recreational activities. However, by using 2 L/day in the calculation of the HHAWQC, EPA is deriving criteria values that are based on the assumption that the general population is indeed consuming 2 L/day of untreated surface water. Thus, the use of 2 L/day in the HHAWQC can insert a significant level of conservatism into the calculations.

The impact of the use of 2 L/day varies according to the BAF/BCF of the chemical. For chemicals with high BAFs/BCFs, the impact of drinking water intake on the ultimate HHAWQC is minimal due to the much larger contribution of the "fish intake x BAF" factor in the equation. However, for substances with low BAFs/BCFs, the impact is much greater. Table 6.1 shows the effect of changing drinking water intake rates on the HHAWQC of some example compounds with different BCFs.

Table 6.1 Human Health Ambient Water Quality Criteria Calculated for Varying Drinking Water Intakes

		HHAWQC (µg/L)		
Compound	BCF	DI = 2L/day (current default)	DI = 1L/day (mean DI for adults[1])	DI = 0.007L/day (ingestion while swimming)
Methyl bromide	3.75	47.4	91.96	1,349.40
Arsenic	44	0.017	0.031	0.137
BEHP[2]	130	1.17	1.53	2.19
Chlordane	14100	0.000804	0.000807	0.000811
PCBs	31200	0.0000639	0.0000640	0.0000641

[1]EPA 2011
[2]Bis(2-ethylhexyl)-phthalate

6.2.4 *Fish Consumption*

Note: Appendix A of this document contains a thorough treatment of topics related to the collection and interpretation of data used for deriving fish intake rates (FIs) (or fish consumption rates, FCRs) and applied in the derivation of HHAWQC. The appendix was prepared by Ellen Ebert, a recognized expert on interpretation of fish collection and consumption survey data.

Surveys of Fish Consumption - FIs tend to be overestimated in most surveys for a number of reasons. Individuals who respond to surveys with long recall periods tend to overestimate their participation in activities that are pleasurable to them. Creel surveys tend to be biased toward higher representation of more avid anglers who have high success rates and, thus, may consume at higher rates than the typical angler population. Short-term diet recall surveys tend to incorrectly classify people who eat a particular type of food infrequently as "non-consumers" and overestimate consumption by "consumers." Often people classified as "non-consumers" are excluded from the summary statistics of short-term diet recall survey resulting in an overestimate for ingestion rates for the entire survey population. Finally, when specific information is lacking from survey data, decisions are generally made during analysis of the survey data to ensure that consumption will not be underestimated (e.g., relatively large meal sizes will be substituted for unknown meal sizes, frequency of meals reported will be assumed to be consistent throughout the year regardless of fishing season, etc.) More detailed discussion of surveys used to determine FIs may be found in Appendix A.

Consumption of Marine and Imported Fish - As noted in Section 5.4 above, EPA's HHAWQC methodology document recommends that fish consumption rates be based on consumption of freshwater and estuarine species only and that any consumption of marine species of fish should be accounted for in the calculation of the RSC (EPA 2000a). However, the surveys used as the basis for EPA's recommended default fish consumptions rates collected information on the total consumption of fish of any species and from all sources, e.g., purchased or sport-caught fresh, frozen, or canned fish from local, domestic, or international sources (EPA 2011b). Surveys that collect information on the specific species consumed reveal that the majority of finfish consumed by Americans are marine species (Table 6.2). Also, as reported by the NOAA Fisheries Service[6], most of the seafood consumed in the U.S. is not caught in U.S. waters. In fact, about 86 percent of the seafood consumed in the U.S. is imported. Thus, the fish consumption rate used in the calculation of HHWQC significantly overestimates consumption of fish from regulated freshwater/estuarine waters by the majority of the population.

Table 6.2 Per Capita Consumption of Seafood in the U.S. – Top 10 Species (MBA 2011)

Type of Seafood	Pounds Consumed per Person/Year	Additional Comments
Shrimp	4	85% imported, mostly farmed, some wild caught
Canned tuna	2.7	Marine species
Salmon	2	Marine species
Tilapia	1.5	Farmed fish, most are imported
Pollack	1.2	Marine species
Catfish	0.8	Farmed fish, from both domestic and imported sources
Crab	0.6	
Cod	0.5	Marine species
Pangasius	0.4	Primary source is fish farms in Asia
Clams	0.3	

Additional discussion of the basis for excluding marine fish from fish consumption rate determinations may be found in Appendix B, which addresses issues relevant to the accumulation of persistent, bioaccumulative, and toxic chemicals by salmon in the context of the development of fish consumption rates in the state of Washington.

Consumption of Fish from Regulated Waters - Default assumptions that the general population consumes fish taken from contaminated water bodies every day and year of their entire life represent additional conservative assumptions. When applied to establishing permit limits or the risk

[6] http://www.noaanews.noaa.gov/stories2011/20110907_usfisheriesreport.html

assessment of a specific site or waterbody, the HHAWQC inherently assumes that 100 percent of the fish consumed over a lifetime are taken from that waterbody. This may be a reasonable assumption when the chemical constituents of concern are ubiquitous so that it is possible that individuals might receive similar levels of exposure even if they fish multiple waterbodies, but is likely to overestimate potential risk when applied to a single waterbody or one that is unique in terms of its chemical concentration or sources of the chemical in question. While it is possible individuals could obtain 100 percent of their fish from a single waterbody, this is not typical unless the waterbody is very large or represents a highly desirable fishery. In addition, individuals are likely to move many times during their lifetimes and, as a result of those moves, may change their fishing locations and the sources of the fish they consume. Finally, it is likely that most anglers will not fish every year of their lives. Health issues and other demands, like work and family obligations, will likely result in no fishing activities or reduced fishing activities during certain periods of time that they live in a given area. Thus, these assumptions add conservatism to the derivation of HHAWQC.

Implied Harvest Rate - EPA's default rate of 17.5 g/day indicates the amount of fish that is actually consumed. In order to achieve that rate, one must harvest 58 g/day of whole fish [assuming EPA's recommended edible portion of 30 percent (EPA 1989)] to yield 17.5 g/day of edible fish. When annualized, this results in 21,300 grams of fish per person or 47 pounds of fish per consumer per year. When considered over the 70-year exposure period (as assumed in the HHAWQC calculation), this results in the total removal of 3,300 pounds of fish/person during that period. In addition, if that individual is providing fish to a family of four, it would be necessary to remove roughly 13,000 pounds of fish from a single waterbody during that 70-year span. This represents a significant level of fishing effort and harvest and likely represents a substantial overestimate of any actual fish that is likely to be harvested from a single waterbody by a single individual.

Source of HHAWQC Default FIs - The food intake survey upon which the default fish consumption rates were based were short-term surveys. Numerous researchers have reported that the long-term average daily intake of a food cannot be determined using these short-term cross-sectional surveys (Tran et al. 2004). The use of short-term surveys has been shown to overestimate long-term food intakes in the upper percentile ranges (Tran et al. 2004) that are typically used by EPA in exposure assessments, especially for infrequently consumed foods (Lambe and Kearney 1999) like fish. Additional discussion of the limitations of the use of short-term survey data on fish consumption may be found in Appendix A, Section 3.2.2.

Summary - The fish consumption rates used in calculating HHAWQC can have a significant impact on the resulting HHAWQC. This is because the HHAWQC are proportional to the fish consumption rates (as the rate increases, the HHAWQC decreases) and there is substantial variability in the rates of fish consumption among the consuming population. In addition, the potential exposure through the fish consumption pathway is dependent upon a number of different variables including the types of fish consumed, the sources of those fish, and the rates at which they are consumed. The quantification of fish consumption rates is complicated by the methods used to collect consumption information, the availability of fish from regulated sources, and the habits of the targeted population of fish consumers.

The selection of fish consumption rates when calculating HHAWQC is discussed in more detail in Appendix A.

6.2.5 *Cooking Loss*

The derivation of HHAWQC is based on the assumption that there will be no loss of chemicals from fish tissues during the cooking process. However, numerous studies have shown that cooking reduces the levels of some chemicals. For example, Zabik et al. (1995) reported that cooking significantly reduced levels of the DDT complex, dieldrin, hexachlorobenzene, the chlordane complex, toxaphene, heptachlor epoxide, and total PCBs. Similarly, Sherer and Price (1993), in a review of published studies, reported that cooking processes such as baking, broiling, microwaving, poaching, and roasting removed 20-30% of the PCBs while frying removed more than 50%.

In its development of Fish Contaminant Goals (FCGs) and Advisory Tissue Levels, the State of California uses a cooking reduction factor to account for cooking loses for some chemicals:

> FCGs take into account organochlorine contaminant loss during the cooking process. The concentration of PCBs and other organic contaminants in fish are generally reduced by at least 30 percent, depending on cooking method… As such, a cooking reduction factor of 0.7 was included in the FCG equation for organic compounds (allowing for 70 percent of the contaminant to remain after cooking) (CA 2008).

By not incorporating a chemical-specific factor to adjust for cooking loss, the exposure level from fish consumption will be overestimated for organic compounds, thus lending an additional layer of conservatism to the resulting HHAWQC.

6.2.6 *Exposure Duration*

As noted in Section 5, exposure duration is an implicit element in the derivation of HHAWQC and a value of 70 years, or an approximate lifetime, is assumed. While average lifetimes may be approximated by 70 years, it is generally considered conservative to assume that an individual would be continuously exposed to substances managed through the development of HHAQWC because waters contaminated with such substances do not exist everywhere and it is unlikely that many persons would reside only in contaminated areas, and drink and fish only in these waters for an entire lifetime. Choosing to assume a 70-year exposure duration may be justified in cases where a pollutant is ubiquitous in the environment and thus it could reasonably be assumed that ingestion of drinking water and locally caught fish from essentially all freshwater locations would lead to similar levels of exposure. There is little evidence, however, supporting the ubiquity of most substances for which HHAWQC have been established (though an exception might be justified for mercury or other pollutants for which atmospheric deposition is the dominant mechanism contributing substances to surface waters).

Perhaps more significantly, however, it is uncommon for people to reside in a single location for their entire life. EPA's Exposure Factors Handbook (EPA 2011) contains activity factors, including data for residence time, from several US studies. Table 6.3 summarizes some of these results.

Table 6.3 Values for Population Mobility

	Mean	90^{th} Percentile	95^{th} Percentile
Residential Occupancy Period (Johnson and Capel 1992)	12 years	26 years	33 years
Current Residence Time (US Census Bureau 2008)	8 years (median) 13 years (mean)	32 years	46 years

As with other survey results, there is some uncertainty and potentially some bias associated with the residency periods reported in these studies. Additional studies are discussed (EPA 2011) concerning the distance people move, when they do move. However, the data clearly suggest that the central tendency (mean or median) and upper percentile values are substantially less than the 70 year exposure period assumed by EPA. The assumption of a 70 exposure duration overestimates median exposure duration by 8-fold, mean exposure duration by approximately 6-fold and the 90th percentile by 2- to 3-fold. Thus, the choice to use 70 years is conservative for most non-ubiquitous chemicals. Table 6.4 shows the effect on some example HHAWQC when assuming exposure durations of 70 and 30 years.

Table 6.4 HHAWQC Calculated Based on 70 and 30 Year Exposure Durations

	HHAWQC (µg/L)	
Compound	70 year exposure duration	30 year exposure duration
Arsenic	0.017	0.040
BEHP	1.17	2.73
Chlordane	0.000804	0.00187
PCBs	0.0000639	0.000149

6.2.7 *Exposure Concentration*

As noted in Section 5, implicit with the derivation of HHAQWC is the assumption that both the water column and fish tissue concentrations exist at their maximum allowed values for the entire 70 year exposure duration. In reality, water column concentrations vary over time and space. The assumption that concentrations are always the maximum allowed is unnecessarily conservative as a practical matter because, as described in the following paragraphs, regulations governing water quality in the US would not allow a substance to persist in a water body at the HHAQWC concentration for such a period.

EPA's Impaired Waters and Total Maximum Daily Load Program provides guidance to states concerning when waters are considered to be impaired. The EPA guidance is not specific as to recommendations for identifying stream impairments due to exceedances of HHAWQC and many state impaired stream listing methodologies lack specific provisions unique to the basis for establishing HHAWQC (i.e., exposure over a 70 year lifetime). However, it is common that states will consider listing a stream that exceeds WQC for chronic aquatic life (i.e., the CCC) and human health more than 10% of the time (i.e., the "10% rule"). Indeed, EPA guidance for listing impaired surface waters (EPA 2003b) states:

> "Use of the '10% rule' in interpreting water quality data in comparison with chronic WQC will generally be more appropriate than its use when making attainment determinations where the relevant WQC is expressed "concentration never to exceed ___, at any time." Chronic WQC are always expressed as average concentrations over at least several days. (EPA's chronic WQC for toxics in freshwater environments are expressed as 4-day averages. On the other extreme, EPA's human health WQC for carcinogens are calculated based on a 70-year lifetime exposure period.) Using the '10% rule' to interpret data for comparison with chronic WQC will often be consistent with such WQC because it is unlikely to lead to the conclusion that water conditions are better than WQC when in fact, they are not."

The guidance above suggests that listing of waters using the 10% rule is likely to be over protective for chronic aquatic life criteria. That is, it is considered unlikely that a water exceeding the chronic WQC 10% or less of the time would exist, on average, at the criterion value for the 4-day averaging period on which chronic WQC are based. By this same logic, it is an essentially impossible scenario that a water exceeding a HHAWQC 10% or less of the time would average at the criterion value for the 70 year averaging period on which HHAWQC are based.

It may be more realistic, instead, to predict a mean or median water column concentration using the HHAWQC as an upper percentile value occurring in the stream. Considering the 10% rule, one might predict the average water column concentration by assuming that the HHAWQC is the 90th percentile value in a distribution of water column concentrations existing over 70 years. By way of example, Table 6.5 illustrates the effect of variable stream concentrations on the ratio of the 90th percentile concentration to the mean concentration. An approximately normal distribution is assumed for these examples.

Table 6.5 Ratio of 90th Percentile Upper Bound Concentration to the Mean (normal distribution)

	Assumed Distribution	HHAWQC	Standard Deviation and Coefficient of Variation[1]	Estimated Mean[2]	Ratio HHAWQC/Mean
Substance X	Normal	1	0.25	0.68	1.5x
Substance Y	Normal	1	0.50	0.36	2.8x
Substance Z	Normal	1	0.60	0.23	4.3x

[1]The coefficient of variation (or relative standard deviation) is the ratio of the standard deviation to the mean and represents the degree of relative variability of the data around the mean.
[2]The 90th upper percentile of a normal distribution lies about 1.28 standard deviations from the mean.

The same general characteristic would be expected for stream concentrations that are log-normally distributed, which is a more common situation. Assuming that the values used in the normal distribution case in the previous table apply to the logarithms of the original data, a ratio of the antilogs of the HHAWQC (90th percentile value) and mean values in the normal distribution case can be calculated. Results are shown below in Table 6.6.

Table 6.6 Ratio of 90th Percentile Upper Bound Concentration to the Mean (lognormal distribution)

	Assumed Distribution	Antilog of HHAWQC	Standard Deviation of log concentrations	Estimated Geometric Mean[1]	Ratio HHAWQC/Geometric Mean
Subst. X	Lognormal	10	0.25	4.8	2.1x
Subst. Y	Lognormal	10	0.50	2.3	4.4x
Subst. Z	Lognormal	10	0.60	1.7	5.9x

[1]The geometric mean is equal to the antilog of the Estimated Mean in the normal distribution table.

As can be seen in Tables 6.5 and 6.6, the actual mean can be a small fraction of the upper 90th percentile value. In these examples the degree of conservatism embodied in the HHAWQC value ranges between 1.5x and 5.9x.

6.3 Compounded Conservatism

Compounded conservatism is the term used to describe the "impact of using conservative, upper-bound estimates of the values of multiple input variables in order to obtain a conservative estimate of risk…" (Bogen 1994). Bogen (1994) pointed out that "safety or conservatism initially assumed for each risk component may typically magnify, potentially quite dramatically, the resultant safety level of a corresponding final risk prediction based on upper-bound inputs." In the HHAWQC derivation process, compounded conservatism plays a role both in the determination of individual factors of the Equations 3.1, 3.2, and 3.3 (i.e., in the toxicity factors and explicit and implicit exposure elements) and in the equations' use of multiple factors, each based on upper bound limits and/or conservative assumptions.

In addition to the conservatism embodied in the selection of individual components of the calculations (both explicit and implicit), the fundamental underlying assumption, which is that the most sensitive subpopulations will be exposed to maximum allowable concentrations over a full lifetime, is a highly unlikely and highly protective scenario. For example, the derivation of HHAWQC is based on the assumptions that an individual will live in the same place for their entire life (70 years) and that 100% of the drinking water and fish consumed during those 70 years will come from the local water body being regulated.

The suggestion that the use of multiple default factors based on upper bound limits and/or conservative assumptions lead to a situation of compounded conservatism has been the subject of considerable discussion (see Section 6.0). However, in a staff paper, EPA suggests that "when exposure data or probabilistic simulations are not available, an exposure estimate that lies between the 90th percentile and the maximum exposure in the exposed population [should] be constructed by using maximum or near-maximum values for one or more of the most sensitive variables, leaving others at their mean values" (EPA 2004). This appears to be an acknowledgement that adequately protective assessments do not require that each, or even most, component parameter(s) be represented by a 90th or 95th percentile value.

Similarly, in the 2005 Cancer Risk Assessment Guidelines, EPA (2005) stated:

> Overly conservative assumptions, when combined, can lead to unrealistic estimates of risk. This means that when constructing estimates from a series of factors (e.g., emissions, exposure, and unit risk estimates) not all factors should be set to values that maximize exposure, dose, or effect, since this will almost always lead to an estimate that is above the 99th-percentile confidence level and may be of limited use to decision makers.

Viscusi et al. (1997) provided a simple example to illustrate compounded conservatism. In Superfund exposure assessments, EPA states that they consider "reasonable worst case" exposures to be in the 90-95th percentile range (Viscusi et al. 1997). However, the use of just three conservative default variables (i.e. 95th percentile values) yields a reasonable worst case exposure in the 99.78th percentile. Adding a fourth default variable increases the estimate to the 99.95th percentile value. In a survey of 141 Superfund sites, the authors reported that the use of conservative risk assessment parameters in site assessments yields estimated risks that are 27 times greater than those estimated using mean values for contaminant concentrations, exposure durations, and ingestion rates.

In a recent report on the economics of health risk assessment, Lichtenberg (2010) noted that the use of conservative default parameters is intended to deliberately introduce an upward bias into estimates of risk. Lichtenberg (2010) also stated that "the numbers generated by such procedures can't really be thought of as estimates of risk, since they bear only a tenuous relationship to the probability that individuals will experience adverse health consequences or to the expected prevalence of adverse health consequences in the population." Indeed, he pointed out that the number of actual cancer deaths that can be attributed to all environmental and occupational causes is much lower than the number that is predicted by risk assessments (Doll and Peto 1981, as cited by Lichtenberg 2010). Lichtenberg (2010) describes concerns about compounded conservatism by saying:

> …regulators continue to patch together risk estimates using a mix of "conservative" estimates and default values of key parameters in the risk generation process. Such approaches give rise to the phenomenon of compounded conservatism: The resulting estimates correspond to the upper bound of a confidence interval whose probability is far, far greater than the probabilities of each of the components used to construct it and which depends on arbitrary factors like the number of parameters included in the risk assessment.

6.4 Summary

Most of the components of the equations used to calculate HHAWQC contain some level of conservatism. The toxicity factors in and of themselves contain multiple conservative parameters, leading to a compounding of conservatism in their derivation. The default RSC is the most conservative allowable level derived using the more conservative of two possible approaches. The default body weight of 70 kg is 10 kg less than the EPA currently recommended value of 80 kg. The derivation process for the HHAWQC does not take into account expected cooking losses of organic chemicals. The compounded conservatism that results from the use of multiple conservative factors yields a HHAWQC that provides a margin of safety that is considerably larger than EPA suggests is required to be protective of the population, even when sensitive or highly exposed individuals are considered. Tables 6.7 and 6.8 illustrate the impact of replacing just two default parameters, body weight and drinking water intake, with average values and allowing for cooking loss on the HHAWQC for methyl bromide and bis(2-ethylhexyl)-phthalate (BEHP).

Table 6.7 Impact of Multiple Conservative Defaults/Assumption on Methyl Bromide HHAWQC

Parameters Used	HHAWQC (µg/L)
Default	47
Factor of 0.7 included for cooking loss	48
Factor of 0.7 included for cooking loss + DI default (2 L/day) replaced by mean value of 1 L/day	94
Factor of 0.7 included for cooking loss + DI default (2 L/day) replaced by mean value of 1 L/day + Default BW of 70 kg replaced by current EPA recommended BW of 80 kg	107

Table 6.8 Impact of Multiple Conservative Defaults/Assumption on BEHP HHAWQC

Parameters Used	HHAWQC (µg/L)
Default	1.17
Factor of 0.7 included for cooking loss	1.39
Factor of 0.7 included for cooking loss + DI default (2 L/day) replaced by mean value of 1 L/day	1.93
Factor of 0.7 included for cooking loss + DI default (2 L/day) replaced by mean value of 1 L/day + Default BW of 70 kg replaced by current EPA recommended BW of 80 kg	2.20

Not only do the individual components of the equations represent a variety of conservative assumptions, the underlying premise upon which calculations of HHAWQC are based is itself highly conservative. It assumes that 100 percent of the fish and drinking water consumed by an individual over a 70 year period is obtained from a single waterbody (or that a chemical is ubiquitous in all water), that the chemical is present at the HHAWQC at all times, an individual consumes fish every year at the selected upper bound consumption rate, and that no loss of the chemical of interest occurs during cooking.

In addition, the toxicological criteria used to develop the HHAWQC have been selected to be protective of the most sensitive individuals within the exposed population and have been combined with conservative target risks. It is unlikely that this combination of assumptions is representative of the exposures and risks experienced by many, if any, individuals within the exposed population.

Tables 6.9 and 6.10 summarize the primary sources of conservatism found in both the explicit and implicit toxicity and exposure parameters of HHAWQC derivation and, for some parameters, quantify the extent of that conservatism.

Table 6.9 Conservatism in Explicit Toxicity and Exposure Parameters

Explicit Exposure Parameter	Default Value	Represents:	Default is conservative because:	Impact of conservatism on HHAWQC (if known)
RfD	N/A	Estimate of daily exposure likely to be without appreciable risk of adverse effects over a lifetime	Bioavailability not typically considered, effects of compounded conservatism in use of multiple UFs	Larger RfD yields higher HHAWQC, magnitude uncertain and varies between compounds
RSD	N/A	Dose associated with incremental risk level of 10^{-6}	based on upper bound risk estimate	Magnitude uncertain, varies between compounds
Relative Source Contribution (RSC)	20%	Fraction of total exposure attributable to freshwater/ estuarine fish	For most chemicals, available data support a larger RSC	Larger RSC yields 1.5x to 4x higher HHAWQC
Body Weight (BW)	70 kg	Adult weight, average for the general population	Mean body weight for adults is now 80 kg	Use of 80 kg yields 1.125x higher HHAWQC
Drinking Water Intake (DI)	2 L/day	86th percentile of general population	Assumes all water consumed is at HHAWQC and that all drinking water is untreated surface water	Magnitude is compound specific[7]
Fish Intake (FI)	17.5 grams/ day for general population and sportfishers 142.4 grams/ day for subsistence fishers	90th percentile per capita consumption rate for the U.S. adult population	Represents an upper percentile, most people eat less fish	Magnitude is compound specific[8]
Bioconcentration Factor (BCF)	Substance specific	Tissue:water ratio at 3% tissue lipid	NA	NA

[7] HHAQWC are inversely proportional to DI value for substances with low BCFs. The DI value has very little influence on HHAWQC for substances with high BCFs.
[8] HHAQWC are inversely proportional to FI value for substances with high BCFs. The FI value has very little influence on HHAWQC for substances with low BCFs.

Table 6.10 Conservatism in Implicit Exposure Parameters

Implicit Exposure Parameter	Default Value	Represents:	Default is conservative because:	Impact of conservatism on HHAWQC (if known)
Cooking Loss	zero	loss of organic chemical during cooking	Does not account for the known 20-50% reduction in concentration of organic chemical in fish tissues following cooking	Inclusion of a factor to account for cooking loss yields 1.25x to 2x higher HHAWQC
Exposure Duration	70 years	Length of time a person is exposed	Assumes 100% of drinking water and fish consumed over the course of 70 years will come from a regulated water body	For non-ubiquitous compounds, recognizing that residency periods are much shorter than 70 years yields HHAQWC that are 2x to 8x higher.
Exposure Concentration	HHAWQC	Concentration in water body of interest equal to HHAWQC	Assumes concentration is always equal to HHAWQC without regard for changes in input or in flow characteristics	Magnitude uncertain but could easily be 1.5x to more than 4x
Relative Bioavailability	1	Bioavailability from fish and water compared to bioavailability in the experiment from which the toxicity benchmark was derived.	Some chemicals are less bioavailable in water or fish tissue than in the experiments from which toxicity benchmarks were derived.	Magnitude is chemical specific

7.0 IMPLICATIONS OF HHAWQC FOR FISH TISSUE CONCENTRATIONS AND CHEMICAL EXPOSURES VIA FISH CONSUMPTION

7.1 Fish Tissue Concentrations

The purpose for including factors for fish intake and bioaccumulation/bioconcentration in the derivation of HHAWQC is to account for consumption of chemicals that are contained within fish tissues. An underlying assumption of this approach is that the HHAWQC correspond to a chemical concentration in edible fish tissue that yields an acceptable daily intake when fish from surface waters are consumed at the default intake rates (e.g., 17.5 g/day general population or 142 g/day subsistence anglers). Once a HHAWQC is calculated, the allowable fish tissue concentration (FTC) associated with that HHAWQC can be easily derived using the same equation. One way of assessing the overall conservatism of the process through which HHAWQC are derived is to compare the associated allowable fish tissue concentrations to existing fish tissue concentration data and concentrations found in other foods, as well as other guidelines or risk-based levels used to regulate chemical concentrations in edible fish tissues (e.g., fish consumption advisory “trigger levels,” US Food and Drug Administration (FDA) tolerances).

Appendix C, “Fish Tissue Concentrations Allowed by USEPA Ambient Water Quality Criteria (AWQC): A Comparison with Other Regulatory Mechanisms Controlling Chemicals in Fish,” illustrates this type of analysis using six example compounds: arsenic, methyl bromide, mercury (total, inorganic, organic), PCBS (total), chlordane, and bis-(2-ethylhexyl)phthalate (BEHP). The analysis revealed that:

- Concentrations of PCBs and mercury in fish from virtually all surface waters in the U.S. exceed FTCs associated with HHAWQC derived using the FI rate for subsistence anglers (142 g/day).
- FTCs associated with HHAWQC derived using the FI rate for the general public (17.5 g/day) are 20 times to 4,000 times lower (more stringent) than fish consumption advisory “trigger levels” commonly used by state programs.
- Although about 50% of fish samples collected during a national survey had PCB levels greater than the allowable PCB FTC associated with the HHAWQC, only about 15% of the nation’s reservoirs and lakes (on a surface area basis) are subject to a fish consumption advisory. When the FI for subsistence anglers is used to calculate a HHAWQC for PCBs, the percentage of samples exceeding the associated FTC increases to 95%.
- The FDA food tolerances for PCBs, chlordane, and mercury in fish are, respectively, 500, 27, and 2.5 times greater than the FTCs associated with the HHAWQC for those chemicals. If the subsistence angler FI rate (142 g/day) is used to calculate the HHAWQC, the FDA food tolerances for those chemicals are, respectively, 4,000, 214, and 20 times greater.

These results indicate that, with respect to FTCs, the HHAWQC as they are currently calculated, with a default FI rate of 17.5 g/day, provides a wide margin of safety below the FTCs considered acceptable by states (as indicated by FCA trigger levels) and by the FDA (as indicated by food tolerances).

7.2 Chemical Exposures via Fish Consumption

Once the FTC associated with a HHAWQC is calculated, that value can also be used to estimate the allowable daily dose of that chemical. Comparing the allowable daily dose associated with HHAWQC with actual exposures to the general population via other sources provides an indication of the potential health benefits that might be gained by increasing the default fish consumption rate and thus lowering the HHAWQC. Appendix C shows the results of such a comparison for six example compounds (arsenic, methyl bromide, mercury (total, inorganic, organic), PCBS (total), chlordane, and BEHP and indicates that for all of these chemicals, exposure via consumption of fish from surface waters to which HHAWQC apply represents only a small percentage of the total exposure from all sources. Therefore, reducing exposures to chemicals via fish consumption by lowering HHAWQC may not provide any measurable health benefits.

8.0 CONCLUSIONS

HHAWQC are derived by EPA, or by authorized states or tribes, under the authority of Section 304(a) (1) of the Clean Water Act (CWA). The methodology by which HHAWQC are derived is based on equations that express a risk analysis. The values used in the HHAWQC equation are based on scientific observations (generally a range of observations) and, thus, have a scientific basis. However, the selection of a single value to represent the full range of observations represents a policy choice and is a subjective decision. Therefore, HHAWQC, though based on science, represent a policy (i.e., non-scientific) choice (EPA 2011a). EPA has stated that their goal in setting HHAWQC is to "protect individuals who represent high-end exposures (typically around the 90^{th} percentile and above) or those who have some underlying biological sensitivity" (EPA 2004). To that end, its selections for individual default parameter values are typically upper percentiles of a distribution (e.g., a 90^{th} percentiles value for fish consumption rate) or conservative assumptions (e.g., 100% of water used for drinking and cooking during a 70 year lifespan is untreated surface water).

The parameters used in the derivation of HHAWQC may be divided into two categories, toxicity parameters and exposure parameters. Toxicity parameters fall into three categories: 1.) non-carcinogenic effects, for which the parameter is the RfD, 2.) non-linear carcinogenic effects, for which the parameters are the POD and UF, and 3.) linear carcinogenic effects, for which the parameter is the RSD, which is derived from the slope factor and the target incremental cancer risk. Derivation of an RfD, selection of a POD and UFs, modeling the dose-response for carcinogenic effects, and calculating the slope factor (m) are based on science, but also involve a variety of policy decisions. These policy decisions all embody some degree of conservatism, such as the use of multiple 95^{th} percentiles and upper bound confidence limits. Thus, the factors representing toxicity in the HHAWQC derivation equation certainly represent conservative (i.e., selected to more likely overestimate than underestimate risks) estimates of toxicity and act to drive HHAWQC toward lower concentrations.

Explicit exposure parameters include the RSC, BW, DI, FI, and BAF. There are also implicit parameters that, while not components of the equations used to calculate HHAWQC, are assumptions that underlie HHAWQC derivation. As with the toxicity parameters, most of the exposure parameters are based on scientific observations, generally a range of observations and thus have a scientific basis. However, selection of a single value to represent the full range of observations is a policy choice. Default values for these parameters and the degree of conservatism associated with them are summarized in Tables 6.9 and 6.10, which shows that these parameter values represent upper percentile values and highly conservative assumptions that act to drive HHAWQC toward lower concentrations.

EPA acknowledges in more recent guidance that the existence of the phenomenon of compounded conservatism, which occurs when the combination of multiple highly conservative assumptions leads to unrealistic estimates of risk. It suggests that in order to avoid this problem when constructing estimates from a series of factors (e.g., exposure and toxicity estimates), not all factors should be set to values that maximize exposure, dose, or effect (e.g., EPA 2005). However, in spite of that, most of the parameters used for the derivation of HHAWQC are set at the 90^{th} (or higher) percentile level.

The overall level of conservatism embodied within the HHAWQC derivation process is illustrated by comparing the allowable fish tissue concentration implied by the designation of HHAWQC to existing guidelines or risk-based levels used to regulate chemical concentrations in edible fish tissues, such as fish consumption advisory "trigger levels" and US Food and Drug Administration (FDA) tolerances. Fish tissue concentrations associated with HHAWQC derived using the fish intake rate for the general public (17.5 g/day) are 20 times to 4,000 times lower (more stringent) than fish consumption advisory "trigger levels" commonly used by state programs. Similarly, FDA food tolerances for PCBs, chlordane, and mercury in fish are, respectively, 500, 27, and 2.5 times greater than the HHAWQC-associated fish tissue concentrations and if the subsistence angler fish intake rate (142 g/day) is used to calculate the HHAWQC, the FDA food tolerances for those chemicals are, respectively, 4,000, 214, and 20 times greater.

Following a consideration of the overall level of conservatism contained within the HHAWQC, the level of protectiveness that EPA has indicated that states should achieve, and concerns that have been expressed by certain segments of the public and some state regulators and elected officials, three issues in particular seem to stand out. The first is the idea that HHAWQC represent an estimate of likely actual exposures to the public, such that, for example, if a HHAWQC is set at 42 ppb, the general public will be exposed to 42 ppb and therefore, any subgroups that may, e.g., consume more fish than average, will not be adequately protected by a 42 ppb HHAWQC. However, a consideration of the sources of the various parameters used to calculate the HHAWQC, as provided in preceding sections of this report, clearly shows that this is not the case.

The second is the idea that, because the HHAWQC for carcinogens are based on a 10^{-6} risk level for the general population, highly exposed subgroups whose risk level might be 10^{-5} or 10^{-4} are not being adequately protected. A consideration of the concept of population risk, as described in Section 6.1.3 demonstrates that this is not the case. Even if a small subgroup of the general population has higher exposures (e.g., higher rates of fish consumption), the expected number of excess cancers corresponding to individual risks at the 10^{-4} risk level is essentially zero. Indeed, in actual practice, in Federal regulatory decisions related to small population risks, the *de minimis* lifetime risk is typically considered to be 10^{-4}.

Finally, there is the belief that increasing the fish consumption rates used to derive HHAWQC which will, in turn, lower HHAWQC, will benefit public health, particularly for populations of high level consumers of fish from regulated surface waters. However, an analysis of six chemicals, selected to represent a range of chemical classes, clearly shows that exposures via consumption of fish from regulated water bodies is only a small percentage of the total dietary exposure from all sources. Thus, the establishment of more stringent HHAWQC may not provide any measurable public health benefit.

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APPENDIX A

FISH CONSUMPTION RATE (FCR)

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1.0 INTRODUCTION

A key component of the equation used to derive ambient water quality criteria (AWQC) is the long-term fish consumption rate (FCR). Selection of an appropriate FCR can be challenging for a number of reasons. In certain cases, there may not be relevant, local or regional fish consumption data available from which to select rates. In other instances, numerous studies of fish consumption behaviors may have been conducted, but the studies report a wide range of FCRs for similar consumer populations. Often, in light of the variability in FCRs, there is a tendency for regulators to select the most conservative (highest) of the available rates to ensure that HHAWQC will be protective of potentially exposed populations, thereby adding considerable conservative bias to the HHAWQC. While there is always variability in consumption rates due to differing behaviors among the consumers, in many cases, the variability among the reported rates for similar populations is a consequence of the survey design, methodology, and approach used to analyze the data, rather than actual variability in consumption rates. It is important to understand how the approaches used to collect and analyze fish consumption data may bias results so that the most appropriate and representative rates can be selected for the development of HHAWQC.

2.0 CURRENT EPA GUIDANCE

EPA's (2000) methodology for deriving AWQC recommends that, when available, consumption rates for populations of concern should be drawn from local or regional survey data. The consideration of local and regional survey data is important in deriving AWQC because these data may vary widely depending upon the waterbodies to which the AWQC will be applied, the population of individuals who may consume fish from those waterbodies, seasonal influences on fishing, availability of desirable species, and the particular consumption habits of those individuals. In many situations, the population of consumers may be the general population who consume fish from commercial sources; in other situations, the only consumers may be the population of fishermen who catch and consume their own fish from a particular waterbody. Typically, recreational fishermen are the population that is likely to consume the most fish from a specific waterbody as they may repeatedly fish that waterbody over time. This is a common rationale for using the habits of this population as a basis for deriving an FCR to be used in developing AWQC.

When local or regional survey data are not available, EPA has historically recommended that a default FCR of 17.5 g/day be used (EPA 2000). This rate is an estimate of the 90th percentile rate of consumption of freshwater and estuarine finfish and shellfish by adults in the general population of the United States. It is an annualized, long-term rate that indicates that the targeted population may consume roughly one half-pound fish meal every two weeks (28 meals/year) from the waterbodies to which the AWQC will be applied. It is based on the USDA's Continuing Food Studies data (USDA 1998) and is recommended by EPA for deriving AWQC because it represents an estimate of high end fish consumption by the general population and average consumption among sport anglers. If subsistence populations are present, EPA (2000) states that a default consumption rate of 142.4 g/day may be used. This rate indicates that this population may consume roughly 229 half-pound meals of fish per year or more than four meals per week.

In addition, EPA (2011) has evaluated a substantial portion of the fish consumption literature and has presented the results of its analysis in its revised *Exposure Factors Handbook*. This guidance presents the findings of the studies and the estimates that EPA has derived based on its analysis of the data. A variety of recommended FCRs are presented for the general population of the United States, individuals who consume sport-caught fish from marine waters, individuals who consume sport-caught fish from freshwaters, and various subpopulations of fishermen. While the previous version of the *Exposure Factors Handbook* made specific recommendations of FCRs to be used, the revised version does not provide specific recommendations. Instead, it presents a range of values from studies that it identified as being relevant and reliable and instructs readers to select the value that is most relevant to their needs.

One difficulty with the way that the FCRs are presented in EPA's tables of recommendations is that not all studies are conducted in the same way. While the text of that guidance discusses the methodologies, strengths and weaknesses of each of those studies, it presents the resulting rates as if they are equivalent. However, the choices made in study design, target population, and approach to data analysis result in a wide range of FCRs. This variability among the FCRs presented can be confusing, resulting in a tendency for risk managers to select rates at the high end of those ranges to ensure protection of public health. The variability, however, is primarily the result of differences in the types of populations and fisheries studied, and the study designs employed. It is important to consider all of these factors in selecting an FCR (Ebert et al. 1994). When setting AWQC, it is important to select values that are representative of the target population to ensure that public health is being protected without putting unmanageable or unnecessary burdens on those who must comply with the AWQC (Ebert et al. 1994).

3.0 ANALYSIS OF FCR SURVEY DATA

While there are many studies of fishing consumption behavior available, it is important to consider the quality of the studies for the purpose of estimating FCRs. Many fishing surveys include collection of some data related to consumption of fish but often that is not the purpose for which the surveys were designed. Instead they may have been designed to determine dietary preferences, assess compliance with advisories, estimate fishing effort and success, determine angler preferences, etc. As such, while they may contain some information about consumption by the surveyed individuals, the data collected may not be adequately detailed or comprehensive to permit the estimation of reliable, long-term FCRs for that population.

For example, Connelly et al. (1992) conducted a survey of New York recreational anglers that provided information about sport-caught fish consumption but the study was designed for the purpose of providing information about anglers' knowledge of fishing advisories in New York and the impacts of the advisories on their fishing and consumption behavior. While it collected information about the number of meals and species consumed, it did not collect information about the size of fish meals. In order to use these data, one must make an assumption about the size of each meal, which in turn affects the rates derived from the study. When EPA (2011) analyzed these data to derive consumption rates, they assumed that each meal was 150 g in size based on a study of the general population conducted by Pao et al. (1982). Had EPA made different assumptions about meal size, they might have derived substantially higher or lower consumption rate estimates. It cannot be determined from the available data whether the rates derived by EPA were actually representative of consumption rates for the surveyed population.

There are a number of other survey design and analysis issues that affect the estimation of FCRs that may be considered in deriving AWQC. To better understand the nuances of FCRs derived from surveys of target populations, it is important to understand the influence that survey design and analysis can have on consumption rate estimates. These issues are discussed below.

3.1 Survey Methods

Fish consumption surveys can be conducted in a number of different ways. These methods include creel (or intercept) surveys, recall mail and telephone surveys, fishing diaries, and dietary recall studies. Each of these methods can be designed to provide information based on short- or long-term periods of recall (periods of time over which individuals are asked to remember their fish consumption behaviors).

While each of the survey methods can be used to estimate rates of consumption, each method has particular strengths and weaknesses and the survey design can greatly affect the resulting FCR estimates. Thus, the survey method used, the recall period, and the target population all need to be considered carefully when comparing FCRs that are reported. Many times the magnitude of the estimated FCRs are an artifact of the study methodology rather than a reflection of actual differences in fish consumption behaviors.

3.1.1 Creel Surveys

Historically, creel surveys have been used by fisheries managers to collect information about catch and harvest rates and determine the adequacy and characteristics of fishery stock. In some cases, however, creel surveys are modified to collect specific information about fish consumption based on individual fishing trips to a particular waterbody. Generally, survey clerks make contact with individuals who are fishing on a particular survey day to ask them what they have caught and what they intend to eat. Typically individuals are only interviewed once during a survey period (no repeat interview) although sometimes repeat interviews are part of the survey design and the responses on multiple interview days are combined for the individual.

Creel surveys are very effective for collecting information about consumption from a specific waterbody by the individuals who use that waterbody. In addition, if there is a particular subpopulation that uses the fishery differently from the general angler population, those individuals will be identified and their consumption habits captured.

While creel surveys provide reliable information about the fish catch on the day of the interview, they are subject to a number of limitations when attempting to estimate long-term average FCRs, which are the rates that are generally used in developing AWQC.

- Consumption rates based on creel surveys are subject to avidity bias; that is, there is a greater chance of interviewing more avid anglers because they are present at the fishery more frequently. More avid anglers are likely to be more successful anglers and, if they harvest fish for consumption, their rates of consumption are likely to be higher than the typical anglers' consumption rates. In order to use creel survey data to estimate consumption habits of the total user population, it is necessary to make a correction for avidity bias so that the results are representative of the entire angler population that uses the fishery (EPA 2011).

  EPA (2011) discusses this phenomenon in its discussion of FCRs in its 2011 *Exposure Factors Handbook*, stating that "in a creel study, the target population is anyone who fishes at the locations being studied. Generally in a creel study, the probability of being sampled is not the same for all members of the target population. For instance, if the survey is conducted for one day at a site, then it will include all persons who fish there daily but only about 1/7 of the people who fish there weekly, $1/30^{th}$ of the people who fish there monthly, etc. In this example, the probability of being sampled … is seen to be proportional to the frequency of fishing...[B]ecause the sampling probabilities in a creel survey, even with repeated interviewing at a site, are highly dependent on fishing frequency, the fish intake distributions reported for these surveys are not reflective of the corresponding target populations. Instead, those individuals with high fishing frequencies are given too big a weight and the distribution

> is skewed to the right, i.e., it overestimates the target population distribution." (EPA 2011, p. 10-3)

To correct for avidity bias, the survey sample is typically weighted based on the reported frequency of fishing by survey participants (EPA 2011; Price et al. 1994). For example, a single day of surveying may have encountered three individuals: 1) one individual who fished with a frequency of one day per year; 2) one individual who fished with a frequency of one day per month; and 3) one individual who fished daily. If those individuals ate one half pound (227 g) fish meal on each day of fishing, their annualized average daily FCRs would be 0.62, 7.5 and 227 g/day, respectively. Based on this 3-person sample, one would conclude that the average consumption rate for these three individuals was 78 g/day. However, if the survey were to be conducted at that location daily throughout the year, it is likely that it might have encountered 365 individuals who fished once per year, 12 individuals who fished once per month, and one individual who fished daily. Thus, the total user population would be 396 individuals, representing 396 points on the fish consumption distribution for the total user population. If their FCRs were identical to the rates for the individuals interviewed during the single day of the survey, the result would be 365 individuals consuming 0.62 g/day, 30 individuals consuming 7.5 g/day, and 1 individual consuming 227 g/day. Thus, for this total angler population, the average rate would be 1.7 g/day. This is substantially lower than the average of 78 g/day based on the actual sample of three individuals. This demonstrates the considerable conservative bias introduced to the FCR estimate if avidity bias is not corrected. Actual corrections depend on the frequency of sampling and the population sampled and so need to be made on a study-by-study basis.

While it is now recognized that avidity bias needs to be considered when analyzing survey data to derive estimates that are representative of the total consuming population, this was not generally done for historical surveys and is still often not done by current study authors. Instead, the consumption rates presented in many survey reports reflect the consumption rates derived from only those individuals who were sampled and thus are biased toward more frequent anglers and consumers. Sometimes it is possible to make these corrections retroactively if the raw data are still available, but often this is not the case. As a result, many consumption estimates that are presented based on creel survey data have not been adjusted to reduce this conservative bias and consequently overestimate consumption rates for the total target population.

- Short-term behavior captured during a single snapshot in time may not be representative of long-term behavior because of variability in fishing effort and success. There may be substantial seasonal variations in the habits of anglers due to fishing regulations, climate, and the availability of target species. Consequently, information collected during a single interview may not be representative of activity on previous or subsequent trips or at other times of the year. Because of limited time for conducting interviews, it is difficult to ask enough detailed questions to allow development of a reliable estimate of the long-term rates of consumption. In addition, the assumptions that must generally be made to extrapolate from short-term data to estimate long-term behaviors add greatly to the uncertainties associated with those estimates.

  Creel surveys are effective at characterizing the consumption habits of individuals who use a specific fishery and are helpful in identifying any subpopulations of fish consumers that are present. It is more challenging, however, to derive a long-term estimate of consumption or to expand the results to a larger geographic area unless very detailed information is collected and there is an appropriate correction for avidity bias.

3.1.2 *Mail Surveys*

Mail surveys are a good tool for collecting detailed information about fishing and consumption behaviors. Generally, mail surveys are designed to randomly sample the target population. Often, for fish consumption, the target population is recreational anglers and mailing addresses are obtained from fishing licenses sold within the target area. Mail surveys can generally collect more detailed information over a longer period of recall, ranging from months to a year. There are, however, some limitations associated with the use of mail surveys.

- Response rates may be low, unless there is a concerted follow-up effort. If rates are very low, then the resulting FCRs may not be representative of the entire target population. In this case, rates are generally overestimated due to the fact that individuals who choose to respond to the survey tend to self-select; that is, the individuals who are most likely to return a mail survey are those for which fishing is an important activity. These individuals tend to be more avid anglers who fish more frequently than the typical angler population and have a higher rate of success in catching fish. Thus, consumption rates based on data collected in a survey with a low response rate may be biased higher than rates that would be estimated if the entire angler population was equally represented in the survey data.

- Because mail surveys often focus on a longer period of recall, the resulting FCRs are subject to recall bias. It is possible that difficulties in recalling specific information about fishing activity may result in the omission of some meals; however, data on the biases associated with long-term recall periods for recreational activities indicate that individuals tend to overestimate their participation, particularly if the issue being investigated is salient for them (Westat 1989). Thus, the tendency is for FCRs to be overestimated with longer recall periods.

- It can be difficult to target certain subpopulations of fish consumers (e.g., high end consumers, specific ethnic groups, individuals who fish a particular waterbody, etc.) with a mail survey. Individuals who are homeless or migrant will not be captured, and those individuals who have limited language skills and/or low levels of literacy may not understand the survey questions and, thus, may choose not to complete and return it. Thus, these groups may be under-represented in the survey sample.

Mail surveys are often conducted to collect information on a statewide or regional basis. If well designed, they can provide detailed information about the fish consumption behaviors of study participants as they can be completed at the respondent’s leisure rather than requiring instantaneous recall of past events. However, FCRs derived from mail surveys may be overestimated if recall periods are long. They may also be overestimated if response rates are low because often non-respondents are less interested in the subject of the survey and, therefore, choose not to participate. In this case, however, data collected through follow-up contact with non-respondents can be used to adjust survey results.

3.1.3 *Telephone Surveys*

Telephone surveys generally consist of the one-time collection of data from a survey participant by telephone. Lists of telephone numbers of individuals within the target population are developed either through the random selection of telephone numbers from all telephone listings in a given area (e.g., statewide, population within certain counties, or population within certain zip codes near a specific waterbody or fishery) or, in the case of surveys of recreational anglers, may be based on information obtained from fishing licenses purchased. Survey respondents are asked to recall information about past fishing trips and fish consumption behavior.

Telephone surveys are rarely used in isolation, however, and are often a follow-up to surveys that have been previously sent to the targeted individuals, thereby providing an opportunity for those individuals to review the survey questions before being asked to respond to them (EPA 1992). They may also be conducted to provide information about non-response bias (for those individuals who did not respond to a mail survey effort) or to confirm or add to data that were collected in the field during a creel survey (EPA 1992).

Telephone surveys are effective in evaluating regional information and can reach large numbers of individuals (EPA 1992) but also have limitations, including the following:

- Individuals who are being interviewed by telephone are rarely willing to spend more than 10 or 15 minutes participating in a telephone interview, particularly when they have had no warning that they will be called. This limits the amount of information that can be captured from them and is likely to result in recall bias due to the fact that individuals may not recall information completely or accurately when they are unprepared to do so. In addition, because of limited time, they can only be asked general information about their long-term fish consumption habits or specific information about their most recent activities.

- Because telephone surveys generally only include a single interview with an individual, they are subject to bias due to the fact that the responses of the participants may only reflect their most recent activities. Thus, if the telephone interview occurs at a time that the respondent is actively fishing or consuming fish, the resulting data may over-estimate his long term level of activity. At the same time, if the telephone interview occurs during a period of inactivity, his long term consumption activity may be under-estimated.

- Individuals who do not have telephones cannot be included in the sample population. Because those individuals are likely to be low income individuals who cannot afford the cost of a telephone, this segment of the population is likely to be under-represented in the survey sample. Similarly, individuals with unlisted numbers will not be included in the survey.

- Recent telephone surveys may be biased toward an older, higher income population if they have not included the sampling of cell phones in addition to land lines, as younger people are more likely than older individuals to rely completely on cell phones. In addition, even if cell phones are sampled, it is not always possible to accurately sample the geographic location targeted because cell phones are not tied to specific addresses (individuals may move to a different home or area but retain the same cell phone number).

- Telephone surveys can be useful if the general population of a given area is being targeted or if anglers are being targeted and the telephone numbers have been obtained from recent fishing licenses. However, if the target population is a particular socioeconomic subpopulation (e.g., ethnicity or income level), it is very difficult to identify those individuals in advance when selecting a list of telephone numbers. Thus, the smaller the target population, the larger the survey effort necessary to gain enough data about the subpopulation or group of interest.

All of these issues can affect the FCR estimates that are derived based on a telephone survey. The most important considerations are the way that the short-term recall information has been used to estimate long term consumption rates and the attention to avoiding the bias introduced in survey results if certain segments of the population are not well represented in the sampling.

3.1.4 *Fishing Diaries*

Diary studies are an excellent means of collecting detailed information about specific fishing trips and fish meals. In these studies, individuals from the targeted population are recruited to participate in the study and are asked to keep a diary of the fishing trips taken. These studies can be short- or long-term studies. For long-term studies, individuals are generally asked to complete monthly diaries and can record very detailed information about every trip taken and every harvested fish that was consumed. If the individuals complete the diaries in a timely fashion, these studies minimize the potential for recall bias and also increase the level of detail that the person is able to recall (e.g., the size of a fish meal, the species consumed, the number of people who shared in the meal, etc.). If this information is collected over a long time period (e.g., for example, monthly diaries completed over a one year period), it can result in very accurate estimates of long-term fish consumption.

One difficulty with long-term diary studies is that there can be a high level of attrition because people tire of recording their information and so stop completing the diaries. However, while the information gathered may only be partial (e.g., several months of the targeted one-year period for the study), the level of detail provided in the diary and the partial data can still yield valid estimates of long-term fish consumption behaviors by the study participants (Balogh et al. 1971).

3.1.5 *Diet Recall Studies*

Diet recall studies are a form of diary study but are generally shorter term. In these studies, individuals are commonly asked to record all foods eaten during a one- or two-day period. The days may be consecutive days or two different days during the study period. These recall studies work well for foods that are consumed on a regular basis (i.e., foods that are consumed daily or at least once every two days) and when evaluating population-level trends, but are not as effective for developing reliable estimates of long-term consumption behavior of foods that are consumed less regularly (as discussed in more detail in Section 3.2.2)). Thus, for those individuals who consume fish daily or several times per week, the estimated rates of consumption based on these data may be representative of their behavior.

However, for many individuals, fish is not consumed on a daily or regular basis. This is particularly true of sport-caught fish, which may only be consumed occasionally (e.g., once per week or less or only during a specific time of the year) (Ebert et al. 1994). As discussed in more detail in Section 3.2.2, short-term recall periods may substantially bias the results by incorrectly assuming that individuals who did not consume during the recall period are non-consumers, and leaving them out of the consumption rate distribution, thereby skewing that distribution toward more frequent consumers. This results in overestimated consumption rates for the total population. In addition, the timing of the diet recall study can substantially affect the resulting consumption estimates if there is a seasonal component to the consumption habits of sport-fishermen. For example, in most states, fishing regulations limit the harvest for individual fish species to certain times of the year. Some individuals have a strong preference for a certain species and only consume fish when those species are available. Thus, while they may consume those fish regularly during that season, they may not consume fish at all during the remainder of the year. If the diet recall survey is conducted during the season when they are regularly consuming those fish, and the survey is not carefully designed to address seasonal variations, their annualized, average FCRs will be overestimated. Conversely, if the diet recall study is conducted during the time when these fish are not being consumed, their FCR will be underestimated as it will, by necessity (due to lack of consumption information) be assumed that they are non-consumers. Because of this, their consumption will not be included in the consumption rate distribution from the survey, thereby biasing that distribution to more frequent consumers and higher consumption rates.

3.2 Analysis of Survey Data to Derive FCRs

Data from surveys can be analyzed a number of different ways and the approach to analysis will depend, in part, on survey design. The key consumption metric for deriving AWQC is to derive an annualized average daily FCR. When estimating these FCRs, it is necessary to understand the size of each meal consumed and the frequency with which those meals are consumed.

There are two common approaches for estimating consumption rates. These include an approach based on reported meal frequency and size, and an approach based on the amount of fish harvested and consumed on a yearly basis.

The meal frequency approach requires that information on the number and size of meals consumed by the surveyed individual over a period of time be collected and then extrapolated to the extent necessary to derive an annualized daily average FCR. Thus, for example, if the survey respondent indicates that he or she eats 26 half-pound [227 gram (g)] fish meals per year, the ingestion rate would be calculated as follows:

$$\text{FCR} = 26 \text{ meals/yr} * 227 \text{ g/meal} * 1 \text{ yr/365 days} = 16.2 \text{ g/day}$$

Similarly, if the respondent indicates that she eats 1 meal every two weeks, her FCR is calculated as follows:

$$\text{FCR} = 0.5 \text{ meal/week} * 227 \text{ g/meal} * 52 \text{ weeks/year} * 1 \text{ yr/365 days} = 16.2 \text{ g/day}$$

Alternatively, the harvest rate approach uses information about the mass of fish actually harvested by the survey participant over time, adjusts that mass by the edible portion of the fish (total mass minus the mass of the parts not consumed by the angler, such as viscera, head, bones, etc.) and the number of people to share in the fish meal. Thus, if a survey respondent indicates that he or she harvested 40 kg (88 pounds) of fish during a year, the default edible fraction of 30 percent (EPA 1989) is used, and it is reported that a total of 2 adults consumed the fish, the FCR would be calculated as follows:

$$\text{FCR} = 40{,}000 \text{ g whole fish/yr} * 0.30 \text{ g edible/g whole} * 1/2 \text{ persons} * 1\text{yr/365 days} = 16.4 \text{ g/day}$$

Depending upon the survey approach used and the questions asked, one method may be more appropriate than the other. There are some limitations of each of these approaches, however, that need to be considered.

- There are uncertainties about the meal method due to the fact that the size of fish meals may vary considerably. Meals of store-purchased fish are likely to be fairly consistent due to the fact that a consistent amount of fish may be purchased for consumption. The same is not true for sport-caught fish. Meal sizes will vary depending upon the mass of fish harvested on a given day and the number of individuals consuming it. Thus, because individuals are generally asked to estimate the size of fish meals consumed, they may or may not accurately represent the variety of meal sizes that are actually consumed over time if the fish are sport-caught fish. While individuals involved in the surveys are often provided with photographs of meals of different sizes, these estimated meal weights may not be representative of the fish actually consumed due to differences in mass resulting from cooking, the way the fish were prepared, and the density of the fish tissue. In addition, although they may provide their estimated average weekly rate of consumption, this weekly rate may vary considerably by season due to changes in weather, fishing time, or availability of target species. Unless data are collected to specifically capture these variations, there is substantial uncertainty introduced by this approach.

- There are also uncertainties introduced when using the harvest method because individuals may not recall exactly how much fish they have harvested over time, and the portion sizes of the individuals who share in the consumption of the fish may vary. Thus, if two people share in the catch it will normally be assumed that the total mass should be divided by two; however, the portions consumed by those individuals may not be equivalent. In addition, there may be some variability around the edible portion of the fish depending on the parts consumed by the survey participants, the fact that edible portions vary somewhat by species, and the number of individuals who share in individual fish meals.

3.2.1 *Identifying "Consumers" and "Non-Consumers"*

When determining the population to be targeted in selecting an FCR for use in developing AWQC, it is important to determine who is likely to be exposed to that chemical via the consumption of fish. Clearly, individuals who never consume fish will have no potential for exposure via this pathway so that the emphasis needs to be on the individuals who actually consume fish as this will be the potentially exposed population. However, depending upon the waterbodies to which the AWQC will be applied, the fish consuming population will vary. If the AWQC will be applied to waterbodies that are commercially fished, then there is potential for exposure to the general population, because they will have access to that fish through commercial sources such as fish markets, grocery stores and restaurants. However, if the waterbodies that are the focus of the AWQC are not commercially fished, then the fish from those waterbodies will not be available to the general population. The only sources of those fish are the recreational anglers who fish those waterbodies.

Once the target population has been identified, it is necessary to identify the FCRs for the individuals within that population who consume fish. Depending upon the survey approach used, this determination can be challenging. For example, if the AWQC are to be applied to commercially fished waterbodies, then the general population who have access to those fish is the target population. However, most surveys of the general population collect information about total fish consumption including consumption of fresh, frozen, canned and prepared fish and shellfish obtained from stores and restaurants, which are most often imported from locations outside of the area of influence of the AWQC, as well as sport-caught fish and shellfish from local sources.

Even if the survey has distinguished among different sources of fish, the identification of consumers may be affected by the survey method. As discussed in more detail in Section 3.2.2 below, short-term diet recall studies, which are often used to evaluate food consumption within the general population, often misclassify individuals as non-consumers. Thus, while the rates are reportedly based on consumers of those fish, they are likely to be excluding a large proportion of actual consumers who have lower frequency of consumption.

3.2.2 *Limitations on the Use of Short Recall Period Survey Data*

Attempting to extrapolate long-term FCRs based on short recall period survey data presents a number of problems. These include the potential misclassification of non-consumers, the overestimation of FCRs based on data collected as a snapshot in time, and the lack of consideration of variation over time.

In general, the length of recall period affects the resulting estimated rates of consumption with shorter term studies resulting in higher estimated rates of consumption than studies with longer recall periods. The higher rates of consumption from the short-term studies may not be a reflection of actual differences in the behaviors within the surveyed populations but may instead be an artifact of the short recall period (EPA 2011; Ebert et al. 1994).

Short-term dietary recall studies can result in misclassification of participants as non-consumers and consequently overestimate consumption rates for true consumers within the surveyed population. Essentially, when a diet recall survey is conducted, if an individual does not indicate that fish was consumed during the recall period, that individual is identified as a non-consumer and is assumed to have zero consumption. When this occurs, rates are reported as either "per capita" rates (which include the non-consumers and their estimated rates of 0 g/day) or as "consumers only" rates, which means that all of the individuals who did not consume fish during that period of time are excluded from the reported results and only those individuals who did consume fish during that period are counted in the consumption rates.

The USDA dietary data that form the basis for EPA's (2000) default FCR of 17.5 g/day were collected using a dietary recall study of survey participants during two non-consecutive 24-hour periods (EPA, 2000). Because of the way in which sampling was conducted, the actual fish consumption behaviors reported are strongly biased toward those respondents who consume fish with a high frequency. All of the individuals included as fish consumers in the USDA estimate consumed fish at least once during the 2-day sampling period. To use these data to estimate long-term consumption rates, EPA assumes that the consumption behavior that occurred during the 2-day period is the same as the consumption behavior that occurs throughout every other 2-day period during the year. Thus, if an individual reported eating one fish meal during the sampling period, the extrapolation used to estimate long-term consumption was the assumption that the individual continues to eat fish with a frequency of one meal every two days, or as many as 183 meals per year. If it is assumed that an individual eats one-half pound (227 g) of fish per meal, this results in a consumption rate of 114 g/day. However, the individual who consumed fish during that sampling period may not actually be a regular fish consumer. In fact, that fish meal could have been the only fish meal that the individual consumed in an entire year. Thus, that person's FCR would be substantially overestimated using this extrapolation method.

Conversely, individuals who did not consume fish during the 2-day sampling period were assumed to be non-consumers of fish, despite the fact that those individuals may simply have been fish consumers who coincidentally did not consume fish during the 2-day sampling period. Because there are no data upon which to base consumption estimates for these individuals, they were assumed to consume 0 g/day. However, they may in fact consume fish with a frequency ranging from as little as zero meals per year to as much as one meal per day (or even more than one meal per day) on all days except the two that USDA conducted the survey. As with the high consumers identified in the USDA database, there is no way to determine whether 0 g/day consumers are actually non-consumers or just individuals who did not consume fish during the 2-day survey period.

There can be enormous variability in the frequency of consumption of specific foods (Balogh et al. 1971; Garn et al. 1976), and the variability in the number of fish meals may be further enhanced by seasonal effects. For example, recreational fishermen in many states are only permitted to fish during certain months due to fishing regulations. Thus, it is possible that their sport-caught fish ingestion rates are substantially higher during the fishing season, when fresh fish are readily available, than they are during the remainder of the year. In addition, many anglers target specific species and only fish when those species are available. For example, many anglers in the Pacific Northwest target salmon, which are only available during their time-limited spawning runs. Thus, they may not fish at all or consume sport-caught fish during other times of the year when the salmon are not available.

Because of this phenomenon, there is a tendency, if only "consumers" are considered, for short-term recall surveys to report substantially higher FCRs than do surveys with longer periods of recall. This is well demonstrated in EPA's (2011) tables of relevant fish consumption studies. For example, when reviewing EPA's relevant studies of statewide[9] freshwater recreational fish intake (EPA 2011, Table 10-5), FCRs appear to be highly variable, with means for "consuming" anglers ranging from 5.8 to 53 g/day and 95th percentile (95th %ile) values ranging from 26 to 61 g/day.[10] However, one of those studies collected data from individuals on a single day (ADEM 1994), one involved a single interview but also included a 10-day dietary diary component (Balcom et al. 1999), one involved a 90-day recall period (Williams et al. 1999), one included a 7-day recall period but also collected some

[9] There are additional studies provided on EPA's table of relevant studies but those studies are waterbody specific and thus are not directly comparable with the statewide studies.

[10] 95th percentiles are not available for all studies listed in EPA's Table 10-5. For example, EPA reports the highest mean rates for studies conducted in Alabama and Connecticut but provides no 95th percentile values from those studies. Thus, those studies cannot be included in the comparison of 95th %ile rates.

information on seasonal variation for the remainder of the year (West et al. 1989), and the remainder of the studies collected data for a 1-year recall period. When the statewide studies are segregated by recall period, the bias toward higher consumption rates based on shorter recall periods is apparent, as shown below.

Rates for Sport-caught Freshwater Fish Consumption (Adult consumers) from Statewide Studies by Recall Period (Table 10-5, EPA 2011)

Recall Period	1-day		1-day interview and 10-day diary		90 day				1 year	
Metric	Mean	95th %ile	Mean	95th %ile	Mean	95th %ile	Mean	95th %ile	Mean	95th %ile
FCR (g/day)	53	NA	53	NA	20	61	14	39	5.8-14	26-43
Study	ADEM 1994		Balcom et al. 1999		Williams et al. 1999		West et al. 1989		Ebert et al. 1993; Benson et al. 2001, Connelly et al. 1996, Fiore et al. 1989	

NA: Not available. This value was not presented by EPA (2011)
[a]The West et al. 1989 study requested information about a 7 day recall period but also collected some information on variation in behavior during different seasons of the year which were used to estimate long-term FCRs.
[b]A subsequent West et al. (1993) study collected information for a 7-day recall period but collected no longer term information that could be used to annualize the rates. While the means from the 1989 and 1993 surveys were nearly identical, the 95th percentile for the 1993 study (78 g/day; EPA 1997) was substantially higher than the 95th percentile of 39 g/day that was derived from the 1989 survey data.

Consumption of sport-caught fish is likely to have a seasonal component, particularly in states where fishing may occur for only a portion of the year. Like other seasonal foods, it is likely that these foods are eaten more frequently during their seasons than they are at other times of the year. For example, fresh, local strawberries are only available in the northeastern United States for a few weeks during the summer. When they are available locally, it is likely that strawberries are consumed in greater quantities than they are when they are out of season and can only be imported from other locations and purchased from supermarkets. That is not to say that they are never eaten when they are out of season but rather that if individuals were to be asked about their strawberry consumption during the time that fresh strawberries are in-season, it is likely that they would overestimate their consumption for other times of the year when local strawberries are not available. At the same time, if they were asked in the winter to report their strawberry consumption, it is likely that they would underestimate their strawberry consumption during the summer when fresh, local strawberries are readily available. These seasonal variations are important in terms of their affect on estimating long term consumption rates. While the USDA survey (upon which EPA's rate of 17.5 g/day is based) collected data on two different days, the survey days were no more than 10 days apart. Thus, the rates of consumption for all foods that are seasonally affected would have been dependent upon the timing of those survey days and would not necessarily reflect the participants' long-term average consumption rates.

EPA (2011) has acknowledged that short-term dietary records are problematic when attempting to estimate long-term rates of consumption, particularly for upper bound FCR estimates. In its review of NHANES 2003-2006 study data, EPA (2011, p. 10-16) stated, "the distribution of average daily intake rates generated using short-term data (e.g., 2-day) does not necessarily reflect the long-term distribution of average daily intake rates." In addition, in its discussion of the limitation of the West et al. (1993) study of Michigan anglers EPA (2011, p. 10-38) stated: "However, because this survey only measured fish consumption over a short (1 week) interval, the resulting distribution will not be indicative of the long-term fish consumption distribution, and the upper percentiles reported from the U.S. EPA analysis will likely considerably overestimate the corresponding long-term percentiles. The overall 95th percentile calculated by U.S. EPA (1995) was 77.9; this is about double the 95th percentile estimated using yearlong consumption data from the 1989 Michigan survey." In addition, when discussing the USDA methodology, EPA (1998, p. 10-107) stated that "[t]he non-consumption of finfish or shellfish by a majority of individuals, combined with consumption data from high-end consumers, resulted in a wide range of observed fish consumption. This range of fish consumption data would tend to produce distributions of fish consumption with larger variances than would be associated with a longer survey period, such as 30 days." As a result, upper-bound fish consumption estimates based on these data will be biased high and overestimate actual upper-bound consumption rates for the total population of consumers.

Short-term recall periods generally result in an overestimate of consumption behavior, particularly for foods that are not eaten on a daily basis. While this does not appear to greatly affect central tendency values for the populations studied (EPA 2011; Garn et al. 1976), the inverse relationship between upper-bound FCRs and the length of survey recall period has been clearly demonstrated (Ebert et al. 1994).

3.2.3 *Estimating Means and Upper Percentiles*

Once FCRs have been calculated for the individual survey respondents, they are typically evaluated statistically to define a central tendency or upper-bound estimate of consumption to be used in deriving AWQC. The central tendency may be an arithmetic mean, geometric mean, or a median (50th percentile value) of the range of consumption rates derived. Because the estimated FCR distribution (the range of rates) is generally very highly skewed, as are consumption rates for most foods (Garn et al. 1976), with a very large number of individuals consuming fish at very low FCRs and a few individuals consuming at high rates, the arithmetic mean is typically not a good estimate of actual central tendency. For example, in the statewide survey of Maine's recreational anglers, which included rates ranging from 0.02 to 183 g/day, the median rate of consumption by individuals who ate at least one fish meal from Maine's freshwater bodies during the year was 2 g/day but the arithmetic mean FCR for this same population was 6.4 g/day and represented the 77th percentile of the distribution of FCRs from that survey (Ebert et al. 1993).

Upper-bound FCRs may be calculated in a number of ways. For some surveys, they may be calculated as the 95th upper confidence limit of the arithmetic mean consumption rate. Alternatively, for some surveys, FCR results are ranked in order of magnitude and then the upper-bound value is selected as the 95th percentile of that distribution. Thus, for example, in the same Maine survey for which there were 1,053 FCRs calculated, the 95th percentile value of 26 g/day represented the FCR reported for angler 1,000 after order ranking of the results (Ebert et al., 1993).

3.2.4 *Consumption of Resident and Anadromous Fish Species*

It is important that the FCR used in deriving AWQC reflects consumption of the fish species that will be affected by the AWQC. This will ensure that FCRs are not overestimated.

Estimated FCRs are generally based on the total consumption of fish, and may include fish of a variety of types, including resident finfish, anadromous finfish, and shellfish. For example, the FCR recently adopted by Oregon Department of Environmental Quality was supported by state-specific data on consumption for which a substantial portion of the consumption was the ingestion of anadromous species such as salmon and steelhead. Anadromous species are not substantially affected by local water quality in estuaries and rivers because they are only present in those waterbodies when they are juveniles and when they return as adults to spawn. They spend the majority of their lives in marine waters and are typically harvested during their return spawning runs. As a result, any chemical constituents that are present in their bodies are predominantly the result of exposures they have received during their time in marine waters. Thus, changes in AWQC for local waterbodies will not affect the concentrations of those chemicals in their edible tissues. Instead the fish that are sensitive to changes in local water quality are the resident species that spend their entire life stages in local waters.

This is an important consideration for states, such as Oregon and Washington, where a substantial portion of the fish harvested for consumption are anadromous fish. For example, the Columbia River tribes consume, on average, nearly three times more anadromous fish (including salmon, trout, lamprey and smelt) as they do resident species (CRITFC 1994). Similarly, Toy et al. (1996) reported that at the 95^{th} %ile consumption rate for the combined Tulalip and Squaxin tribes, who fish Puget Sound, 95% of the total finfish consumed were anadromous species.

Because the AWQC approach incorporates a chemical-specific bioaccumulation factor, it essentially assumes that fish are in equilibrium with constituent concentrations in the water bodies of interest. This is not likely to be the case for anadromous species because of the short time period during which they are in fresh and estuarine waters. For example, after hatching, juvenile Chinook salmon spend several months in the Columbia River before they begin their out-migration to marine feeding areas. They generally return to the river to spawn between the ages of two and six years (ODFW, 1989) and do not generally feed during their spawning run. These fish, which provide a substantial portion of the freshwater fish harvested both commercially and recreationally from the river, are clearly not at equilibrium with their surroundings.

Because migrating fish do not spend adequate time in a particular river reach to achieve equilibrium with concentrations in the water column and sediments there, the bioaccumulation factor used in developing the AWQC overestimates the tissue concentrations in such fish that can be attributed to that reach. It is only the resident species that will be impacted by local water quality. Consequently, the use of an FCR that includes anadromous fish substantially overestimates exposure to local chemicals. For example, if an individual has a total FCR of 20 g/day and 90 percent of the fish consumed during the year are anadromous fish, only 10 percent of the fish consumed, or 2 g/day, are resident fish that are likely to be affected by changes in local water quality. Thus, to use a total FCR of 20 g/day overestimates the individuals' actual potential for exposure due to local contaminants by a factor of 10. Instead, it is the consumption rates for resident species that should be used to derive AWQC because it is these species that will be affected by changes in water quality.

Not all states have the type of access to anadromous species that occurs in the Pacific Northwest. Thus, these fish will not constitute a substantial fraction of consumers' diets in many areas of the country. This makes it extremely important to ensure that the FCRs that are used in developing AWQC for a specific region are based on fish consumption information for that region and not simply based on a one-size-fits-all approach for selecting consumption rates.

3.2.5 *Consumption of Freshwater and Estuarine Species*

In developing AWQC in coastal states, the FCRs that are used typically do not differentiate between the ingestion of freshwater and estuarine finfish and shellfish. This is because AWQC need to be applied to a number of different types of water bodies. However, this assumption is very conservative when one considers permitting of individual discharges that occur in specific areas of individual water bodies and may only affect freshwater areas. If there is a permitted discharge to a freshwater body, the consumption of estuarine fish and shellfish is likely to be irrelevant. Similarly, if there is a discharge to an estuarine area, the freshwater fish upstream will likely not be affected by that discharge. Thus, inclusion of rates of consumption of freshwater and estuarine finfish and shellfish is a very conservative assumption for these specific applications, providing an additional level of health protection when AWQC are applied to specific waterbodies.

4.0 POPULATION RISK

AWQC are typically derived using a target individual risk level of 1 in 1,000,000 million (1E-06) risk for carcinogens and a hazard index of 1 for non-carcinogens. For carcinogens, this target risk represents the increased probability that an individual will develop cancer as a result of exposure through the consumption of fish tissue. The background rate for contracting cancer is roughly 30 percent; thus, when a 1E-06 risk level is selected as the target risk, this means that the probability of an individual contracting cancer increases from 30 percent to 30.0001 percent.

There is, however, another risk metric that should be considered in selecting an FCR. This risk metric is known as the population risk. It is calculated by multiplying the target risk level by the size of the affected population to predict the number of excess cancer cases that might result from that exposure. Thus, if the target risk is 1 in one million, and the size of the population is one million people, the population risk will be calculated as 1 excess cancer over the combined lifetimes of 1 million individuals who are actually exposed as a result of the modeled exposures.

Population risk is an important consideration in selecting an FCR for use in developing AWQC because as the size of the exposed population decreases, the population risks also decrease when the same target risk level is used. The higher the FCR selected for a particular population, the smaller the population to which that FCR applies. For example, if the FCR selected is a 95th percentile rate, it is assumed that it is protective of all but 5 percent of the exposed population or 50,000 of the 1 million people provided in the example above. Thus, if the same target risk level of 1E-06 is used with this reduced population, the resulting population risk is 0.05 excess cancers within a population of 1 million people. In other words, in order to reach the target risk of 1 excess cancer, it would be necessary for a population of 20 million people to have lifetime exposures equivalent to the estimated exposure conditions.

EPA (2000) states that both a 1E-06 and 1 in 100,000 (1E-05) target risk level may be acceptable for the general population as long as highly exposed populations do not exceed a target risk level of 1E-04 or 1 in 10,000. In other words, if an AWQC is based on a 1E-06 risk level and an FCR if 17.5 g/day is used, this means that if there is a subpopulation of individuals who consume fish at a rate of 175 g/day, they will be protected at a risk level of 1E-05, and in order for a subpopulation to exceed the recommended upper bound risk level of 1E-04 outlined in EPA's (2000) methodology, they would have to consume more than 1,750 g of fish daily throughout their lifetimes.

EPA (2000) states that "[a]doption of a 10-6 or 10-5 risk level, both of which States and authorized Tribes have chosen in adopting water quality standards to date, represents a generally acceptable risk management decision, and EPA intends to continue providing this flexibility to States and Tribes. EPA believes that such State or Tribal decisions are consistent with Section 303(c) if the State or authorized Tribe has identified the most highly exposed subpopulation, has demonstrated that the chosen risk level is adequately protective of the most highly exposed subpopulation, and has completed all necessary public participation" (EPA 2000).

Selection of an FCR to be used in developing AWQC is as much a policy decision as a technical decision. There are wide ranges of FCRs available depending upon the population targeted for study and it is important that the target population be identified so that the selection of an FCR rate can be based on that target population and the target risk level can consider both individual and population risks for that population.

5.0 DISCUSSION

When selecting an FCR for establishing HHAWQC, it is critical that a number of important issues be considered. These include: 1) identifying the target population of fish consumers and the waterbodies that will be affected by changes in HHAWQC; 2) evaluating and selecting FCRs based on fish consumption studies that provide reliable, long-term information on the fish consumption habits of the target populations and waterbodies; and 3) consideration of both individual and population risks in selecting an FCR.

Generally speaking, the population of interest for the development of HHAWQC consists of those individuals who consume freshwater or estuarine finfish and/or shellfish from the area of interest. If the waters to which HHAWQC are to be applied are commercially fished, then this population will include members of the general population who may consume fish from a wide variety of commercial and recreational sources. In this case, FCRs should be based on general population studies of good quality. If, however, the waterbodies of interest are not commercially fished, then the target population includes those anglers who catch and consume their own fish from those waterbodies and the FCR should be selected from regionally-appropriate studies of consumption by recreational anglers.

HHAWQC are used as environmental benchmarks and as objectives in the development of environmental permits. While they are applicable to all ambient waters in a state, they are most often considered for individual water bodies when state regulatory agencies are developing permitting and effluent limits. Thus, assumptions that are already judged and selected to be conservative when one is attempting to develop statewide criteria, become extremely conservative when considering individual water bodies.

In light of the way in which HHAWQC are applied in permitting, the approach used to develop HHAWQC includes a number of highly conservative assumptions, particularly for constituents that are limited and localized. The conservative assumptions used in the development of HHAWQC and subsequently applied to permitting typically include:

- FCRs that include the combined consumption of freshwater and estuarine fish and shellfish and, in some areas, include anadromous species that are not impacted by local water quality conditions;
- 100 percent of the fish consumed in a lifetime are obtained from a single, impacted waterbody;
- There is no reduction in chemical concentration that occurs as a result of cooking or preparation methods;
- Concentrations of compounds in fish are in equilibrium with compound concentrations in the water body; and,
- The allowable risk level upon which they are typically based is one in one million. This means that the probability of developing cancer over a lifetime increases from 30% to 30.0001%.

There are a very small number of individuals, if any, to whom all of these conservative assumptions would apply.

EPA’s recommended FCR of 17.5 g/day can reasonable be judged as conservative and protective when used in establishing AWQC for a number of reasons.

- It is based on survey data collected by the USDA, which are surveys of the general population, and includes information about many species and meals of fish that would not be found in the waterbodies that are subject to the HHAWQC. The reported fish meals were obtained from numerous sources and included fresh, frozen, prepared and canned fish products that may have been produced in other regions of the United States or other countries and, consequently, not derived from local waterbodies. Thus, the USDA data overestimate the consumption of locally caught fish, particularly if there are no commercial fisheries, and certainly overstate consumption from individual waterbodies that are regulated under the HHAWQC.

- As discussed previously, this rate is based on 24-hour dietary recall data. Use of such data to estimate long term consumption rates for any population results in biased and highly uncertain estimates.

- HHAWQC based on that consumption rate, combined with other very conservative assumptions that are included in the HHAWQC calculation, ensure that risks of consuming fish from a single regulated waterbody are likely to be substantially overestimated and, therefore, will also be protective of individuals who are at the high end of the consumption distribution.

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APPENDIX B

A BRIEF REVIEW OF ISSUES RELEVANT TO THE ACCUMULATION OF PERSISTENT, BIOACCUMULATIVE, AND TOXIC (PBT) CHEMICALS BY SALMON

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1.0 INTRODUCTION

In September 2011 Washington State Department of Ecology (WDOE) issued Publication No. 11-09-050, *Fish Consumption Rates Technical Support Document, A Review of Data and Information about Fish Consumption in Washington*. This technical support document (TSD) was generated to support decision making regarding how to obtain an appropriate fish consumption rate (FCR) for use in calculating water quality standards for protecting human health (HHWQS). One of the issues WDOE raised in this TSD was whether consumption of salmon should be included in whatever FCR is ultimately used in these calculations, and if it is concluded that salmon should be included in an FCR, how to do so.

The driver behind this is human exposure to toxic chemicals, specifically via consumption of fish (or aquatic tissue in general). The greatest risk to human health from consumption of fish is generally understood to result from the presence of persistent, bioaccumulative, and toxic (PBT) chemicals. Thus the primary factor in determining the appropriateness of including consumption of salmon in an FCR is where salmon actually pick up these contaminants. A brief review of what is known about this subject is presented herein.

2.0 WHERE SALMON ACCUMULATE PBT CHEMICALS

As discussed by NOAA (2005), different runs of salmon exhibit different life histories. More specifically, NOAA described stream-type and ocean-type life histories. Behavioral attributes of these two general types of salmon are summarized in Table B1.

From Table B1, different species of salmon and different runs of the same species can exhibit distinctly different life histories, including how much time is spent in freshwater and where in freshwater systems this time is spent. These differences are potentially significant in that they may lead to differences in the mass (burden) of chemical contaminants (e.g., PBT chemicals) ultimately accumulated by the salmon, and in the fraction of this ultimate burden accumulated in freshwater vs. saltwater. Although the latter may not be relevant when assessing the risk to human health resulting from eating contaminated fish in general, it is relevant when considering what fraction of this overall risk results from accumulation of contaminants in freshwater systems vs. saltwater systems.

This last point is directly relevant to the question of whether there is any utility in including consumption of salmon in an FCR that will be used to drive remedial action(s) on the geographically limited scale of a single state. If a significant fraction of the contaminant burden found in salmon is accumulated in true freshwater systems it makes sense that the consumption of salmon be included in an FCR. However, if accumulation in the open ocean dominates, inclusion of salmon in an FCR makes no sense because there is no action the state can take that will have a significant effect on the contaminant burden found in returning adult salmon.

Table B1 A Summary of the Juvenile Characteristics of Stream and Ocean Life History Types

Stream-Type Fish	Ocean-Type Fish
Species	
Coho salmon	Coho salmon
Some Chinook populations	Some Chinook populations
Steelhead	Chum
Sockeye	Pink
Attributes	
Long period of freshwater rearing (>1 yr)	Short period of freshwater rearing
Shorter ocean residence	Longer ocean residence
Short period of estuarine residence	Longer period of estuarine residence
Larger size at time of estuarine entry	Smaller size at time of estuarine entry
Mostly use deeper, main channel estuarine habitats	Mostly use shallow water estuarine habitats, especially vegetated ones

[SOURCE: NOAA 2005]

Exclusion of salmon from an FCR does not imply that human exposure to contaminants due to consumption of salmon should not be accounted for when assessing overall risks to human health. Instead, these issues should be weighed when deciding whether salmon are accounted for when assessing the risks resulting from consumption of freshwater fish (by including consumption of salmon in an FCR) or when assessing the risks resulting from consumption of saltwater or marine fish (salmon would be backed out of the risk assessment for deriving a freshwater HHWQS via the relative source contribution or RSC). Ultimately, the issue of where the risks from consumption of salmon are counted appears to be an academic question. The more important factor (from the perspective of characterizing risk) is to ensure that consumption of salmon is not double counted by including it in both an FCR and as a component of the RSC.

In any case, the issue of salmon (or anadromous fish in general) is unique in that it is quite likely that a generic salmon will accumulate contaminants in both freshwater and saltwater habitats, and that the relative fraction accumulated in one habitat vs. the other will vary with species, run, and even individual. Taken to the extreme, this implies that each run needs to be evaluated independently to determine where contaminants are accumulated. However, much of the scientific literature supports accumulation in the open ocean as the dominant pathway for uptake of PBT chemicals by salmon, with the work of O’Neill, West, and Hoeman (1998), West and O’Neill (2007), and O’Neill and West (2009) providing perhaps the most thorough examination of the issue.

Figure B1 is taken from O’Neill and West (2009) and shows that levels of polychlorinated biphenyls (PCBs) in adult Chinook salmon (fillets) collected from a wide range of geographic locations are relatively uniform except for fish taken from Puget Sound, which show three to five times higher levels of PCBs than fish taken from other locations. As discussed by the authors, these data can be interpreted as indicating accumulation of PCBs in Puget Sound and/or along the migratory routes of these fish, which, depending on the specific runs, can pass through some highly contaminated Superfund sites (e.g., Duwamish Waterway). However, O'Neill and West (2009) concluded that, on average, >96% of the total body burden (mass) of PCBs in these Puget Sound Chinook was accumulated in the Sound and not in natal river(s).

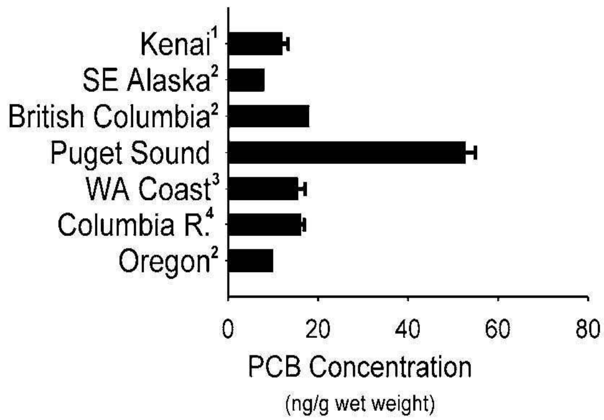

Figure B1 Average (±SE) PCB Concentration in Chinook Salmon Fillets
Data for Puget Sound were based on 204 samples collected by the Washington Department of Fish and Wildlife from 1992 to 1996; data for other locations were taken from the following (indicated by superscript numbers): [1]Rice and Moles (2006), [2]Hites et al. (2004; estimated from publication), [3]Missildine et al. (2005), and [4]United States Environmental Protection Agency (USEPA 2002) [SOURCE: O'Neill and West 2009]

The basis for this conclusion is presented in Table B2, which compares PCB concentrations and body burdens in out migrating Chinook smolts collected from the Duwamish River and adults returning to the Duwamish.

Table B2 Concentration of PCBs (ng/g) and Body Burden of PCBs (total ng/fish) in Out-migrating Chinook Salmon Smolts and Returning Adults from the Contaminated Duwamish River, Washington

Variable	Smolts	Adults
Number of samples	80	34
Mean fish weight (g)	10	6,000
Whole body PCB concentration (ng/g)[a]		
Mean	170	57
95th percentile	860	88
PCB body burden (ng/fish)[a]		
Mean	2,100	350,000
95th percentile	9,200	800,000
Mean % of PCB body burden from the most contaminated smolts[b]	—	3.8

[a] Values for smolts are from J. P. Meador (National Oceanic and Atmospheric Administration Fisheries, Northwest Fisheries Science Center, personal communication); values for adults were estimated from measured muscle tissue concentration using the fillet–whole-body regression (see Methods) for PCBs.

[b] Contaminant data were only available for out-migrating subyearling smolts, so only samples with adults that went to sea as subyearlings were included in the analysis.

[SOURCE: O'Neill and West 2009]

These data show that even the most contaminated out migrating smolts contained no more than 4% of the body burden (mass) of PCBs found in returning adults. Thus, >96% of the PCB mass (burden) found in the returning adults was accumulated in Puget Sound. Even allowing for an order of magnitude underestimate in the body burden of out migrating smolts, O'Neill and West (2009) concluded that accumulation in freshwater would account for <10% of the average PCB burden ultimately found in adults returning to the Duwamish. By extension, this analysis supports the conclusion that Chinook salmon passing through uncontaminated estuaries during out migration accumulate a dominant fraction of their ultimate PCB body burdens in the open ocean. Other researchers have also reached this conclusion using their own data (e.g., Johnson et al. 2007; Cullon et al. 2009).

However, this analysis does not explain why Chinook salmon collected in Puget Sound exhibit higher concentrations of PCBs than Chinook salmon collected from other locations (Figure B1). Ultimately, O'Neill and West (2009) attributed this to a combination of factors, specifically PCB contamination of the Puget Sound food web (e.g., West, O'Neill, and Ylitalo 2008) combined with a high percentage of Chinook displaying resident behavior. That is, a large fraction of out migrating Chinook smolts take up permanent residence in the Sound, where they feed from a more contaminated food web than found in the open ocean. These factors would not affect Chinook runs or runs of any other species associated with natal rivers that discharge to saltwater outside Puget Sound.

Overall, these data support the position that, as a general rule, the predominant fraction of the ultimate PCB burden found in harvested adult fish is accumulated while in the ocean-phase of their life cycle (e.g., Cullon et al. 2009; Johnson et al. 2007; O'Neill and West 2009). Although this conclusion is specific to PCBs, there is no reason to suppose that it would not also hold for other legacy PBTs (e.g., DDT, dioxins) or globally ubiquitous PBTs (e.g., PBDEs, methylmercury) in general (e.g., Cullon et al. 2009). Because concerns about human consumption of fish are driven by risks from exposure to PBTs, driving the FCR higher by including salmon would thus appear to be of limited utility from the perspective of protecting human health simply because these contaminants are accumulated in the ocean.

With that said, there are sufficient data to conclude that the food web in Puget Sound is contaminated with PCBs to a greater degree than the food web in the open ocean. To the extent that this is a result of true local sources (e.g., sediment hotspots), there may in fact be some “local” action that can be taken to reduce PCBs, or potentially other PBTs, in Puget Sound salmon. However, this is totally dependent on identification of localized sources amenable to remediation, and not simply a conclusion that the food web is contaminated (e.g., West and O’Neill 2007).

Again, simply increasing the FCR by including salmon will have essentially no positive effect on human health given that the dominant fraction of PBT body burdens in salmon appears to be accumulated in the open ocean, and not in waters immediately subject to in-state loadings.

3.0 PBT ACCUMULATION BY DIFFERENT SALMON SPECIES

As discussed, there is ample evidence that the body burdens of PBTs found in returning adult Chinook salmon depend to a significant extent on the life history of the specific run. Beyond this, there are interspecies differences in migratory and feeding behavior that suggest Coho, sockeye, pink, and chum salmon will not accumulate PBTs to the same extent as Chinook salmon under similar exposure scenarios (Groot and Margolis 1991; Higgs et al. 1995). Perhaps the most significant factor differentiating Chinook from the other salmon species is that Chinook tend to eat more fish (Higgs et al. 1995). Thus they effectively feed at a higher trophic level than the other species of salmon, and would be expected to accumulate greater burdens of PBT chemicals even when sharing the same habitat. This is in fact observable. For example, when looking at adult Chinook and Coho returning to the same rivers, O’Neill, West, and Hoeman (1998) found that Chinook muscle contained, on average, almost twice the total PCB concentrations found in Coho muscle. This was also true for adults collected in Puget Sound proper (O’Neill, West, and Hoeman 1998).

Differences between species can also manifest in sub-adults. For example, Johnson et al. (2007) reported ΣPCB concentrations in juvenile wild Coho collected from five different estuaries ranging from 5.9 to 27 ng/g (wet weight; whole body minus stomach contents). The corresponding range for wild Chinook juveniles collected from the same estuaries was 11 to 46 ng/g (wet weight; whole body minus stomach contents). Overall, PCB concentrations in juvenile Coho were, on average, equivalent to nominally 50% of those found in the paired Chinook juveniles. This is essentially the same ratio observed by O’Neill, West, and Hoeman (1998) in adult fish.

All this indicates that PBT residues in salmon will vary within species depending on the specific run, and between species regardless (i.e., even when different species share the same general habitat). Thus, grouping all salmon together does not provide an accurate assessment of PBT doses delivered to human consumers due to consumption of salmon. This suggests that human health risk assessments should, as a general rule, incorporate salmon on a species-specific basis, if not a run-specific basis.

Certainly, none of this is supportive of adopting a single default value for the dose of any contaminant received by humans via consumption of salmon. Thus adoption of a single default FCR for salmon is also not supported.

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APPENDIX C

FISH TISSUE CONCENTRATIONS ALLOWED BY USEPA AMBIENT WATER QUALITY CRITERIA (AWQC): A COMPARISON WITH OTHER REGULATORY MECHANISMS CONTROLLING CHEMICALS IN FISH

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1.0 INTRODUCTION

For chemicals that are capable of concentrating in fish, Ambient Water Quality Criteria for the Protection of Human Health (HH-WQC) are derived based on the uptake of the chemical by edible fish and an assumed level of fish consumption by anglers (USEPA 2000). It follows that for these chemicals, there is an allowable fish tissue concentration corresponding with each HH-WQC. The associated allowable concentrations are risk-based benchmarks analogous to other risk-based thresholds applied to edible fish in other circumstances and, therefore, the comparison with the more formal screening levels or guidelines is of interest. This appendix first describes how these allowable fish tissue concentrations, which are an integral component of the HH-WQCs, are derived. Next, several comparisons are presented between these allowable fish tissue concentrations and existing fish concentration data, concentrations found in other foods, as well as other guidelines or risk-based levels used for regulating chemical concentrations in edible fish, such as fish consumption advisory (FCA) "trigger levels" issued by state and federal agencies, and U.S. Food and Drug Administration (USFDA) tolerances, illustrating the differences in these values.

These comparisons will focus on a short list of chemicals for which an HH-WQC has been established and for which fish tissue concentration data are likely to be available. This list is comprised of the following chemicals:

- arsenic
- methyl bromide
- mercury (total, inorganic and organic)
- PCBs (total)
- chlordane; and
- bis-(2-ethylhexyl)phthalate (DEHP)

These six chemicals were selected based on several considerations: 1) propensity for accumulating in fish; 2) inclusion in fish tissue monitoring programs; 3) inclusion in recent studies measuring chemicals in other foods; 4) inclusion in specific analyses estimating human (dietary) intake; and 5) subject of FCAs in at least one state. Not all of these criteria were satisfied for each of the six example chemicals; nor did the available data allow comparisons to be made for all six chemicals; however, in general, at least four of the six chemicals could be included in each of the comparisons that were undertaken as part of this analysis.

2.0 ALLOWABLE FISH TISSUE CONCENTRATIONS DERIVED FROM THE HH-WQCS

The HH-WQCs are established based on two exposure pathways: use of surface water as a source of drinking water; and the consumption of fish that may be caught and eaten from the surface water. The same algorithms that are used to calculate the HH-WQC can be rearranged to "back-calculate" an allowable fish tissue concentration.[11] Such values could be termed a water quality-based fish tissue concentration (FTC_{WQ}). These values are therefore a function of the same exposure assumptions, toxicity values and target risk level of 1×10^{-6} (for carcinogenic effects) used in calculating the HH-WQC.

The fish consumption rate (FCR) is an important factor in determining the HH-WQCs for chemicals having a moderate or high bioaccumulation potential. This analysis employs three different FCRs. As intended for the general population of fish consumers, we used the U.S. Environmental Protection Agency's (USEPA's) previously recommended default FCR of 6.5 grams/day or the current USEPA-recommended FCR of 17.5 grams/day. The choice between these two FCRs for each of the six chemicals was based on the derivation of the current HH-WQC, as published by USEPA. Specifically, the FCR used by USEPA to derive the current WQC for each chemical was selected for this analysis. For all but one chemical, this FCR was 17.5 grams/day. The exception was arsenic, where the HH-WQC is still based on an FCR of 6.5 grams/day. (The FTCs based on a FCR of 17.5 grams/day are referred to as the $FTC_{WQ\text{-}17.5}$ in the remainder of this appendix. Note that the recreational consumption rate FTC for arsenic is also referred to as $FTC_{WQ\text{-}17.5}$ despite being based on a FCR of 6.5 grams/day.)

Applying a FCR of 142.4 grams/day produced another set of FTC_{WQ} (referred to as the $FTC_{WQ\text{-}142}$ in this appendix); this FCR represents a higher-end fish intake, which USEPA specifically recommends for subsistence anglers and is similar to the FCR recently adopted by the state of Oregon for state-wide ambient water quality criteria (Oregon DEQ 2011). The resulting FTC_{WQ} for the six chemicals represent concentrations a regulatory agency might use to restrict consumption of fish in areas where there was reason to believe that subsistence fishing was known to occur. FTC_{WQ} calculated for the six chemicals are summarized in Tables C1a (based on a FCR of 6.5 or 17.5 gram/day) and C1b (based on a FCR of 142 gram/day).

FTC_{WQ} were derived from both the "water + organism" and the "organism only" HH-WQC. The former assumes that a surface water body is used as a source of drinking water and a source of fish consumption. The latter assumes that a surface water body is used only for consumption of fish. The influence of the drinking water consumption pathway is minor, or negligible for chemicals with a high bioconcentration factor (BCF), such as polychlorinated biphenyls (PCBs) and chlordane; however, it is important for chemicals with lower BCFs, such as methyl bromide, arsenic, and BEHP. For these chemicals, the use of the water and organism HH-WQC means that the allowable fish tissue concentration (i.e., FTC_{WQ}) will be substantially lower, because the target risk levels must be split between these pathways. However, the resulting FTC_{WQ} would be assumed to be applicable in most areas because most states require that surface water bodies be protected for use as a source of drinking water.

[11] Mathematically, this is the equivalent of multiplying the HH-WQC by the BCF, as long as a pathway-specific HH-WQC is used, i.e., based on the "organism only" or "water+organism" HH-WQC values.

Table C1a Allowable Fish Tissue Concentrations Derived from HH-WQC ($FTC_{WQ-17.5}$) for Six Chemicals: FCR = 17.5 g/day[1]

		HH-WQC Category[2]			
		Water+Organism		Organism Only	
Chemical	BCF (L/kg)	HH-WQC (µg/L, ppb)	$FTC_{WQ-17.5}$ (µg/kg, ppb)	HH-WQC (µg/L, ppb)	$FTC_{WQ-17.5}$ (µg/kg, ppb)
PCBs	31,200	6.4E-05	2.0	6.4E-05	2.0
Methyl bromide	3.75	47	178	1,493	5,600
Arsenic	44	0.018	0.77(1)	0.14	6.2
Mercury	7,343	0.054	394(3)	0.054	400
Chlordane	14,100	8.0E-04	11.3	8.1E-04	11.4
BEHP	130	1.2	15	2.2	286

Notes:
[1] Tissue concentration for arsenic was calculated based on former FCR of 6.5 g/day, because current HH-WQC still uses this value.
[2] Assumed use of the surface water body
[3] USEPA has established a Fish Tissue WQC for methylmercury of 300 ppb, which would be expected to supersede this value.

Despite the limited applicability of "organism only" FTC_{WQ} concentrations, they are still presented in some of the comparisons below because some regulatory agencies have derived FCA trigger levels based on fish consumption only or such triggers may be applied to waters not designated as a drinking water source (e.g., estuaries).

Table C1b Allowable Fish Tissue Concentrations Derived from HH-WQC (FTC_{WQ-142}) for Six Chemicals: FCR = 142 g/day

		HH-WQC Category[1]			
		Water+Organism		Organism Only	
Chemical	BCF (L/kg)	HH-WQC (µg/L, ppb)	FTC_{WQ-142} (µg/kg, ppb)	HH-WQC (µg/L, ppb)	FTC_{WQ-142} (µg/kg, ppb)
PCBs	31,200	7.9E-6	0.25	7.9E-6	0.25
Methyl bromide	3.75	38.7	145	184	690
Arsenic	44	4.9E-3	0.21	6.4E-3	0.28
Mercury	7,343	6.7E-3	49.2(2)	6.7E-3	49.3(2)
Chlordane	14,100	1.0E-04	1.4	1.0E-04	1.4
BEHP	130	0.24	31.8	0.27	35.2

Notes:
[1] Assumed use of the surface water body
[2] USEPA has established a Fish Tissue WQC for methylmercury of 300 ppb; this value does not apply to subsistence levels of fish consumption, but the unique approach applied to mercury by USEPA could have an effect on these values.

3.0 MEASURED FISH TISSUE CONCENTRATIONS IN U.S. LAKES AND RESERVOIRS: COMPARISON WITH FTC_{WQ}

Several federal and state programs have provided data on the fish tissue concentrations of environmental chemicals in U.S. lakes and rivers. In addition to nationwide programs sponsored by USEPA, such as the National Study of Chemical Residues in Fish (USEPA 1992), some states have ongoing fish monitoring programs or have sponsored targeted studies. Many of these programs are focused on a particular set of compounds or a particular area.

The National Study of Chemical Residues in Lake Fish Tissue (or "National Lake Fish Tissue Study", or NLFTS) was a statistically-based study conducted by USEPA Office of Water, with an objective of assessing mean levels of selected bioaccumulative chemicals in fish on a national scale. The results represent concentrations throughout the U.S. based on samples collected from 500 lakes and reservoirs in 48 states (USEPA 2009; Stahl et al. 2009). The sampling phase was carried out from late 1999 through 2003. The focus on lakes and reservoirs, rather than rivers and streams, was based on the greater tendency of lakes for receiving and accumulating environmental chemicals. A *National Rivers and Streams Assessment*[12] is currently in progress, and it would be of interest to examine the fish tissue concentration data from this survey when the data become available. It is likely that any fresh water survey of a national scope, whether it included bound or flowing water bodies would find a broad range of fish tissue concentrations, with the concentrations being more highly influenced by the location and history of the water body.

The NLFTS included PCBs, dioxins, polycyclic aromatic hydrocarbons (PAHs), 46 pesticides, arsenic and mercury. Adult fish were collected from two categories: predator and bottom-dwelling, with the predatory fish comprised of largemouth bass (50%), walleye (10%) and northern pike (7%), and bottom-dwelling species comprised of common carp (26%), white sucker (20%) and channel catfish (16%). A summary of the results from this study is shown in Table C2a.

Table C2a Concentrations in Fish as Reported by the National Lake Fish Tissue Study (USEPA 2009)

	Predator (Fillets) (µg/kg, ppb)			FTC_{WQ} Water+Organism (µg/kg, ppb)	
Chemical	Mean	50th %ile	90th %ile	$FTC_{WQ\text{-}17.5}$	$FTC_{WQ\text{-}142}$
PCBs	13.2	2.2	18.2	2.0	0.25
Arsenic	ND[(2)]	ND[(2)]	ND[(2)]	0.77	0.21
Mercury	352	285	562	394	49
Chlordane	ND[(2)]	ND[(2)]	3.6	11.3	1.4

Notes:

[1] National Lake Fish Tissue Study (NLFTS) (USEPA 2009); data from 486 predator fillet samples

[2] Infrequent detection in fish. Arsenic was detected at <1% of sampling locations, for predatory fish with a detection limit of 30 ppb. Chlordane was detected at 1-5% of sampling locations (for predatory fish) with a detection limits of 0.02 (alpha) and 0.49 (gamma) ppb. BEHP was detected at 1-5% of sampling locations (for predatory fish) and results are not provided by USEPA (2009).

[12] http://water.epa.gov/type/rsl/monitoring/riverssurvey/index.cfm

The NLFTS was not focused on areas specifically affected by industrial activities or historic releases. The water bodies included in this survey were selected at random with an objective of capturing typical levels of the chemicals analyzed. In fact, many lakes were included that could be regarded as pristine, likely to have been affected by only minimal human activity. Therefore, the resulting data could be representative of 'background' concentrations, which are from unavoidable depositional inputs of the chemicals of interest. However, because many of the water bodies included the NLFTS may have been affected by specific discharges or historic releases, we refer to the resulting data being only representative of typical levels for U.S. lakes. For simplicity, only the data representing predatory fish were included in this analysis, because these are the species likely to be targeted by anglers. The bottom-dwelling fish, which were included in the NLFTS to represent ecological (wildlife) exposures, contained substantially higher concentrations of PCBs (6 times greater at the median) and chlordane (1.7 ppb vs. ND), but lower concentrations of mercury (4 times lower at the median).

As shown in Table C2a, this study provided data for PCBs and mercury, as well as for arsenic and chlordane. Arsenic and chlordane were reported at very low frequencies of detection making quantitative comparisons between fish concentrations and FTCs challenging. Nevertheless, because the detection limits for chlordane (0.02 ppb for alpha and 0.5 ppb for gama) are less than the $FTC_{WQ-17.5}$ (11.3 ppb), and the 90th percentile of the distribution of chlordane concentrations is roughly 3 times lower than the $FTC_{WQ-17.5}$, NLFTS data do demonstrate that chlordane concentrations in predatory fish from the large majority of U.S. surface waters are below the $FTC_{WQ-17.5}$. This also suggests that current concentrations of chlordane in most U.S. surface waters are unlikely to be above the HH-WQC derived based on the consumption rate of recreational anglers.

A similar evaluation could not be conducted for arsenic. The reported arsenic detection limits was above the $FTC_{WQ-17.5}$ derived from the HH-WQC, precluding a comparison with the $FTC_{WQ-17.5}$ absent making assumptions about the concentration of arsenic in fish samples with non-detectable concentrations. As a specific example, the NLFTS reported a method detection limit (MDL) for inorganic arsenic of 30 ppb, even using a state-of-the-art analysis, Method 1632A for the speciation of arsenic. Given that the $FTC_{WQ-17.5}$ for arsenic is 0.77 ppb, it is not possible to determine whether concentrations in predator fillets are above or below that $FTC_{WQ.}$ Assuming detection limits for arsenic cannot be easily refined, this comparison does suggest that it is not possible to demonstrate compliance with the arsenic $FTC_{WQ-17.5.}$

For PCBs, the NLFTS data indicate that a substantial portion of predatory fish from U.S. lakes exceed the $FTC_{WQ-17.5}$ for PCBs (2 ppb). The extent of this exceedance depends on whether the data are represented by the mean concentration (13.2 ppb), which exceeds the $FTC_{WQ-17.5}$ by a factor of about 6x, or the median (i.e., 50th percentile) concentration (2.3 ppb), which is nearly equivalent to the $FTC_{WQ-17.5}$. While this comparison indicates the average concentration of PCBs in fish throughout the U.S. is substantially higher than the $FTC_{WQ-17.5}$, it does not follow that fish in most surface waters of the U.S. have PCB concentrations greater than both of the FTC_{WQ}s. The difference between the mean and median concentration comparisons for this data set likely arises because the data are skewed, with the majority of samples having relatively low concentrations. As noted above, the 50th percentile of the distribution of PCB concentrations in predatory fish from U.S. lakes is approximately equal to the $FTC_{WQ-17.5}$. Assuming the BCF accurately reflects the relationship between the PCB concentration in fish and water, the comparison of the $FTC_{WQ-17.5}$ to the 50th percentile indicates that roughly half of sampled U.S. waters had PCB concentrations that met or were below the HH-WQC derived based on the consumption of recreational anglers. .

The mean mercury concentration of the NLFTS data (352 ppb) is slightly lower than the $FTC_{WQ-17.5}$ for mercury (394 ppb). The percentile data provided by USEPA (2009) indicate the distribution of mercury concentrations in predatory fish is also skewed, though a smaller proportion of the samples (approximately 25%) exceed the mercury $FTC_{WQ-17.5}$ than exceeded the PCB $FTC_{WQ-17.5.}$

The results of parallel comparisons with FTCs derived based on subsistence anglers (i.e., FTC_{WQ-142}) lead to a different conclusion for three for the four compounds (chlordane, PCBs and mercury). The arsenic FTC_{WQ-142} is about four times lower than the $FTC_{WQ-17.5}$ and is also below the typical detection limits for inorganic arsenic, precluding any meaningful quantitative comparisons with the FTC_{WQ-142}.

The detection limit for alpha chlordane is slightly above the FTC_{WQ-142} and the detection limit for gamma is slightly below (see footnotes to Table C2a). Additionally, the 90th percentile of the distribution of chlordane concentrations is only about 2.5 times higher than the $FTC_{WQ-142.}$ These comparisons suggest that typical concentrations of chlordane may be similar to or less than the FTC_{WQ-142} in many U.S. surface waters, though the upper percentiles of the distribution do exceed the FTC_{WQ-142}, in some cases, substantially (Table C2a).

The FTC_{WQ-142} is about 10 times lower than the $FTC_{WQ-17.5}$ for PCBs and mercury (Table C2a). With the increase in FCR, the average fish tissue concentration exceeds the FTC_{WQ-142} by approximately 50x and 7x for PCBs and mercury, respectively (Table C2a). Additionally, the majority of the distribution of PCB and mercury concentrations is above the $FTC_{WQ-142.}$ For both chemicals, the concentration at the 5th percentile of the distribution exceeds the $FTC_{WQ-142.}$ These comparisons indicate that if HH-WQC were to be revised using an FCR of 142 grams/day, assumed to be representative of subsistence anglers, the concentrations of PCBs and mercury in fish from virtually all surface waters in the U.S. would exceed the allowable fish concentration associated with such an HH-WQC.

Several state programs have surveyed fish tissue concentrations, often including PCBs, metals and/or pesticides. The state data assembled for our analyses included surveys conducted by Washington State Department of Ecology (WA-DOE) and by the Florida St. Johns River Water Management District (SJRWMD). Overall, the state programs include more recent data (through 2011) than those presented in the NLFTS (through 2003). These are much more limited data sets compared to the data from the NLFTS. Additionally, the number of observations from each state varies by chemical and in some instances all the data points are from a single state (e.g., all PCB data are from Washington).

Table C2b Measured Concentrations in Fish Samples from Washington and Florida

	Data from State Programs (µg/kg, ppb)			FTC_{WQ}[1] (µg/kg, ppb)	
Chemical	Mean[2]	50th %ile	90th %ile	$FTC_{WQ-17.5}$	FTC_{WQ-142}
PCBs	27.4	22.1	49.8	2.0	0.25
Mercury	191	120	408	394	49
Chlordane	1.4	0.62	2.8	11.3	1.4

Notes:
Based on data provided by J. Beebe (NCASI) and comprised of data from Washington State WA-DOE (2011), WA-EIMS, http://www.ecy.wa.gov/eim), and St. Johns River Water Management District (SJRWMD), Florida (http://sjr.state.fl.us).
[1] FTC_{WQ} derived from water and organism HH-WQC.
[2] Data included: for PCBs, 45 samples from WA-EIMS; for mercury, 1598 samples from WA-EIMS and SJRWMD; and for chlordane, 382 samples from SJRWMD.

The mean concentration of PCBs in predatory fish (27.4 ppb), is about 14 times and 100 times higher than the $FTC_{WQ-17.5}$ and FTC_{WQ-142}, respectively. In fact, both FTC_{WQ}s are well below the minimum reported concentration (9.7 ppb) from this data set. Assuming these data were collected from waters potentially affected by PCB releases suggests that meeting the HH-WQC, based on either the recreational of subsistence FCR, in such waters is likely to be a challenge. To the extent these data are only from Washington, this finding may only apply to waters of that state.

The mean concentrations of mercury and chlordane from state programs are below their respective $FTC_{WQ-17.5}$ by approximately 2x- and 8x-, respectively (Table 4-2b) suggesting that a substantial portion of the surface waters in these states would meet an HH-WQC derived based on an FCR assumed to be representative of a recreational angler. The mean concentration of chlordane is equal to the FTC_{WQ-142}. If the chlordane distribution from these two states has a similar "shape" to the distribution in the national survey, this comparison suggests that a substantial portion of surface waters in these two states would meet an HH-WQC based on an FCR representative of a subsistence angler. Fewer waters are likely to meet such an HH-WQC for mercury, given that the mean concentration exceeds the FTC_{WQ-142} by approximately 4x.

Arsenic was included in several of the state databases, however, inorganic arsenic was not detected at measurable concentrations. As discussed above for the NLFTS data, meaningful comparison of inorganic arsenic concentrations to FTCs is precluded because MDLs are greater than the FTCs.

4.0 COMPARISON OF FTC_{WQ} TO FCA TRIGGER LEVELS ESTABLISHED BY STATE OR OTHER PUBLIC HEALTH AGENCIES

Most states and various federal agencies have programs for the protection of anglers who may eat fish containing trace amounts of chemicals. These programs are responsible for issuing FCAs for lakes and reservoirs where particular chemicals have been detected at levels in fish that exceed some risk-based "trigger level." While the approach to setting FCAs may differ, most programs use a risk-based approach to develop guidelines that are intended to be protective of the health of the angler communities with a wide margin of safety. USEPA (2000) issued guidance that could be used to establish some uniformity in the methods used to derive FCAs, but most states are maintaining programs and guidelines that have served them for many years. A common feature of both federal and state guidelines is the movement away from a single trigger level and towards a progression of trigger levels, each associated with an increasing level of restricted intake for the fish (and chemical) in question. Despite this increased complexity, USEPA (2000) also provided screening values (SV) based on moderate (recreational) and high (subsistence) levels of fish consumption, termed SVrec and SVsub, respectively, and shown in Table 4-3 for PCBs, arsenic, chlordane, and mercury.

Also shown in Table 4-3 are examples of FCA trigger levels from state programs that publish numerical benchmarks for this purpose. For states that have adopted a series of trigger levels, this analysis presents the levels based on either a "no more than 2 meal per month" restriction (noted as "L2" in Table 4-3), or a 'do not eat' advisory (complete restriction, notes as "R" in Table 4-3). Two 8-ounce (227 g) meals per month is assumed to be comparable to the 17.5 gram/day FCR applied by USEPA to the derivation of HH-WQC.[13]

[13] The guidelines from WI-DNR and MI-DCH, however, only included a one meal per month advisory level, and the concentrations accompanying this advisory level are shown for these two agencies (noted as "L1" in Table 4-3).

Table C3 USEPA Screening Values for Fish and FCA Trigger Levels Used by Select State Agencies[1]

	Federal USEPA (2000)[2] (µg/kg, ppb)		Select State Programs (µg/kg, ppb)			FTC_{WQ} Organism Only Values (µg/kg, ppb)	
Chemical	SV(rec)[3]	SV(sub)[3]	WI-DNR	MI-DCH	WV-DHHS	$FTC_{WQ-17.5}$	FTC_{WQ-142}
PCBs	20	2.5	220 (L1) 2,000 (R)	200 (L1) 2,000 (R)	150 (L2) 1,340 (R)	2.0	0.25
Arsenic	26	3.3	--	NA	140 (L2) 1,250 (R)	6.2	0.28
Mercury	400	50	500-1000 (NS)	500 (L) 1,500 (R)	220 (L2) 1,880 (R)	400	49
Chlordane	114	14	660 (L1) 5,620 (R)	300 (NS)	880 (L2) 7,660 (R)	2.2	1.4

Notes:
R: Restricted, referring to 'do not eat' advisory.
L: Limited, or a limited amount of consumption is advised.
L1: Limited to 1 meal per month.
L2: Limited to 2 meals per month.
NS: Not stated whether the value represents a restriction or a limit.
[1] Wisconsin Department of Natural Resources (WI-DNR), 2007, 2011; Michigan Department of Community Health (MI-DCH), 2008; West Virginia Department of Health and Human Services (WV-DHHS).
[2] USEPA, 2000. Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1.
[3] Screening values (SV) for the recreational and subsistence angler.

When compared to these FCA trigger levels, the $FTC_{WQ-17.5}$ for PCBs, arsenic and chlordane are 20-4,000 times lower (more stringent) (Table C3). For mercury, the $FTC_{WQ-17.5}$ is comparable to the trigger levels prompting some restriction on fish consumption, but is as much as 4x lower than the level where a 'do not eat' advisory is prompted. FTC_{WQ-142} are between 200-8,000 times lower than the FCA trigger levels for PCBs, arsenic, and chlordane, and 4 to 40 times lower than the trigger levels for mercury (Table C3).

As shown in Table C3, the USEPA SVs are either similar or 10x higher than the FTC_{WQ} derived from the HH-WQC. Because these USEPA values are intended to be generic screening-level benchmarks, they are very conservative compared to the trigger levels used by the most state programs (discussed further below).

Comparing the USEPA SVs to FTC_{WQ} for chemicals for which noncancer endpoints are the driver, such as mercury, SVs are the same as the FTC_{WQ}s. For the other three constituents, for which the cancer endpoint is most sensitive, the SVs are approximately 10 times higher, because SVs are derived based on a $1x10^{-5}$ target risk level, rather than a $1x10^{-6}$ target risk level.

In contrast, fish advisory trigger levels used by public health agencies in Wisconsin, Michigan, and West Virginia (Table C3) are less stringent, and in general, would require substantially higher concentrations of arsenic, chlordane and PCBs than allowed by the HH-WQC before issuing even a moderate restriction on fish consumption. Based on our survey of state "trigger levels" and recent reviews comparing the FCAs between states (IWG-ACA, 2008; Scherer et al. 2008), we believe that the FCAs from Wisconsin, Michigan, and West Virginia are likely to be representative of the FCAs from many state programs. Scherer et al. (2008) found the FCAs among states to be quite similar, despite some variation in the methods used to develop the FCAs. Many state programs rely on less-stringent food tolerance levels as the basis for their trigger levels; this choice is consistent with the desire by States to consider the value of their recreational fisheries and the benefits of fish consumption, while protecting the public from potential chemical risks. The difference in the State vs. EPA trigger levels is due to several factors. As noted previously, state guidelines are typically based on a series of FCA trigger levels, giving the States the ability to partially restrict fish consumption at many concentration levels. Further, the ability to issue consumption limits for specific target fish species also permits states to allow higher fish tissue concentrations. Lastly, state agencies are more likely to apply lower assumed fish consumption rates based on local or regional surveys conducted within the state.

A key illustration of the conservative nature of the FTCs is provided by a comparison of the proportion of samples in the NLFTS data set that exceed an FTC_{WQ} to the proportion of waters in the U.S. that have a fish consumption advisory. As described above approximately 50% of fish samples have PCB concentrations that exceed the $FTC_{WQ\text{-}17.5}$ and over 95% exceed the $FTC_{WQ\text{-}142}$. Yet, only about 15% of the nation's lakes are subject to a fish consumption advisory (USEPA 2009). Given that a goal of both an HH-WQC and an FCA is protection of the health of anglers, the much larger proportion of waters estimated to potentially pose an unacceptable risk when an HH-WQC is used than measured by the posting of an FCA, suggests that the derivation of HH-WQC by USEPA is substantially more conservative than the derivation of FCAs by state agencies.

5.0 COMPARISON OF FTC_{WQ}S TO HEALTH-BASED LIMITS FOR FISH OR OTHER FOODS

Other federal and global agencies charged with protection of food safety have established guidelines for ensuring the safety of foods in commerce. The most notable examples in the U.S. are the food tolerances established by USFDA. These tolerances have been used as a guideline for assessing the safety of food, largely animal products, such as beef, chicken, fish, milk and eggs. These tolerances are typically less stringent than analogous values derived using USEPA methods for risk assessment. Unlike the USEPA, the USFDA must balance potential economic concerns with the potential benefits to public health; in other words, the USFDA must consider the consequences of its actions on the U.S food supply. USEPA exposure limits and screening levels may also be considered for their economic consequences, but this review is conducted outside of the Agency and only after the value has been derived. Regardless, USFDA tolerances are risk-based concentrations and many risk assessors and scientists support the idea that the tolerances are protective of the public health (Cordle et al. 1982; Maxim and Harrington 1984; Boyer et al. 1991). Due to recent incidents in Europe in which PCBs were accidentally introduced into animal feeds, the European Commission (EC) has set maximum levels for PCBs in foods and feedstuffs, including fish (EC, 2011). The limits were based on a report of the European Food Safety Authority (EFSA) deriving allowable exposure levels, and on monitoring data compiled throughout the European Union (EU). The EU considered both the public health protection and the feasibility of attaining these limits, based on current levels measured in foods.

FTC_{WQ} derived from the HH-WQC are in all cases well below both the USFDA and EU food tolerance levels (Table C4). The USFDA tolerance for PCBs in fish of 2,000 ppb is 1,000 times higher than the $FTC_{WQ\text{-}17.5}$ and 8,000 times higher than the $FTC_{WQ\text{-}142}$.

Table C4 Comparison of FTC_{WQ} to Food Safety Guidelines for Chemical Concentrations in Fish

	Food Safety Standards		HH-WQC-Based Threshold for Fish	
Chemical	USFDA Tolerance for Fish[1] (µg/kg, ppb)	EU Limit for Fresh Fish[2] (µg/kg, ppb)	FTC_{WQ} FCR = 17.5 (µg/kg, ppb)	FTC_{WQ} FCR=142 (µg/kg, ppb)
PCBs	1,000 (action level) 2,000 (limit)	250[(3)]	2.0	0.25
Mercury	1,000 (action limit)	--	394	49.2
Chlordane	300	--	11.3	1.4

Notes:
[1] USFDA (1998, 2011); Values are based on wet weight.
[2] European Commission (EC) 2011. Commission Regulation No. 1259/2011.
[3] EC Limit for PCBs is 125 ng/g wet wt. for the sum of 6 'marker' congeners, which comprise about 50% of the PCBs in fish. Therefore, to be applicable to a measure of total PCBs, this value was multiplied by a factor of 2 (EC, 2011).

6.0 TYPICAL INTAKES OF THE CHEMICALS IN THE U.S. POPULATION: COMPARISON TO THE ALLOWABLE DAILY INTAKES DERIVED FROM THE HH-WQC

The goal of an HH-WQC is to limit exposure of the population to chemicals in water such that an allowable dose (or risk) is not exceeded. If the dominant exposure pathway for a chemical is direct contact or use of surface water, then compliance with the AWQC may, indeed, limit overall exposure to allowable levels. However, if other pathways also contribute to overall exposure and, in particular, if the other pathways represent larger exposures than surface water, then establishment and enforcement of a stringent surface water criterion may not provide a measurable public health benefit. This section compares exposures allowed by the HH-WQC to the potential exposures from a limited set of other exposure sources or pathways for five chemicals.

One of the key assumptions used to derive FTC_{WQ} is an allowable daily intake of each constituent in question. This allowable daily intake is a toxicologically-derived value and is represented by a reference dose (RfD) (for noncancer endpoints) or a risk-specific dose (RSD) (when cancer is the endpoint). The RSD is equal to the target risk level (typically 1×10^{-6}) divided by the cancer slope factor (CSF) for a particular constituent.

As shown in Table C5, the RfDs and RSDs for the six chemicals evaluated in this appendix range from 0.35 µg/day for PCBs to 98 µg/day for methyl bromide.[14] These are the toxicity values chosen by USEPA for the derivation of HH-WQC.

Another way to estimate the allowable daily dose associated with the HH-WQC, and the FTC_{WQ} in particular, is to multiply the allowable fish tissue concentrations (i.e., the FTC_{WQ}) by the assumed FCR of 17.5 grams/day. The results, as shown in Table C5 as "Fish Dose", represent the dose of each chemical that someone would receive who ate fish containing chemicals at concentrations equal to the FTC_{WQ}.

[14] Traditional units of dose in mg/kg-day are converted to units of intake (µg/day) by multiplying by an adult body weight of 70 kg and a conversion factor of 1000 µg/mg.

For PCBs, mercury and arsenic, very low, but measurable daily intakes by the U.S. population are based on releases of these substances into the environment and their presence in trace quantities in the food supply. Arsenic occurs naturally in soils and groundwater and, therefore, there is a normal daily intake that varies by region. For BEHP, the presence of trace amounts in food stems from its use in plastic food packaging materials (Fromme et al. 2007). A summary of the data used to provide an estimate of the typical daily intake of each chemical is presented below.

PCBs: The intake of PCBs through foods, mainly animal products, has declined dramatically in the last 30 years. However, Schecter et al. (2010) recently carried out a market-basket survey of several types of foods and found measurable levels in enough foods to propose a daily intake of about 0.1 µg/day for a typical resident of the U.S. Other studies in Europe have proposed slightly higher intake levels (as high as 0.8 µg/day), but overall, corroborate the findings of Schecter et al. (2010). This range of typical dietary intakes of PCBs is 3 times to as much as 20 times greater than the risk-specific dose (RSD) used to derive the HH-WQC (0.035 µg/day) (Table C5). Thus, the HH-WQC is based on an exposure limit for PCBs that is routinely exceeded by the typical PCB intake that occurs through dietary exposures.

BEHP: Considerable effort has been made to estimate the human exposure to phthalate esters, which arises from food packaging materials, e.g., plastic food wraps. A German study by Fromme et al. (2007) provides the most reliable estimates of intake, based on a study using both samples of dietary items and biomonitoring data. Because phthalate ester exposures are derived from plastic packaging/wrapping that is sold across the globe, intakes estimated by this study for a German population are likely to be comparable to those in U.S. The authors report a median BEHP intake of 2.4 µg/kg-day (162 µg/day) which is approximately 30 times greater than the RSD used by the HH-WQC (Table C5). Thus, the HH-WQC is based on an exposure limit for BEHP that is routinely exceeded by the typical intake that occurs through dietary exposures.

Table C5 Allowable vs. Actual Daily Intakes for Select Chemicals

	Allowable Daily Intakes Used as the Basis for the HH-WQCs		Measured or Estimated Average Daily Intakes Derived from Food		
	Value [RfD or RSD] (µg/day)	Fish Dose[1] (µg/day)	Intake (µg/day)	Group	Note
PCBs	0.035 [RSD]	0.035	0.1-0.8	all	(a)
Methyl bromide	98 [RfD]	3.1	6.5 (mean); 310 (95th %ile)	male	(b)
			10 (mean); 350 (95th %ile)	female	
Arsenic	0.04 [RSD]	0.014	3.6 / 2.7 (avg.); 9.4 (90th %ile)	male	(c)
			2.8 / 2.4 (avg.); 11.4 (90th %ile)	female	
Mercury	7 [RfD]	7	8.6 (mean); 166 (90th %ile)	male	(d)
			8.2 (avg.); 204 (90th %ile)	female	
BEHP	5 [RSD]	0.26	162 (median); 309 (95th %ile)	all	(e)

Notes:
RfD, Reference Dose; RSD, Risk-Specific Dose
[1] Computed as FTC_{WQ} [from Table C1a] x FCR [17.5 g/day]
(a) Range is based on the results of several studies (Darnerud et al. 2006; Arnich et al. 2009; Roosens et al. 2010; Schecter et al. 2010).
(b) Cal-EPA 2002; assumed body weight of 70 kg for adults.
(c) Meacher et al. 2002; assumed body weight of 70 kg for adults.
(d) MacIntosh et al. 1996.
(e) Fromme et al. 2007.

Arsenic: A study by Meacher et al. (2002) represents a comprehensive evaluation of total inorganic arsenic exposure in the U.S. population. The authors discuss other studies with a similar aim and conclude that the average daily intake, primarily from food and drinking water, is in the range of 1 to 10 µg/day. Estimates of average daily intakes are 60 to 90 times greater than the RSD. Thus, the HH-WQC is based on an exposure limit for arsenic that is exceeded by a wide margin, by typical dietary intakes of arsenic.

Methyl bromide: The concentrations detected in foods are mainly in animal products, such as milk, which makes estimates of a one-time exposure as high as 4-5 µg/kg-day, but with average daily exposures likely to be less than 1 µg/kg-day, according to a study by Cal-EPA (2002). While 95th percentile values (310-350 µg/day) are more than 40 times higher that the mean intake estimates, it can be concluded that typical methyl bromide intakes based on diet are likely to be below the RfD of 98 µg/day. Thus, for methyl bromide, dietary intakes would not appear to hinder the objective of limiting the exposures based on fish consumption.

Mercury: The predominant human intake is from concentrations in predatory and deep-sea fish such as tuna. Average daily intakes are estimated to be about 8 µg/day (MacIntosh et al. 1996) and are comparable to the RfD of 7 µg/day (Table C5). Thus, for mercury, it is not uncommon for the consumption of store-bought tuna to provide an intake equivalent to the RfD; achieving this level of exposure would at least appear to be an achievable public health objective.

In summary, estimated daily intakes for five of the six chemicals could be obtained from the literature (Table C5). For PCBs, arsenic and BEHP, the chemicals for which potential cancer risk is the most sensitive endpoint, the estimated daily intake for the U.S. population is between 3 times to 90 times greater than the RSD. In surface waters with fish that have concentrations that are no more than a 2-times lower than the FTC, based on the comparisons shown in Table C5, decreasing exposures to the levels associated with HH-WQC would be likely to have no discernible effect on the intake of these chemicals in the community.

7.0 SUMMARY AND CONCLUSIONS

This paper described the derivation of allowable fish tissue concentrations (referred to as FTC_{WQ}) associated with HH-WQC for a select group of chemicals. FTC_{WQ} are based on the same exposure and toxicity factors used to derive the HH-WQC. Separate FTC_{WQ} were derived for USEPA's recommended fish consumption rate for recreational anglers (17.5 grams/day, $FTC_{WQ\text{-}17.5}$) and subsistence anglers (142 grams/day, $FTC_{WQ\text{-}142}$). Given the nearly 10x higher consumption rate assumed for subsistence anglers compared to recreational anglers, $FTC_{WQ\text{-}142}$ were lower than the $FTC_{WQ\text{-}17.5}$ for every chemical by about 10x. FTC_{WQ} were compared to: (1) concentrations measured in fish from U.S. water bodies; (2) trigger levels used by State agencies to set fish consumption advisories; and (3) allowable concentrations set by other US and international health agencies. Additionally, ADIs used to derive FTC_{WQ} were compared to estimated daily dietary intakes from all sources.

PCB concentrations in about half of the fish from the NLFTS exceeded the $FTC_{WQ\text{-}17.5}$ and PCB concentrations in essentially all fish from the NLFTS exceeded the $FTC_{WQ\text{-}142}$. (Additionally, all of the fish from two state-specific surveys had PCB concentrations above the $FTC_{WQ\text{-}17.5}$ and the $FTC_{WQ\text{-}142}$.) The mercury concentrations for the majority of fish in the NLFTS were below the $FTC_{WQ\text{-}17.5}$ but most fish had mercury concentrations above the $FTC_{WQ\text{-}142.}$ Chlordane was not detected in the majority of NLFTS samples with detection limits below the $FTC_{WQ\text{-}17.5}$ and the $FTC_{WQ\text{-}142}$ suggesting the majority of fish have chlordane concentrations below either FTC_{WQ}. Arsenic was not detected in majority of NLFTS; however, unlike chlordane, the method detection limit for arsenic exceeds both the $FTC_{WQ\text{-}17.5}$ and the $FTC_{WQ\text{-}142}$ by more than 30x, precluding the possibility of determining whether arsenic concentrations meet the HH-WQC. Thus, whether nationwide fish tissue concentrations meet the FTC_{WQ} depends upon the chemical of interest and whether recreational or subsistence angler consumption rates are used to derive the $FTC_{WQ.}$ It does appear that if HH-WQC were to be revised using an FCR of 142 grams/day, the concentrations of PCBs and mercury in fish from virtually all surface waters in the U.S. would exceed the allowable fish concentration associated with such HH-WQC.

$FTC_{WQ\text{-}17.5}$ for PCBs, arsenic, and chlordane were 20 to 4,000 times lower (more stringent) than FCA trigger levels commonly used by state programs. For mercury, the $FTC_{WQ\text{-}17.5}$ was comparable to typical state trigger levels prompting some restriction on fish consumption, but it was as much as 4 times lower than the level where a 'do not eat' advisory is prompted. Again, the comparisons were much more remarkable using the $FTC_{WQ\text{-}142}$. $FTC_{WQ\text{-}142}$ were between 200 times and 8,000 times lower than the FCA trigger levels for PCBs, arsenic, and chlordane, and 4 times to 40 times lower than the state trigger levels for mercury. These comparisons were based on the guidelines from a select number of states, including Wisconsin, Michigan, and West Virginia; however, the FCA trigger levels were comparable among this small group of states, and based on our review of guidelines in many other states not included in this analysis, we believe that these states can be considered representative of many other state programs.

A comparison of FCAs to the NLFTS data provides another comparison that highlights the conservatism of the FTC_{WQ} (and the HH-WQC from which they were derived). Approximately 50% of fish samples from the NLFTS had PCB concentrations that exceeded the $FTC_{WQ\text{-}17.5}$ and over 95% exceeded the $FTC_{WQ\text{-}142}$. However, only about 15% of the nation's lakes and reservoirs (on a surface area basis) are subject to a FCA based on PCBs (USEPA 2009). Thus, use of HH-WQC indicated that a much larger proportion of US surface waters pose an unacceptable risk than indicated by FCA postings. This comparison further illustrates that the assumptions used by USEPA to derive HH-WQC are more conservative than the assumptions used by state agencies to derive FCAs.

Various agencies, both Federal and international, have established concentration limits for fish as a food in commerce. The FDA food tolerances are the most notable example. FTC_{WQ} were compared to FDA tolerance limits and a recently established EU limit for PCBs in fish. The $FTC_{WQ\text{-}17.5}$ for PCBs of 2 ppb is 500 times lower than the FDA action limit of 1,000 ppb and 125 times lower than an EU limit of 250 ppb. The $FTC_{WQ\text{-}142}$ is 1,000x and 4,000x lower than the EU and FDA action limits, respectively. The FDA tolerance of 300 ppb for chlordane is similarly much less stringent than either the $FTC_{WQ\text{-}17.5}$ (11.3 ppb) or the $FTC_{WQ\text{-}142}$ (1.4 ppb) for chlordane. The FDA action level for mercury of 1,000 ppb is similar to but still higher than either the $FTC_{WQ\text{-}17.5}$ (394 ppb) or the $FTC_{WQ\text{-}142}$ (49 ppb) for mercury. These comparisons indicate that HH-WQCs are limiting fish tissue concentrations to levels substantially below those considered to be without significant risk by public health agencies whose goal is to ensure the safety of edible fish.

Lastly, allowable daily intakes (RfDs for noncancer endpoints, RSDs for the cancer endpoint) assumed by the FTC_{WQ} were compared to estimates of the daily intake of arsenic, BEHP, mercury and PCBs obtained from the open literature. Specifically, daily intakes were taken from studies that measured concentrations in various foodstuffs. Typical daily dietary intakes of arsenic, BEHP and PCBs exceeded the allowable daily intakes used to derive HH-WQC by a substantial margin. The typical daily dietary intake of mercury, mostly from tuna, is comparable to the RfD used to derive the HH-WQC. Thus, for those compounds whose daily dietary intake is greater than the intake associated with surface water and already exceeds the allowable daily intakes used to establish HH-WQC, the establishment and enforcement of a more stringent HH-WQC may not provide a measurable public health benefit.

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Appendix D

Differences between Proposed and Adopted Rule Language

Note:

<u>Proposed Rule to Adopted Rule:</u>

Gray highlighted, blue, underlined text: New text

Gray highlighted, red, struck out text: Deleted text

<u>Original Rule to Proposed Rule:</u>

Black, underline text: New text

Black, struck out text: Deleted text

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-100 Authority and purpose. (1) This chapter is promulgated under the authority of chapter 90.48 RCW, the Water Pollution Control Act; chapter 70.105D RCW, the Model Toxics Control Act; chapter 90.70 RCW, the Puget Sound Water Quality Authority Act; chapter 90.52 RCW, the Pollution Disclosure Act of 1971; chapter 90.54 RCW, the Water Resources Act of 1971; and chapter 43.21C RCW, the state Environmental Policy Act, to establish marine, low salinity and freshwater surface sediment management standards for the state of Washington.

(2) The purpose of this chapter is to reduce and ultimately eliminate adverse effects on biological resources and significant health threats to humans from surface sediment contamination by:

(a) Establishing standards for the quality of surface sediments;

(b) Applying these standards as the basis for management and reduction of pollutant discharges; and

(c) Providing a management and decision process for the cleanup of contaminated sediments.

(3) Part III, Sediment quality standards of this chapter provides chemical concentration criteria, biological effects criteria, human health criteria, and other toxic, radioactive, biological, or deleterious substances criteria which identify

surface sediments that have no adverse effects, including no acute or chronic adverse effects on biological resources and no significant health risk to humans, as defined in this regulation. The sediment quality standards provide a regulatory and management goal for the quality of sediments throughout the state.

(4) The sediment criteria of WAC 173-204-320 through 173-204-340 shall constitute surface sediment quality standards and be used to establish an inventory of surface sediment sampling stations where the sediments samples taken from these stations are determined to pass or fail the applicable sediment quality standards.

(5) Part IV, Sediment source control standards of this chapter shall be used as a basis for controlling the effects of point and nonpoint source discharges to sediments through the National Pollutant Discharge Elimination System (NPDES) federal permit program, state water quality management permit programs, issuance of administrative orders or other means determined appropriate by the department. The source control standards establish discharge sediment monitoring requirements and criteria for establishment and maintenance of sediment impact zones.

(6) Part V, Sediment cleanup standards of this chapter establishes administrative procedural requirements and criteria to identify, screen, ((~~rank~~)) evaluate and prioritize, and cleanup contaminated surface sediment sites. The sediment cleanup standards of WAC 173-204-500 through 173-204-590 shall

be used pursuant to ((~~authorities~~)) authority established under chapter((~~s 90.48 and~~)) 70.105D RCW.

(7) This chapter establishes and defines a goal of minor adverse effects as the maximum level of sediment contamination allowed in sediment impact zones under the provisions of Part IV, Sediment source control standards and as the cleanup screening levels for identification of sediment cleanup sites and as the minimum cleanup levels to be achieved in all cleanup actions under Part V, Sediment cleanup standards.

(8) Local ordinances establishing requirements for the designation and management of marine, low salinity and freshwater sediments shall not be less stringent than this chapter.

Note: All codes, standards, statutes, rules or regulations cited in this chapter are available for inspection at the Department of Ecology, P.O. Box 47703, Olympia, Washington 98504-7703.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-100, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-100, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending Order 90-41, filed 3/27/91, effective 4/27/91)

WAC 173-204-110 Applicability. (1) The sediment quality standards of WAC 173-204-300 through 173-204-315, and 173-204-350, and the sediment cleanup standards of WAC 173-204-500 through 173-204-~~580~~ 575 shall apply to all surface sediments.

(2) The sediment quality standards of WAC 173-204-320, 173-204-330, and 173-204-340 and the applicable sediment cleanup standards of WAC 173-204-560 shall apply to marine, low salinity and freshwater surface sediments, respectively.

(3) The source control standards of WAC 173-204-400 through 173-204-420 shall apply to each person's actions which exposes or resuspends surface sediments which exceed, or otherwise cause or potentially cause surface sediments to exceed, the applicable standards of WAC 173-204-320 through 173-204-340.

(4) The sediment recovery zone standards of WAC 173-204-590 shall apply to each person's cleanup action decision made pursuant to WAC 173-204-570 and 173-204-~~580~~ 575 where the selected cleanup action leaves in place marine, low salinity, or freshwater sediments that exceed the applicable sediment ((~~quality~~)) cleanup standards of WAC ((~~173-204-320 through 173-204-340~~)) 173-204-560.

(5) The sediment quality standards of WAC 173-204-320 through 173-204-340 shall not apply:

(a) Within a sediment impact zone as authorized by the department under WAC 173-204-415; or

(b) Within a sediment recovery zone as authorized by the department under WAC 173-204-590; or

(c) To particulates suspended in the water column; or

(d) To particulates suspended in a permitted effluent discharge; or

(e) To Part V of this chapter.

(6) Nothing in this chapter shall constrain the department's authority to make appropriate sediment management decisions on a case-specific basis using best professional judgment and latest scientific knowledge for cases where the standards of this chapter are reserved or standards are not available.

[Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-110, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-130 Administrative policies. The department shall implement this chapter in accordance with the following policies:

(1) The department shall seek to implement, and as

necessary modify this chapter to protect biological resources and human health consistent with WAC 173-204-100(2). To implement the intent of this subsection, the department shall use methods that accurately reflect the latest scientific knowledge consistent with the definitions contained in WAC 173-204-200 ((~~(14) and (15)~~)) and 173-204-505, as applicable.

(2) At the interface between surface sediments, groundwater or surface water, the applicable standards shall depend on which beneficial use is or could be adversely affected, as determined by the department. If beneficial uses of more than one resource are affected, the most restrictive standards shall apply.

(3) It shall be the goal of the department to modify this chapter so that methods such as confirmatory biological tests, sediment impact zone models, use of contaminated sediment site ((~~ranking~~)) models, etc., continue to accurately reflect the latest scientific knowledge as established through ongoing validation and refinement.

(4) Any person or the department may propose an alternate technical method to replace or enhance the application of a specific technical method required under this chapter. Using best professional judgment, the department shall provide advance review and approval of any alternate technical method proposed prior to its application. Application and use of alternate technical methods shall be allowed when the department determines that the technical merit of the resulting decisions will improve the department's ability to implement and meet the intent of this chapter as described in WAC 173-204-100(2), and

will remain consistent with the scientific intent of definitions contained in WAC 173-204-200 ((~~(14) and (15)~~)) and 173-204-505. The department shall maintain a record of the department's decisions concerning application for use of alternate technical methods pursuant to this subsection. The record shall be made available to the public on request.

(5) Intergovernmental coordination. The department shall ensure appropriate coordination and consultation with federally recognized Indian tribes and local, state, and federal agencies to provide information on and to implement this chapter.

(6) The department shall conduct an annual review of this chapter, and modify its provisions every three years, or as necessary. Revision to this chapter shall be made pursuant to the procedures established within chapter 34.05 RCW, the Administrative Procedure Act.

(7) Review of scientific information. When evaluating this chapter for necessary revisions, the factors the department shall consider include:

(a) New or additional scientific information which is available relating surface sediment chemical quality to acute or chronic adverse effects on biological resources as defined in WAC 173-204-200 ~~(2)~~ (1) and ~~(12)~~ (7);

(b) New or additional scientific information which is available relating human health risk to marine, low salinity, or freshwater surface sediment chemical contaminant levels;

(c) New or additional scientific information which is available relating levels of other toxic, radioactive, biological and deleterious substances in marine, low salinity, or freshwater sediments to acute or chronic adverse effects on biological resources, or to a significant health risk to humans;

(d) New state or federal laws which have established environmental or human health protection standards applicable to surface sediment; or

(e) Scientific information which has been identified for addition, modification or deletion by a scientific review process established by the department.

(8) Public involvement and education. The goal of the department shall be to provide timely information and meaningful opportunities for participation by the public in the annual review conducted by the department under subsection (6) of this section, and any modification of this chapter. To meet the intent of this subsection the department shall:

(a) Provide public notice of the department's decision regarding the results of its annual review of this chapter, including:

(i) The department's findings for the annual review factors identified in subsection (7) of this section;

(ii) The department's decision regarding the need for modification of this chapter based on its annual review; and

(iii) Identification of a time period for public opportunity to comment on the department's findings and decisions pursuant to this subsection.

(b) Provide public notice by mail or by additional procedures determined necessary by the department which may include:

(i) Newspaper publication;

(ii) Other news media;

(iii) Press releases;

(iv) Fact sheets;

(v) Publications;

(vi) Any other method as determined by the department.

(c) Conduct public meetings as determined necessary by the department to educate and inform the public regarding the department's annual review determinations and decisions.

(d) Comply with the rule making and public participation requirements of chapter 34.05 RCW, the Administrative Procedure Act, for any revisions to this chapter.

(9) Test sediments evaluated for compliance with the sediment quality standards of WAC 173-204-320 through 173-204-340 and/or the sediment impact zone maximum criteria of WAC 173-204-420 and/or the sediment cleanup ((~~screening levels criteria~~)) standards of WAC ((~~173-204-520~~)) 173-204-560 shall be sampled and analyzed using the Puget Sound Protocols or other methods approved by the department. Determinations made pursuant to this chapter shall be based on sediment chemical and/or biological data that were developed using an appropriate quality assurance/quality control program, as determined by the department.

(10) The statutory authority for decisions under this chapter shall be clearly stated in the decision documents prepared pursuant to this chapter. The department shall

undertake enforcement actions consistent with the stated authority under which the action is taken. The process for judicial review of these decisions shall be pursuant to the statutes under which the action is being taken.

(11) When the department identifies this chapter as an applicable, or relevant and appropriate requirement for a federal cleanup action under the Comprehensive Environmental Response, Compensation and Liability Act, the department shall identify the entire contents of this chapter as the appropriate state requirement.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-130, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-130, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-200 Definitions. ~~In cases where a definition does not exist in the is chapter, the definitions in chapter 173-340 WAC will apply unless the context indicates otherwise.~~ For the purpose of this chapter, the following definitions shall apply unless the context indicates otherwise:

~~(2)~~ (1) "Acute" means measurements of biological effects using surface sediment bioassays conducted for time periods that are relatively short in comparison to the life cycle of the test organism. Acute effects may include mortality, larval abnormality, or other endpoints determined appropriate by the department.

~~(3)~~ (2) "Amphipod" means crustacean of the Class Amphipoda, e.g., Rhepoxynius abronius, Ampelisca abdita, ((~~or~~)) Eohaustorius estuarius, or Hyalella azteca.

~~(4) "Anthropogenic" means created by humans or caused by human activity.~~

~~(6)~~ (3) "Appropriate biological tests" means only tests designed to measure directly, or through established predictive capability, biologically significant adverse effects to the established or potential benthic or aquatic resources at a given location, as determined by rule by the department.

~~(7)~~ (4) "Beneficial uses" means uses of waters of the state which include, ~~but are not limited to~~ but are not limited to, use for domestic, stock watering, industrial, commercial, agricultural, irrigation, mining, fish and wildlife maintenance and enhancement, recreation, generation of electric power, and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state.

~~(9)~~ (5) "Best management practices" or "BMPs" means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of surface sediments of the state ~~as approved by~~

~~the department~~. BMPs ~~also~~ also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or water disposal, or drainage from raw material storage.

~~(10)~~ (6) "Bioassay" means a test procedure ~~or biological assessment~~ that measures the response of living plants, animals, or tissues to a sediment sample.

~~(12)~~ (7) "Chronic" means measurements of biological effects using sediment bioassays conducted for, or simulating, prolonged exposure periods of not less than one complete life cycle, evaluations of indigenous field organisms for long-term effects, assessment of biological effects resulting from bioaccumulation and biomagnification, and/or extrapolated values or methods for simulating effects from prolonged exposure periods. Chronic effects may include mortality, reduced growth, impaired reproduction, histopathological abnormalities, adverse effects to birds and mammals, or other endpoints determined appropriate by the department.

~~(16)~~ (8) "Contaminated sediment" means ~~surface~~ surface sediments ((~~designated under the procedures of WAC 173-204-310 as~~)) exceeding the applicable sediment quality standards ((~~of~~)) in WAC 173-204-320 through 173-204-340 or the applicable ~~criteria~~ sediment cleanup standards in WAC 173-204-560.

~~(17)~~ (9) "Control sediment sample" means a surface sediment sample which is relatively free of contamination and is physically and chemically characteristic of the area from which bioassay test animals are collected. Control sediment sample bioassays provide information concerning a test animal's tolerance for stress due to transportation, laboratory handling, and bioassay procedures. Control sediment samples cannot exceed the applicable sediment quality standards of WAC 173-204-320 through 173-204-340 or the applicable criteria in WAC 173-204-~~560~~ -562 and 173-204-563.

~~(18)~~ (10) "Department" means the department of ecology.

~~(20)~~ (11) "Freshwater sediments" means surface sediments in which the sediment pore water contains less than or equal to 0.5 parts per thousand salinity.

~~(21) "Include" means included, but not limited to.~~

~~(22)~~ (12) "Low salinity sediments" means surface sediments in which the sediment pore water contains greater than 0.5 parts per thousand salinity and less than 25 parts per thousand salinity.

~~(23)~~ (13) "Marine finfish rearing facilities" ((~~shall~~)) means those private and public facilities located within state waters where finfish are fed, nurtured, held, maintained, or reared to reach the size of release or for market sale.

~~(24)~~ (14) "Marine sediments" means surface sediments in which the sediment pore water contains 25 parts per thousand salinity or greater.

~~(25)~~ (15) "Minor adverse effects" means a level of effects that:

(a) Has been determined by rule by the department, except in cases subject to WAC 173-204-110(6); and

(b) Meets the following criteria:

(i) An acute or chronic adverse effect to biological resources as measured by a statistically and biologically significant response relative to reference or control, as appropriate, in no more than one appropriate biological test as defined in WAC 173-204-200~~(6)~~ (3); or

(ii) A statistically and biologically significant response that is significantly elevated relative to reference or control, as appropriate, in any appropriate biological test as defined in WAC 173-204-200(3); or

(iii) Biological effects per (b)(i) or (ii) of this subsection as predicted by exceedance of an appropriate chemical or other deleterious substance standard, except where the prediction is overridden by direct biological testing evidence pursuant to (b)(i) and (ii) of this subsection; and

(c) Does not result in significant human health risk as predicted by exceedance of an appropriate chemical, biological, or other deleterious substance standard.

~~(29)~~ (16) "No adverse effects" means a level of effects that:

(a) Has been determined by rule by the department, except in cases subject to WAC 173-204-110(6); and

(b) Meets the following biological criteria:

(i) No acute or chronic adverse effects to biological resources as measured by a statistically and biologically significant response relative to reference or control, as appropriate, in any appropriate biological test as defined in WAC 173-204-200~~(6)~~ (3); and

(ii) No acute or chronic adverse biological effect per (b)(i) of this subsection as predicted by exceedance of an appropriate chemical or other deleterious substance standard, except where the prediction is overridden by direct biological testing evidence pursuant to (b)(i) of this subsection; and

(iii) Does not result in significant human health risk as predicted by exceedance of an appropriate chemical, biological, or other deleterious substance standard.

~~(30) "Nonanthropogenically affected" means not affected by humans or caused by human activities.~~

~~(31)~~ (17) "Other toxic, radioactive, biological, or deleterious substances" means, except for purposes of Part V of this chapter, contaminants which are not specifically identified in the sediment quality standards chemical criteria of WAC 173-204-320 through 173-204-340 (e.g., organic debris, tributyltin, DDT, etc.).

~~(32)~~ (18) "Person" means an individual, firm, corporation, association, partnership, consortium, joint venture, commercial entity, ~~industry, private corporation, port district, special purpose district, irrigation district,~~ industry, private corporation, port district, special purpose district, irrigation district, unit of local government, state government agency, federal government agency, Indian tribe, ~~or any other entity whatsoever~~ or any other entity whatsoever.

~~(34)~~ (19) "Practicable" means, except for purposes of Part V of this chapter, able to be completed in consideration of environmental effects, technical feasibility and cost.

~~(36)~~ (20) "Puget Sound basin" or "Puget Sound" means:

(a) Puget Sound south of Admiralty Inlet, including Hood Canal and Saratoga Passage;

(b) The waters north to the Canadian border, including portions of the Strait of Georgia;

(c) The Strait of Juan de Fuca south of the Canadian border; and

(d) All the lands draining into these waters as mapped in water resources inventory areas numbers 1 through 19, set forth in water resources management program established pursuant to the Water Resources Act of 1971, chapter 173-500 WAC.

~~(37)~~ (21) "Puget Sound protocols" means *Puget Sound Estuary Program. 1986. As amended. Recommended Protocols for Measuring Selected Environmental Variables in Puget Sound, U.S. Environmental Protection Agency, Region 10, Seattle, WA (looseleaf)*.

~~(39)~~ (22) "Reference sediment sample" means a surface sediment sample which serves as a laboratory indicator of a test animal's tolerance to important natural physical and chemical characteristics of the sediment, e.g., grain size, organic content. Reference sediment samples represent the nonanthropogenically affected background surface sediment quality of the sediment sample. Reference sediment samples cannot exceed the applicable sediment quality standards of WAC 173-204-320 through 173-204-340 or the applicable criteria of WAC ~~173-204-560~~ 173-205-562 and 173-204-563.

(23) "Sediment impact zone" means an area where the

applicable sediment quality standards of WAC 173-204-320 through 173-204-340 are exceeded due to ongoing permitted or otherwise authorized wastewater, storm water, or nonpoint source discharges and authorized by the department within a federal or state wastewater or storm water discharge permit, or other formal department authorization.

((~~(24)~~)) ~~(45) "Sediment quality standard" means chemical concentration criteria, biological effects criteria, other toxic, radioactive, biological, or deleterious substances criteria, and nonanthropogenically affected sediment quality criteria which are used to identify sediments that have no adverse effects on biological resources per procedures in WAC 173-204-320 through 173-204-340.~~

~~(26)~~)) ~~(48)~~ (24) "Surface sediments" ~~or "sediment(s)"~~ or "sediment(s)" means, except for purposes of Part V of this chapter, ~~settled particulate matter~~ settled particulate matter located in the ~~predominant~~ predominant biologically active ~~aquatic~~ aquatic zone, or exposed to the water column ~~by human activity (e.g., dredging, pore water flux, or other hydrological or natural action.~~ ~~Sediment(s) also includes settled particulate matter exposed by human activity (e.g., dredging) to the biologically active aquatic zone or to the water column.~~ Sediment(s) also includes settled particulate matter exposed by human activity (e.g., dredging) to the biologically active aquatic zone or to the water column.

((~~(27)~~)) ~~(50)~~ (25) "Test sediment" means a sediment sample that is evaluated for compliance with the sediment quality standards of WAC 173-204-320 through 173-204-340 ((~~and/or~~)), the sediment impact zone maximum criteria of WAC 173-240-420, ((~~and/~~))or the ((~~cleanup screening levels~~)) applicable criteria of WAC ((~~173-204-520~~)) 173-204-560.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-200, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-200, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending Order 90-41, filed 3/27/91, effective 4/27/91)

WAC 173-204-310 Sediment quality standards designation procedures. Any person may use these procedures to determine a sediment's designation using the applicable sediment quality standards of WAC 173-204-320 through 173-204-340. Any person who designates test sediments using the procedures of this section shall meet the sampling and testing plan requirements of WAC 173-204-600 and records management requirements of WAC 173-204-610. Test sediments designated using the procedures of this section shall be sampled and analyzed using the Puget Sound protocols or other methods approved by the department, and shall use an appropriate quality assurance/quality control program, as determined by the department. A sediment sample that passes the initial designation procedures is designated as complying with the applicable sediment quality standards of WAC 173-204-320 through 173-204-340, until such time as any person or the department confirms the sediment designation as failing the applicable sediment quality standards of WAC 173-204-320 through 173-204-340. A sediment sample that fails the initial designation procedures is designated as not complying with the applicable sediment quality standards of WAC 173-204-320 through 173-204-340, until such time as any person or the department confirms the sediment designation as passing the applicable sediment quality standards of WAC 173-204-320 through 173-204-340. A sediment sample that passes or fails the confirmatory designation procedures is designated as such under the procedures of WAC 173-204-310. Sediments shall be designated with the applicable sediment quality standards of WAC 173-204-

320 through 173-204-340 as follows:

(1) Initial designation. Sediments that have been chemically analyzed for the applicable chemical concentration criteria of WAC 173-204-320 through 173-204-340 shall be designated as follows:

(a) Sediments with chemical concentrations equal to or less than all the applicable chemical and human health criteria are designated as having no adverse effects on biological resources, and not posing a significant health threat to humans, and pass the applicable sediment quality standards of WAC 173-204-320 through 173-204-340.

(b) Sediments with chemical concentrations which exceed any one applicable chemical or human health criterion in WAC 173-204-320 through 173-204-340 are designated as having adverse effects on biological resources or posing significant human health threats, and fail the sediment quality standards of WAC 173-204-320 through 173-204-340, pending confirmatory designation.

(2) Confirmatory designation. Any person or the department may confirm the designation of sediments which have either passed or failed initial designation procedures listed in subsection (1) of this section using the applicable biological testing of WAC 173-204-315, as required below. Sediment samples that pass all the required confirmatory biological tests are designated as passing the applicable sediment quality standards of WAC 173-204-320 through 173-204-340, notwithstanding the sediment's previous initial designation under subsection (1) of

this section. Any sediment sample which fails any one of the required confirmatory biological tests shall be designated as failing the applicable sediment quality standards of WAC 173-204-320 through 173-204-340, notwithstanding the sediment's previous initial designation under subsection (1) of this section. The confirmatory biological test standards are described below.

(a) To confirm the designation of a sediment which either passed or failed any applicable chemical concentration criterion established in WAC 173-204-320 through 173-204-340, the sediment shall be tested for:

(i) Two of the acute effects biological tests described in the applicable standards of WAC 173-204-315; and

(ii) One of the chronic effects biological tests described in the applicable standards of WAC 173-204-315.

(b) Sediments with chemical concentrations which either passed or failed any applicable human health criterion of WAC 173-204-320 through 173-204-340 shall be eligible for confirmatory designation as follows: Reserved: The department shall determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this chapter.

(3) Initial and confirmatory designation of sediments which contain other toxic, radioactive, biological, or deleterious substances. Sediments which contain other toxic, radioactive, biological, or deleterious substances, as defined in WAC 173-204-200((~~(16)~~)) ~~(31)~~ (17), shall be designated by the department using the following procedures.

(a) The department shall:

(i) Identify individual contaminants of concern;

(ii) Identify appropriate and practicable sampling and analysis methodologies;

(iii) Identify test interpretation standards for initial and confirmatory designation; and

(iv) Identify acceptable levels of sediment contamination for sediments which contain other toxic, radioactive, biological, or deleterious substances.

(b) Where sediment containing other toxic, radioactive, biological or deleterious substances may also be contaminated by chemicals identified in WAC 173-204-320 through 173-204-340, the department shall require application of the appropriate tests and standards of WAC 173-204-320 through 173-204-340, as determined by the department, in addition to any requirements developed pursuant to (a) of this subsection.

(c) The department may use all or some of the sediment biological tests of WAC 173-204-320 through 173-204-340 to designate sediments with other toxic, radioactive, biological or deleterious substances in cases where those tests are technically appropriate, as determined by the department.

[Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-310, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-320 Marine sediment quality standards. (1) Goal and applicability.

(a) The sediment quality standards of this section shall correspond to a sediment quality that will result in no adverse effects, including no acute or chronic adverse effects on biological resources and no significant health risk to humans.

(b) The marine sediment quality standards of this section shall apply to marine sediments located within Puget Sound as defined in WAC 173-204-200((~~(19)~~)) ~~(36)~~ (20).

(c) Non-Puget Sound marine sediment quality standards. Reserved: The department shall determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this chapter.

(2) Chemical concentration criteria. The chemical concentrations in Table I establish the marine sediment quality standards chemical criteria for designation of sediments.

(a) Where laboratory analysis indicates a chemical is not detected in a sediment sample, the detection limit shall be reported and shall be at or below the Marine Sediment Quality Standards chemical criteria value set in this table.

(b) Where chemical criteria in this table represent the sum of individual compounds or isomers, the following methods shall be applied:

(i) Where chemical analyses identify an undetected value for every individual compound/isomer then the single highest detection limit shall represent the sum of the respective compounds/isomers; and

(ii) Where chemical analyses detect one or more individual compound/isomers, only the detected concentrations will be added to represent the group sum.

(c) The listed chemical parameter criteria represent concentrations in parts per million, "normalized," or expressed, on a total organic carbon basis. To normalize to total organic carbon, the dry weight concentration for each parameter is divided by the decimal fraction representing the percent total organic carbon content of the sediment.

(d) The LPAH criterion represents the sum of the following "low molecular weight polynuclear aromatic hydrocarbon" compounds: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, and Anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds as listed.

(e) The HPAH criterion represents the sum of the following "high molecular weight polynuclear aromatic hydrocarbon" compounds: Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Total Benzofluoranthenes, Benzo(a)pyrene, Indeno(1,2,3,-c,d)pyrene, Dibenzo(a,h)anthracene, and Benzo(g,h,i)perylene. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.

(f) The TOTAL BENZOFLUORANTHENES criterion represents the sum of the concentrations of the "B," "J," and "K" isomers.

Table I

Marine Sediment Quality Standards--

Chemical Criteria

CHEMICAL PARAMETER	MG/KG DRY WEIGHT (PARTS PER MILLION (PPM) DRY)
ARSENIC	57
CADMIUM	5.1
CHROMIUM	260
COPPER	390
LEAD	450
MERCURY	0.41
SILVER	6.1
ZINC	410

CHEMICAL PARAMETER	MG/KG ORGANIC CARBON (PPM CARBON)
LPAH	370
NAPHTHALENE	99
ACENAPHTHYLENE	66
ACENAPHTHENE	16
FLUORENE	23
PHENANTHRENE	100
ANTHRACENE	220
2-METHYLNAPHTHALENE	38
HPAH	960
FLUORANTHENE	160
PYRENE	1000

BENZ(A)ANTHRACENE	110
CHRYSENE	110
TOTAL BENZOFLUORANTHENES	230
BENZO(A)PYRENE	99
INDENO (1,2,3,-C,D) PYRENE	34
DIBENZO (A,H) ANTHRACENE	12
BENZO(G,H,I)PERYLENE	31
1,2-DICHLOROBENZENE	2.3
1,4-DICHLOROBENZENE	3.1
1,2,4-TRICHLOROBENZENE	0.81
HEXACHLOROBENZENE	0.38
DIMETHYL PHTHALATE	53
DIETHYL PHTHALATE	61
DI-N-BUTYL PHTHALATE	220
BUTYL BENZYL PHTHALATE	4.9
BIS (2-ETHYLHEXYL) PHTHALATE	47
DI-N-OCTYL PHTHALATE	58
DIBENZOFURAN	15
HEXACHLOROBUTADIENE	3.9
N-NITROSODIPHENYLAMINE	11
TOTAL PCB'S	12

CHEMICAL PARAMETER	UG/KG DRY WEIGHT (PARTS PER BILLION (PPB) DRY)
PHENOL	420
2-METHYLPHENOL	63
4-METHYLPHENOL	670
2,4-DIMETHYL PHENOL	29
PENTACHLOROPHENOL	360
BENZYL ALCOHOL	57
BENZOIC ACID	650

(3) Biological effects criteria. For designation of

sediments pursuant to WAC 173-204-310(2), sediments are determined to have adverse effects on biological resources when any one of the confirmatory marine sediment biological tests of WAC 173-204-315(1) demonstrate the following results:

(a) Amphipod: The test sediment has a higher (statistically significant, t test, $p \leq 0.05$) mean mortality than the reference sediment and the test sediment mean mortality exceeds twenty-five percent, on an absolute basis.

(b) Larval: The test sediment has a mean survivorship of normal larvae that is less (statistically significant, t test, $p \leq 0.05$) than the mean normal survivorship in the reference sediment and the test sediment mean normal survivorship is less than eighty-five percent of the mean normal survivorship in the reference sediment (i.e., the test sediment has a mean combined abnormality and mortality that is greater than fifteen percent relative to time-final in the reference sediment).

(c) Benthic abundance: The test sediment has less than fifty percent of the reference sediment mean abundance of any one of the following major taxa: Class Crustacea, Phylum Mollusca or Class Polychaeta, and the test sediment abundance is statistically different (t test, $p \leq 0.05$) from the reference sediment abundance.

(d) Juvenile polychaete: The test sediment has a mean individual growth rate of less than seventy percent of the reference sediment mean individual growth rate and the test sediment mean individual growth rate is statistically different (t test, $p \leq 0.05$) from the reference sediment mean individual growth rate.

(e) Microtox: The mean light output of the highest concentration of the test sediment is less than eighty percent of the mean light output of the reference sediment, and the two means are statistically different from each other (t test, $p \leq \cancel{<} 0.05$).

(4) Marine sediment human health criteria. Reserved: The department may determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this chapter.

(5) Marine sediment other toxic, radioactive, biological, or deleterious substances criteria. Other toxic, radioactive, biological or deleterious substances in, or on, sediments shall be at or below levels which cause no adverse effects in marine biological resources, and below levels which correspond to a significant health risk to humans, as determined by the department. The department shall determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this chapter pursuant to WAC 173-204-310(3).

(6) Nonanthropogenically affected sediment quality criteria. Whenever the nonanthropogenically affected sediment quality is of a lower quality (i.e., higher chemical concentrations, higher levels of adverse biological response, or posing a greater health threat to humans) than the applicable sediment quality standards assigned for said sediments by this chapter, the existing sediment chemical and biological quality shall be identified on an area-wide basis as determined by the

department, and used in place of the sediment quality standards of WAC 173-204-320.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-320, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-320, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending Order 90-41, filed 3/27/91, effective 4/27/91)

WAC 173-204-350 Sediment quality standards inventory. (1) The department shall gather available data on sediments and produce an inventory of sediment sampling stations which pass or fail the applicable sediment quality standards of WAC 173-204-320 through 173-204-340. Sediment sampling stations which are evaluated for compliance with the sediment quality standards of WAC 173-204-320 through 173-204-340 and placed on the inventory shall be sampled and analyzed using the Puget Sound Protocols or other methods approved by the department, and shall use an appropriate quality assurance/quality control program, as determined by the department. The sediment quality standards inventory produced per this section shall be used by the department, and made available upon request to the public and other federal, state, and local agencies for the following uses:

(a) To identify and target necessary source control activities, such as discharger monitoring, to eliminate adverse effects on biological resources and significant health threats to humans from sediment contamination;

(b) To identify contaminated sediment cleanup sites per the procedures in WAC 173-204-500 through 173-204-590;

(c) To establish sediment quality ambient monitoring program status and trends analyses and reports;

(d) To identify the sediment quality of areas proposed for dredging, in-water construction, and other actions requiring federal, state, and/or local permits; and

(e) To complete other uses consistent with the intent of this chapter, as determined by the department.

(2) Sources of data. Sediment biological and chemical data shall be gathered by the department for review to produce and update the sediment quality inventory on a biennial basis. Data sources include, but are not limited to:

(a) Sediment data collected by the department for the Puget Sound ambient monitoring program, compliance monitoring of permitted discharges, and special environmental investigations.

(b) Sediment data submitted to the U.S. Army Corps of Engineers in support of dredging permit applications.

(c) Sediment data collected to identify problem areas and needed source controls in Puget Sound as defined in WAC 173-204-200((~~(19)~~)) ~~(36)~~ (20), other marine waters, and all low salinity and freshwater areas in Washington state.

(d) Sediment data used or collected in compliance with chapter 70.105D RCW, and the Model Toxics Control Act cleanup regulation, chapter 173-340 WAC.

(e) Sediment data used or collected in compliance with the federal Comprehensive Environmental Response, Compensation and Liability Act.

(f) Sediment data collected as a requirement of a National Pollutant Discharge Elimination System or state discharge permit.

(g) Sediment data derived from other studies including:

(i) Federally sponsored monitoring studies.

(ii) Special monitoring studies conducted by local and municipal governments, or private industry.

(iii) Data derived through Washington state department of natural resources administration of use authorizations.

(3) The inventory shall be updated and made available to the public on a biennial basis.

[Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-350, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-410 Sediment quality goal and sediment impact zone applicability. (1) Goal and policies.

(a) It is the established goal of the department to manage source control activities to reduce and ultimately eliminate adverse effects on biological resources and significant health threats to humans from sediment contamination.

(b) The stated policy of the department shall be to only authorize sediment impact zones so as to minimize the number, size, and adverse effects of all zones, with the intent to eliminate the existence of all such zones whenever practicable. The department shall consider the relationship between environmental effects, technical feasibility and cost in determining whether it is practicable to minimize and/or eliminate sediment impact zones.

(c) The department shall implement the standards of WAC 173-204-400 through 173-204-420 so as to prevent the creation of new contaminated sediment cleanup sites identified under WAC ((~~173-204-530(4)~~)) 173-204-520.

(2) A sediment impact zone authorization issued by the department under the authority of chapter 90.48 RCW does not constitute authorization to trespass on lands not owned by the applicant. These standards do not address and in no way alter the legal rights, responsibilities, or liabilities of the permittee or landowner of the sediment impact zone for any applicable requirements of proprietary, real estate, tort, and/or other laws not directly expressed as a requirement of this chapter.

(3) Except as identified in subsection (6)(d) of this section, any person may apply for a sediment impact zone under

the following conditions:

(a) The person's discharge is provided with all known, available and reasonable methods of prevention, control, and treatment, and meets best management practices as stipulated by the department; and

(b) The person's discharge activity exposes or resuspends sediments which exceed, or otherwise cause or potentially cause sediments to exceed the applicable sediment quality standards of WAC 173-204-320 through 173-204-340, or the antidegradation policy standards of WAC 173-204-120 (1)(a) and (c) within a period of ten years from the later date of either the department's formal approval of the application for a sediment impact zone authorization or the starting date of the discharge.

(4) The department shall only authorize sediment impact zones for permitted wastewater and storm water discharges, and other discharges authorized by the department. The department shall authorize all sediment impact zones via discharge permits or other formal administrative actions.

(5) The department shall not limit the application, establishment, maintenance, or closure of an authorized sediment impact zone via consideration of sediment contamination determined by the department to be the result of unknown, unpermitted or historic discharge sources.

(6) As determined necessary by the department, any person with a permitted discharge shall be required to meet the standards of WAC 173-204-400 through 173-204-420, as follows:

(a) Any person with a new or existing permitted wastewater discharge shall be required to meet the standards of WAC 173-204-400 through 173-204-420;

(b) Any person with a new or existing permitted industrial storm water discharge, regulated as process wastewater in National Pollutant Discharge Elimination System or state discharge permits, shall be required to meet the standards of WAC 173-204-400 through 173-204-420;

(c) Any person with a new or existing permitted storm water or nonpoint source discharge, which fully uses all known, available and reasonable methods of prevention, control, and treatment, and best management practices as stipulated by the department at the time of the person's application for a sediment impact zone, shall be required to meet the standards of WAC 173-204-400 through 173-204-420;

(d) Any person with a storm water discharge, existing prior to the adoption of this chapter, and determined by the department to not be fully using best management practices stipulated by the department at the time of the person's application for a permit from the department, shall be eligible for a sediment impact zone as follows:

(i) The department shall issue sediment impact zone authorizations with requirements for application of best management practices stipulated by the department on an approved time schedule.

(ii) Sediment impact zones authorized by the department for permitted storm water discharges under the applicability provisions of subsection (6)(d) of this section shall be subject to cleanup action determinations made by the department pursuant to WAC 173-204-500 through 173-204-590 when the sediment impact zone maximum criteria of WAC 173-204-420 are exceeded within the authorized sediment impact zone.

(iii) The department shall identify and include best management practices required to meet the sediment impact zone design standards of WAC 173-204-415(4) as soon as practicable within sediment impact zone authorizations established for storm water discharges per WAC 173-204-410 (6)(d).

(7) Dredged material and fill discharge activities subject to authorization under Section 401 of the federal Clean Water Act via chapter 90.48 RCW and chapter 173-225 WAC, establishment of implementation procedures of application for certification, are not subject to the standards of WAC 173-204-415 but are subject to the standards of WAC 173-204-400 through 173-204-410 and 173-204-420 as follows:

(a) Requirements for dredging activities and disposal sites shall be established by the department using best available dredged material management guidelines and applicable federal and state rules. These guidelines shall include the Puget Sound dredged disposal analysis (PSDDA) dredged material testing and disposal requirements cited in:

(i) *Management Plan Report - Unconfined Open-Water Disposal Of Dredged Material, Phase I, (Central Puget Sound), June 1988, or as amended;*

(ii) *Management Plan Report - Unconfined Open-Water Disposal Of Dredged Material, Phase II, (North And South Puget*

Sound), September 1989, or as amended; and

(iii) *Users Manual For Dredged Material Management In Puget Sound, November 1990, or as amended.*

(b) In coordination with other applicable federal and state and local dredged material management programs, the department may issue administrative orders to establish approved disposal sites, to specify disposal site use conditions, and to specify disposal site monitoring requirements.

(c) The department may authorize sediment impact zones for dredged material disposal via federal Clean Water Act Section 401 certification actions.

(d) As determined necessary by the department, the department may authorize sediment impact zones for dredged material disposal via administrative orders issued under authority of chapter 90.48 RCW. The department shall authorize sediment impact zones for all Puget Sound dredged disposal analysis disposal sites via administrative orders issued under authority of chapter 90.48 RCW.

(e) Administrative orders and certifications establishing sediment impact zones for dredged material disposal sites shall describe establishment, maintenance, and closure requirements for the authorized site, consistent with the requirements described in (a) of this subsection.

(8) The source control standards of WAC 173-204-400 through 173-204-420 are applicable in cases where the sediment quality standards of WAC 173-204-320 through 173-204-340 are reserved.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-410, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-410, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-412 Marine finfish rearing facilities. (1) Purpose. This section sets forth the applicability of this chapter to marine finfish rearing facilities only. This section also identifies marine finfish rearing facility siting, operation, closure and monitoring requirements to meet the intent of this chapter, as applicable.

(2) Applicability. Marine finfish rearing facilities and their associated discharges are not subject to the authority and purpose standards of WAC 173-204-100 (3) and (7), and the marine sediment quality standards of WAC 173-204-320 and the sediment impact zone maximum criteria of WAC 173-204-420, within and including the distance of one hundred feet from the outer edge of the marine finfish rearing facility structure. Marine finfish rearing facilities are not subject to the sediment impact zone standards of WAC 173-204-415.

(3) Sediment monitoring. Sediment quality compliance and monitoring requirements for marine finfish rearing facilities

shall be addressed through National Pollutant Discharge Elimination System or other permits issued by the department for facility operation. Marine finfish rearing facilities shall meet the following sediment quality monitoring requirements:

(a) Any person with a new facility shall identify a baseline sediment quality prior to facility operation for benthic infaunal abundance, total organic carbon and grain size in the location of the proposed operation and downcurrent areas that may be potentially impacted by the facility discharge;

(b) Any person with an existing operating facility shall monitor sediment quality for total organic carbon levels and identify the location of any sediments in the area of the facility statistically different (t test, p ≤ ~~<~~ 0.05) from the total organic carbon levels identified as facility baseline levels or statistically different from the applicable total organic carbon levels as identified in Table ((~~1~~)) ~~II~~1:

TABLE ((~~1~~)) ~~II-~~1 - Puget Sound Reference Total Organic Carbon Values

Silt-Clay Particles (percent Dry Weight)	Total Organic Carbon (percent Dry Weight)
0-20	0.5
20-50	1.7
50-80	3.2
80-100	2.6

(c) The locations and frequency of monitoring for total organic carbon, benthic infaunal abundance and other parameters shall be determined by the department and identified in the applicable National Pollutant Discharge Elimination System permit;

(d) Antibacterials. Reserved: The department shall determine on a case-by-case basis the methods, procedure, locations, and frequency for monitoring antibacterials associated with the discharge from a marine finfish rearing facility;

(e) Closure. All permitted marine finfish rearing facilities shall monitor sediments impacted during facility operation to document recovery of sediment quality to background levels. The department shall determine on a case-by-case basis the methods, procedure, locations, and frequency for monitoring sediments after facility closure.

(4) Sediment impact zones. Marine finfish rearing facilities and their associated discharges that are permitted under a National Pollutant Discharge Elimination System permit are hereby provided a sediment impact zone by rule for any sediment quality impacts and biological effects within and including the distance of one hundred feet from the outer edge of the marine finfish rearing facility structure.

(a) The department may authorize an individual marine finfish rearing facility sediment impact zone for any sediments beyond a distance of one hundred feet from the facility perimeter via National Pollutant Discharge Elimination System permits or administrative actions. The authorized sediment impact zone shall meet the benthic infaunal abundance requirements of the sediment impact zone maximum criteria, WAC 173-204-420 (3)(c)(iii). Marine finfish rearing facilities that exceed the sediment quality conditions of subsection (3)(b) of this section beyond a distance of one hundred feet from the facility perimeter shall:

(i) Begin an enhanced sediment quality monitoring program to include benthic infaunal abundance consistent with the requirements of the National Pollutant Discharge Elimination System permit. The sediment quality monitoring program shall include a benthic infaunal abundance reference sediment sample as required in subsection (3)(a) of this section or a benthic infaunal abundance reference sediment sample in compliance with WAC 173-204-200((~~(21)~~)) ~~(39)~~ (22); and

(ii) Be consistent with the sediment source control general considerations of WAC 173-204-400 and the sediment quality goal and sediment impact zone applicability requirements of WAC 173-204-410, apply for a sediment impact zone as determined necessary by the department.

(b) Administrative orders or permits establishing sediment impact zones for marine finfish rearing facilities shall describe establishment, maintenance, and closure requirements as determined necessary by the department.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-412, filed 12/29/95, effective 1/29/96.]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-415 Sediment impact zones. The purpose of this section is to set forth the standards for establishment, maintenance, and closure of sediment impact zones to meet the intent of sediment quality dilution zones authorized pursuant to RCW 90.48.520, except for sediment impact zones authorized under WAC 173-204-410(7). The department shall authorize all sediment impact zones via discharge permits or other formal administrative actions.

(1) General requirements. Authorization, modification and renewal of a sediment impact zone by the department shall require compliance with the following general requirements:

(a) Permits authorizing wastewater discharges to surface waters of the state of Washington under authority of chapter 90.48 RCW shall be conditioned so that the discharge receives:

(i) All known, available and reasonable methods of prevention, control, and treatment prior to discharge, as required by chapters 90.48, 90.52, and 90.54 RCW; and

(ii) Best management practices as stipulated by the department.

(b) The maximum area, and maximum chemical contaminant concentration and/or allowable maximum biological effect level within sediments assigned to a sediment impact zone shall be as authorized by the department, in accordance with the standards of this section.

(c) The department shall determine that the person's activity generating effluent discharges which require authorization of a sediment impact zone is in the public interest.

(d) The department shall determine that any person's activity generating effluent discharges which require authorization of a sediment impact zone has adequately addressed alternative waste reduction, recycling, and disposal options through application of all known, available and reasonable methods of prevention, control, and treatment to minimize as best practicable the volume and concentration of waste contaminants in the discharge.

(e) The area boundaries of the sediment impact zone established by the department shall include the minimum practicable surface area, not to exceed the surface area allowed under subsection (4) of this section.

(f) Adverse effects to biological resources within an authorized sediment impact zone shall be maintained at the minimum chemical contamination and biological effects levels practicable at all times. The department shall consider the relationship between environmental effects, technical feasibility and cost in determining the minimum practicable chemical contamination and biological effects levels. Adverse effects to biological resources within an authorized sediment impact zone shall not exceed a minor adverse effects level as a result of the discharge, as determined by the procedures of subsection (4) of this section.

(g) The operational terms and conditions for the sediment impact zone shall be maintained at all times.

(h) Final closure of the sediment impact zone shall be conducted in strict accordance with the department's sediment impact zone authorization.

(i) Documents authorizing a sediment impact zone shall require that the permitted discharge not result in a violation of the applicable sediment quality standards of WAC 173-204-320 through 173-204-340, outside the area limits of the established zone.

(j) All applications to the department for sediment impact zone authorizations shall be subject to public notice, comment and hearing procedures defined but not limited to the applicable discharge permit or other formal administrative action requirements of chapter 43.21C RCW, the State Environmental Policy Act, chapter 197-11 WAC, SEPA rules, chapter 90.48 RCW, chapter 163-216 WAC, the State waste discharge permit program, and chapter 173-220 WAC, National Pollutant Discharge Elimination System Permit Program prior to issuance of the authorization. In determining the need for, location, and/or design of any sediment impact zone authorization, the department shall give consideration to all comments received during public review of the proposed sediment impact zone application.

(2) Application requirements.

(a) Whenever, in the opinion of the department, as a result of an ongoing or proposed effluent discharge, a person violates, shall violate, or creates a substantial potential to violate the sediment quality standards of WAC 173-204-320 through 173-204-340 as applicable within a period of ten years from the later date of either the department's evaluation of the ongoing discharge or the starting date of the proposed discharge, the department may require application for a sediment impact zone authorization under authority of chapter 90.48 RCW.

(b) Any person with a proposed or permitted effluent discharge shall apply to the department for authorization of a sediment impact zone when:

(i) The department requires the sediment impact zone application by written notification; or

(ii) The person independently identifies that the ongoing or proposed effluent discharge violates, shall violate, or creates a substantial potential to violate the applicable sediment quality standards of WAC 173-204-320 through 173-204-340 within a period of ten years from the later date of the person's evaluation of the ongoing discharge or the starting date of the proposed discharge, using the procedures of this section.

(c) As necessary, the department may require any person to submit a sediment impact zone application in multiple steps concurrent with its ongoing review and determination concerning the adequacy of the application. The application shall provide the sediment impact zone design information required in subsection (4) of this section and other such information the department determines necessary. The application shall also provide the legal location and landowner(s) of property proposed for use as, or potentially affected by, a sediment impact zone, and shall be accompanied by such other relevant information as the department may require. The department shall issue a written approval of the complete sediment impact zone application prior to or concurrent with authorizing a sediment impact zone.

(d) Submittal of an application to the department for authorization of a sediment impact zone under the terms and conditions of this section shall establish the applicant's interim compliance with requirements of chapter 90.48 RCW and this chapter, as determined by the department. The department may authorize an interim compliance period within a valid discharge permit or administrative order to ensure ultimate compliance with chapter 90.48 RCW and this chapter. The interim compliance period shall not continue beyond the date of issuance of a sediment impact zone authorization within a valid discharge permit issued by the department.

(e) Prior to authorization, the department shall make a reasonable effort to identify and notify all landowners, adjacent landowners, and lessees affected by the proposed sediment impact zone. The department shall issue a sediment impact zone notification letter to any person it believes to be a potentially affected landowner and other parties determined appropriate by the department. The notification letter shall be sent by certified mail, return receipt requested, or by personal service. The notification letter shall provide:

(i) The name of the person the department believes to be the affected landowner;

(ii) The names and addresses of other affected landowners to whom the department has sent a proposed sediment impact zone notification letter;

(iii) The name and address of the sediment impact zone applicant;

(iv) A general description of the location, size, and contamination level proposed for the sediment impact zone;

(v) The intention of the department to release all specific sediment impact zone application information to the public upon written request to the department;

(vi) The determination of the department concerning whether the proposed sediment impact zone application meets the standards of this section;

(vii) The intention of the department whether to authorize the proposed sediment impact zone; and

(viii) Notification that the affected landowners, adjacent landowners, and lessees may comment on the proposed sediment impact zone. Any comments on the proposed sediment impact zone authorization shall be submitted in writing to the department within thirty days from the date of receipt of the notification letter, unless the department provides an extension.

(f) Prior to authorization, the department shall issue a sediment impact zone notification letter to affected port districts, the Washington state department of natural resources marine lands division, the U.S. Army Corps of Engineers, and other parties determined appropriate by the department. The notification letter shall be sent by certified mail, return receipt requested, or by personal service. The notification letter shall provide the information required under (e) of this subsection.

(3) Locational considerations. The department shall require any person applying for a sediment impact zone to submit information concerning potential location considerations of the zone. The location of an authorized sediment impact zone shall avoid whenever possible and minimize adverse impacts to areas of special importance. Prior to authorization of a sediment impact zone, the department shall consider all pertinent information from the applicant, all affected parties, local, state and federal agencies, federally recognized Indian tribes, and the public concerning locational considerations, including but not limited to:

(a) Spawning areas;

(b) Nursery areas;

(c) Waterfowl feeding areas;

(d) Shellfish harvest areas;

(e) Areas used by species of economic importance;

(f) Tribal areas of significance;

(g) Areas determined to be ecologically unique;

(h) Water supply intake areas;

(i) Areas used for primary contact public recreation;

(j) High quality waters that constitute an outstanding national resource; and

(k) Areas where sediment quality is substantially better than levels necessary for protection of biological resources and human health.

(4) Design requirements. The location, areal limitations, and degree of effects allowed within an authorized sediment impact zone shall be determined by application of the department's sediment impact zone computer models "CORMIX," "PLUMES," and/or "WASP," or an alternate sediment impact zone model(s) approved by the department under WAC 173-204-130(4), as limited by the standards of this section and the department's best professional judgment. The models shall be used by the department or by the discharger as required by the department, to estimate the impact of any person's wastewater or storm water discharge on the receiving water and sediment quality for a period of ten years from the later date of either the department's formal approval of the application for a sediment impact zone authorization or the starting date of the discharge.

(a) Data requirements. The discharger shall submit the following information to determine requirements for establishment and authorization of a sediment impact zone, as required by the department:

(i) Data reports and analyses results for all samples of wastewater or storm water, receiving water, and sediments collected by the discharger or other parties relating to evaluation of the potential effects of the permitted discharge, as required by WAC 173-204-400.

(ii) Data reports and analyses results determined necessary to:

(A) Apply discharge modeling to the permitted discharge; and

(B) To identify and evaluate potential alternative chemical and biological effects of the discharge on the receiving water and sediments; and

(C) To identify and evaluate potential alternatives to define the areal size and location of a sediment impact zone needed by the discharge.

(iii) Data reports and analyses results from the discharger's application of the "CORMIX," "PLUMES," and/or "WASP" or an alternate sediment impact zone model(s) approved by the department under WAC 173-204-130(4), to the permitted discharge to identify and evaluate:

(A) Potential alternative chemical and biological effects of the discharge on the receiving water and sediments; and

(B) Potential alternatives for the areal distribution and location of a potential sediment impact zone required by the discharge.

(iv) Preferred alternative for closure of the potential sediment impact zone by active removal and/or natural recovery, and identified costs of the preferred closure method.

(b) Overlapping sediment impact zones. Overlapping sediment impact zones, as predicted by the "CORMIX," "PLUMES," and/or "WASP" models or an alternate sediment impact zone model(s) approved by the department under WAC 173-204-130(4), and the department's best professional judgment, shall be authorized only as follows:

(i) The applicable sediment impact zone maximum criteria of WAC 173-204-420 shall not be exceeded as a result of the multiple discharge sediment impact zones overlap; and

(ii) If the department determines that the applicable chemical contaminant concentration and biological effects restrictions of WAC 173-204-420 would be exceeded as a result of the overlap of multiple discharge sediment impact zones, the department may authorize the sediment impact zones after:

(A) Application of a waste load allocation process to the individual permitted discharges to identify individual permit effluent limitations necessary to meet:

(I) The applicable chemical contaminant concentration and biological effects restrictions for sediment impact zones required by this section; and/or

(II) Storm water best management practices required by the department; and

(B) Establishment of individual permit compliance schedules for the multiple permitted discharges to ensure compliance with:

(I) The permit effluent limitations established by the department using the waste load allocation process and best professional judgment; and

(II) The standards of WAC 173-204-400 through 173-204-420.

(5) Maintenance requirements.

(a) The department shall review sediment impact zone monitoring conducted by the discharger to evaluate compliance with the department's sediment impact zone authorization and the standards of WAC 173-204-400 through 173-204-420. The department may require additional sediment impact zone monitoring when the department determines that any sediment sampling station within an authorized sediment impact zone exceeds the sediment impact zone maximum criteria of WAC 173-204-420 or violates the sediment impact zone authorization as a result of the discharge.

(b) Whenever the department can clearly demonstrate that, as a result of an effluent discharge, a discharger violates, shall violate, or creates a substantial potential to violate the department's sediment impact zone authorization, or the sediment impact zone maximum criteria of WAC 173-204-420, the department shall:

(i) Provide written notification and supporting documentation of the department's clear demonstration determination to the affected discharger;

(ii) Establish a reasonable time frame for the affected discharger to either submit a written statement and supporting documentation rebutting the department's clear demonstration determination, or accept the department's determination. The discharger may use the clear demonstration methods identified in (c) of this subsection for rebuttal of the department's clear demonstration; and

(iii) Provide written notification of the department's determination concerning approval or denial of the submitted clear demonstration rebuttal to the discharger.

(c) For the purpose of this section, a clear demonstration shall consist of:

(i) Use of the sediment impact zone model(s) "CORMIX," "PLUMES," and/or "WASP" or other model(s) to demonstrate a discharge(s) is the source of the violation or potential violation; and

(ii) Use of one or more of the following methods to demonstrate a violation of the sediment impact zone authorization or the sediment impact zone maximum criteria of WAC 173-204-420:

(A) Direct sediment sampling. A violation of the sediment impact zone authorization and/or the sediment impact zone maximum criteria of WAC 173-204-420 is demonstrated when:

(I) The average chemical concentration for three stations within the sediment impact zone exceeds the sediment impact zone maximum criteria of WAC 173-204-420 due to the discharge source. This concentration average shall not include stations for which complete biological testing information shows that the biological effects requirements of WAC 173-204-420, or the authorized sediment impact zone if applicable, are met; or

(II) The biological effects at each of any three stations within the sediment impact zone exceed the sediment impact zone maximum biological effects criteria of WAC 173-204-420 or the authorized sediment impact zone as applicable, due to the discharge source; or

(B) Monitoring data which demonstrates a chemical contaminant concentration gradient toward the discharge source exists in sediments which violates the sediment impact zone authorization or the standards of WAC 173-204-420; or

(C) A trend analysis of the effluent chemical discharge quality and ~~(inplace)~~ (inplace) sediment monitoring data which statistically demonstrates an ongoing violation or substantial potential to violate the sediment impact zone authorization or the standards of WAC 173-204-420; or

(D) Field depositional (e.g., sediment traps) and/or effluent particulate (e.g., centrifuge analysis) data which demonstrate an ongoing violation or substantial potential to violate the sediment impact zone authorization or the standards of WAC 173-204-420; or

(E) Mathematical or computer modeling which demonstrates an ongoing violation or substantial potential to violate the sediment impact zone authorization or the standards of WAC 173-204-420.

(d) The department's response to a clear demonstration of a violation or potential violation shall be to require maintenance activities in the following order:

(i) Require reanalysis of whether the discharger's effluent treatment complies with all known, available and reasonable methods of prevention, control, and treatment and best management practices based on the data used to establish the clear demonstration;

(ii) Alter the authorized sediment impact zone size and/or degree of effects consistent with the standards of this section and the results of direct sediment sampling;

(iii) Reduce impacts of the existing or potential violation by requiring additional discharge controls or additional sediment impact zone maintenance activities which can include, but are not limited to:

(A) Dredging and removal of sediments, solely for sediment impact zone maintenance needs or coordinated with maintenance dredging of commercially important areas, e.g., navigational lanes or ship berthing areas;

(B) Dredging, treatment, and replacement of sediments within the sediment impact zone; and/or

(C) Capping of sediments within the sediment impact zone;

(iv) Limit the quantity and/or quality of the existing permitted discharge; and/or

(v) Withdraw the department's sediment impact zone authorization and require final closure of the zone.

(e) All sediment impact zone maintenance actions conducted under this chapter shall provide for landowner review of the maintenance action plans prior to implementation of the action. In cases where the discharger is not able to secure access to lands subject to the sediment impact zone maintenance actions of this subsection, the department may facilitate negotiations or other proceedings to secure access to the lands. Requests for department facilitation of land access shall be submitted to the department in writing by the responsible discharger.

(6) Closure planning and requirements.

(a) The discharger shall select and identify a preferred method for closure of a sediment impact zone in the application required by WAC 173-204-415(2). Closure methods can include either active cleanup and/or natural recovery and monitoring. The department shall incorporate the discharger's identified closure method in the sediment impact zone authorization.

(b) The department may require closure of authorized sediment impact zones when the department determines that:

(i) The discharger has violated the sediment impact zone maintenance standards of subsection (5) of this section; or

(ii) The department determines that:

(A) The wastewater or storm water discharge quality will not violate the applicable sediment quality standards of WAC 173-204-320 through 173-204-340; or

(B) A sediment impact zone is no longer needed or eligible under the standards of WAC 173-204-410 through 173-204-415.

(7) Modification of sediment impact zones. The department may modify sediment impact zone authorization requirements where the nature of a person's activity which generates, transports, disposes, prevents, controls, or treats effluent discharges has substantially changed and been demonstrated to the department's satisfaction. The modification may occur after consideration of the following:

(a) Reduction of effects. Assessment of the discharge activities and treatment methods shall be conducted by the discharger to demonstrate to the satisfaction of the department that:

(i) Elimination of the sediment impact zone is not practicable; and

(ii) Further reduction in any existing or proposed sediment impact zone area size and/or level of contamination or effects is not practicable in consideration of discharge requirements for all known, available and reasonable methods of prevention, control, and treatment, best management practices, and applicable waste reduction and recycling provisions.

(b) Alterations. There are substantial alterations or additions to the person's activity generating effluent discharges which require authorization of a sediment impact zone which occur after permit issuance and justify application of permit conditions different from, or absent in, the existing permit.

(c) New information. Sediment impact zones may be modified when new information is received by the department that was not available at the time of permit issuance that would have justified the application of different sediment impact zone authorization conditions.

(d) New regulations. The standards or regulations on which the permit was based have changed by amended standards, criteria, or by judicial decision after the permit was issued.

(e) Changes in technology. Advances in waste control technology that qualify as "all known, available and reasonable methods of prevention, control, and treatment" and "best management practices" shall be adopted as permit requirements, as appropriate, in all permits reissued by the department.

(8) Renewal of previously authorized sediment impact zones. Renewal of sediment impact zones previously authorized under the

standards of WAC 173-204-410 and this section shall be allowed under the following conditions:

(a) The department determines the discharge activities and treatment methods meet all known, available and reasonable methods of prevention, control, and treatment and best management practices as stipulated by the department; and

(b) The discharger demonstrates to the department's satisfaction that the discharge activities comply with the standards of WAC 173-204-400 through 173-204-420 and with the existing sediment impact zone authorization; and

(c) Reduction of effects. The discharger conducts an assessment of the permitted discharge activities and treatment methods and demonstrates to the department's satisfaction that:

(i) Elimination of the sediment impact zone is not practicable; and

(ii) A further reduction in any existing or proposed sediment impact zone area size and/or level of contamination is not practicable in consideration of discharge requirements for all known, available and reasonable methods of prevention, control, and treatment, best management practices, and applicable waste reduction and recycling provisions.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-415, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-415, filed 3/27/91, effective 4/27/91.]

<u>AMENDATORY SECTION</u> (Amending Order 90-41, filed 3/27/91, effective 4/27/91)

WAC 173-204-500 Sediment cleanup decision process and policies. ((~~(1) The standards of WAC 173-204-500 through 173-204-590 are procedures which specify a cleanup decision process for managing contaminated sediments. These procedures include:~~

~~(a) Screening sediment station clusters of potential concern;~~

~~(b) Conducting hazard assessments to identify cleanup sites;~~

~~(c) Ranking sites identified in (b) of this subsection;~~

~~(d) Determining the appropriate site cleanup authority;~~

~~(e) Conducting a site cleanup study;~~

~~(f) Determining the site-specific cleanup standard;~~

~~(g) Selecting a site cleanup action; and~~

~~(h) Where necessary, authorizing a cleanup site sediment recovery zone.~~

~~(2) Under this chapter, the department may require or take those actions necessary to implement the standards of WAC 173-204-500 through 173-204-580 for all contaminated sediment stations on the inventory identified in WAC 173-204-350.~~

~~(3) The cleanup process and procedures under this chapter and under other laws may be combined. The department may initiate a cleanup action under this chapter and may upon~~

~~further analysis determine that another law is more appropriate, or vice versa.~~

~~(4) It is the policy of the department to manage sediment cleanup actions towards the goal of reducing and ultimately eliminating adverse effects on biological resources and significant health threats to humans from sediment contamination. To achieve this goal, the department will pursue sediment cleanup decisions and cleanup standards that are as close as practicable to the sediment quality standards of WAC 173-204-320 through 173-204-340, including the consideration of net environmental effects, cost and technical feasibility. The department shall only authorize sediment recovery zones so as to minimize the number, size and adverse effects of all zones, with the intent to eliminate the existence of all such zones whenever practicable.~~

~~(5) The department shall endeavor to make sediment cleanup decisions in an expeditious manner, as soon as all needed information is available, consistent with the availability of department resources and the priority of the cleanup site.~~)) (1) **Applicability.**

(a) This part is promulgated under the authority of chapter 70.105D RCW, the Model Toxics Control Act. This part establishes requirements for identifying, investigating, and cleaning up a release or threatened release of a contaminant to sediment that may pose a threat to human health or the environment. This part shall be used for the purposes of chapter 70.105D RCW.

(b) This part shall not be used in the implementation of the federal Clean Water Act (33 U.S.C. Sec. 1251). The ~~S~~sediment cleanup standards and the other cleanup criteria ~~of WAC 173-204-500 through 173-204-590~~ in this part are not sediment quality standards, which ~~shall only be used for purposed specified in chapter 70.105D RCW. Sediment quality standards~~ are established under Part III of this chapter, or sediment impact zone maximum criteria, which are established under Part IV of this chapter ~~under the authority of chapters 70-105D and 90.48 RCW~~.

~~(b)~~ (c) This section describes the decision process and associated policies and principles governing the identification, investigation, and cleanup of contaminated sediment at sites under chapter 70.105D RCW. If there are any inconsistencies between this section and a specifically referenced section, the specifically referenced section shall govern.

(2) **Cleanup decision process.** In general, the process for cleanup of contaminated sediments includes the following steps:

(a) Identifying sediment station clusters of potential concern (WAC 173-204-510);

(b) Identifying cleanup sites for further evaluation (WAC 173-204-520);

(c) Evaluating sites identified in (b) of this subsection (WAC 173-204-530);

(d) Determining the appropriate site cleanup authority (WAC 173-204-540);

(e) Conducting a remedial investigation and feasibility study (WAC 173-204-550);

(f) Establishing the applicable sediment cleanup standards (WAC 173-204-560 through 173-204-564);

(g) Selecting a cleanup action (WAC 173-204-570);

(h) Documenting the cleanup action decision and soliciting public review of that decision (WAC 173-204-~~580~~575); and

(i) Where necessary, authorizing a sediment recovery zone (WAC 173-204-590).

(3) **Coordination with other laws.** The cleanup process and procedures under this ~~chapter~~ part and under other laws may be combined.

(4) **Cleanup process expectations.** The department has the following expectations regarding the cleanup process for contaminated sediment sites. The department recognizes there may be sites where cleanup actions conforming to these expectations are ~~not~~ inappropriate.~~:~~

(a) Scale of cleanups. Sediment contamination can be widespread with multiple contaminants from multiple sources that have been intermingled and dispersed by natural processes and human activity. It is the department's intent to address this widespread contamination using multiple approaches that lead to cleanup as effectively and efficiently as possible. This may include:

(i) The establishment of ~~"~~sediment cleanup unit(s)~~"~~ within a site, and the expedited cleanup of those units consistent with the cleanup strategy and broader scale toxics reduction and source control strategies;

(ii) Coordinating cleanup of multiple sites and sediment cleanup units on a bay-wide, area-wide, or watershed-wide scale; and

(iii) Use of source control measures to minimize future contamination.

(b) Recontamination. Recontamination of sediment at remediated sites or sediment cleanup units may occur from ongoing discharges or other releases. It is the department's expectation that further cleanup of recontamination will not be required by the person(s) conducting the initial cleanup when the person(s) can demonstrate, upon department approval, that the recontamination is caused by ongoing discharges ~~a source~~ or ~~a permitted~~other releases not under the authority or responsibility of the person(s) conducting the initial cleanup.

(c) Restoration time frame and cleanup actions. The department expects that the sediment component of sites and sediment cleanup units ~~with limited contamination~~ will ~~be restored within a single construction season~~ achieve sediment cleanup standards as soon as practicable to minimize impacts to aquatic organisms, habitat, and human health. Recognizing there may be sites where the following expectations are inappropriate, the department expects the likely results of the remedy selection process in WAC 173-204-570 will be as follows:

(i) For sites with a limited areal extent of contamination, the department expects the focus will be on the use of active cleanup actions to achieve sediment cleanup standards quickly and minimize the need for long-term maintenance and monitoring;

or

(ii) For sites with more wide-spread contamination, sediment cleanup standards may not be practicable to achieve using only active cleanup actions. For these types of sites, the department expects the focus will be on the use of active cleanup actions to remove, cap, or treat areas with higher contamination followed by the use of enhanced or monitored natural recovery to achieve sediment cleanup standards as soon as practicable.

~~using active cleanup actions such as dredging or capping. However, the department recognizes longer restoration time frames may be necessary at sites with more extensive or widespread contamination, including sites with ubiquitous chemicals from numerous point and nonpoint source discharges. At such sites, the department expects cleanup actions will include a combination of active and passive cleanup actions and will achieve restoration as soon as practicable following completion of the active cleanup actions.~~

~~(d) Sediment recovery zones. At sites or sediment cleanup units where the cleanup action cannot practicably achieve sediment cleanup standards within ten years after start of the cleanup action, the department expects that a sediment recovery zone will be established and managed in accordance with WAC 173-204-590.~~

~~(e)~~ (d) Compliance monitoring. The department expects that post-cleanup monitoring will be conducted at sites and sediment cleanup units to verify compliance with approved sediment cleanup standards.

(i) Monitoring will typically include analysis of sediment chemistry at a minimum, but may also include bioassays, tissue chemistry, benthic infauna, pore water, and surface water testing.~~, and~~

(ii) ~~more~~ The department expects that, where site-specific circumstances warrant, more discharge monitoring may be required than would normally occur under a discharge permit ~~where circumstances warrant~~.

~~(f)~~ (e) Scope of information. The scope of information needed to adequately characterize different site or sediment cleanup units will vary depending on site conditions and complexity. It is the department's expectation that sufficient information will be gathered in as few sampling events as feasible to enable appropriate decisions and cleanups to proceed expeditiously.

~~(g)~~ (f) Timely decisions. The department shall endeavor to make sediment cleanup decisions in an expeditious manner, as soon as all information required by the department is available, consistent with the availability of department resources and the priority of the cleanup site.

(5) **Relationship between sediment cleanup standards and cleanup actions.** It is the policy of the department to establish sediment cleanup standards and select cleanup actions that support the goal of reducing and ultimately eliminating adverse effects on biological resources and significant health threats to humans from sediment contamination.

(a) Sediment cleanup standards. WAC 173-204-560 establishes requirements for sediment cleanup standards. Sediment cleanup standards consist of sediment cleanup levels for individual contaminants and the locations within the site or sediment cleanup unit where the sediment cleanup levels must be met (points of compliance ~~or biologically active zone~~). Sediment cleanup standards may also include other regulatory requirements that apply to a cleanup action for contaminated sediment because of the type of action and/or location of the site (applicable ~~local, state, and federal~~ laws).

(i) Sediment cleanup level~~s~~. A sediment cleanup level is the concentration or level of biological effects for a contaminant in sediment that is determined by the department to be protective of human health and the environment. The sediment cleanup level is established in accordance with the requirements in WAC 173-204-560(2). The sediment cleanup level is initially established at ~~shall be~~ the sediment cleanup objective and ~~shall~~ may be adjusted upward as ~~required~~ appropriate based on ~~what~~ whether it is technically possible to meet the sediment cleanup objective and whether meeting the sediment cleanup objective will have a net adverse environmental impact on the aquatic environment as specified in WAC 173-204-560 (2)(a)(i)(B) ~~including natural resources and habitat~~. A sediment cleanup level may not be adjusted upward above the cleanup screening level. The sediment cleanup level, in combination with the point of compliance, typically defines the area or volume of sediment at a site or sediment cleanup unit that must be addressed by the cleanup action.

(A) Sediment cleanup objective~~s~~. The sediment cleanup objective defines the goal for protection of human health and environment. This goal is expected to be achieved through a combination of cleanup actions and source control. The sediment cleanup objective is established in accordance with the requirements in WAC 173-204-560(3). If a risk-based concentration is below the natural background level or ~~level that can be reliably measured~~ practical quantitation limit, then the sediment cleanup objective is established at a concentration equal to the practical quantitation limit or natural background, whichever is higher.

(B) Cleanup screening level. The cleanup screening level is established in accordance with the requirements in WAC 173-204-560(4). If a risk-based concentration is below the regional background level or ~~level that can be reliably measured~~ practical quantitation limit, then the cleanup screening level is established at a concentration equal to the practical quantitation limit or regional background, whichever is higher.

(ii) Point~~s~~ of compliance. A point of compliance is the location within the site or sediment cleanup unit where sediment cleanup levels must be achieved. The p~~P~~oint~~s~~ of compliance is~~are~~ established in accordance with the requirements in WAC 173-204-560(6). ~~Points of compliance may be established within the biologically active zone to protect aquatic life or may be established within a different location to protect human health.~~

(b) Cleanup actions. WAC 173-204-570 establishes requirements for cleanup actions for contaminated sediment. The cleanup actions must achieve sediment cleanup standards within the site or sediment cleanup unit, as applicable. Cleanup actions usually consist of a combination of active and passive actions. At sites and sediment cleanup units where there are ongoing sources, the cleanup actions will usually also include source control measures.

(i) Active cleanup actions. Sediment contamination may be addressed by active cleanup actions such as dredging, capping, treatment, and enhanced natural recovery. Active cleanup actions are preferred over passive cleanup actions.

(ii) Passive cleanup actions. When appropriate, p~~P~~assive cleanup actions, such as monitored natural recovery and institutional controls, may be used in combination with active cleanup actions and source control measures to address sediment contamination.

(iii) Source control. Source control measures consist of controlling ongoing sources to limit discharges of contaminants that accumulate in sediment. Source control measures may be ~~necessary~~ required as part of a cleanup action to prevent recontamination of the site or sediment cleanup unit above the sediment cleanup level.

(c) Presumption of protectiveness. Sediment cleanup actions that achieve ~~the~~ sediment cleanup levels at the applicable points of compliance and comply with applicable laws are presumed to be protective of human health and the environment.

(6) **Applicability of new sediment cleanup standards.**

(a) The department shall determine the sediment cleanup standards that apply to a site or sediment cleanup unit based on the rules in effect under this ~~chapter~~ part at the time the department issues a final cleanup action plan or similar decision document as described in WAC 173-204~~-580~~-575.

(b) A site or sediment cleanup unit cleaned up with sediment cleanup standards determined in (a) of this subsection shall not be subject to further cleanup action due solely to subsequent amendments of the requirements in this ~~chapter~~ part governing the establishment of sediment cleanup standards, unless the department determines on a case-by-case basis that the previous cleanup action is no longer sufficiently protective of human health and the environment.

[Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-500, filed 3/27/91, effective 4/27/91.]

NEW SECTION

WAC 173-204-505 Definitions. For purposes of this part, in cases where a definition does not exist in this part or WAC 173-204-200 the definitions in chapter 173-340 WAC will apply unless the context indicates otherwise. For the purpose of this part, the following definitions shall apply:

(1) "Active cleanup action" means ~~those engineered controls~~ a cleanup action requiring physical construction to ~~meet~~ achieve sediment cleanup standards. Active cleanup actions include dredging, capping, treatment, and enhanced natural recovery. Passive cleanup actions such as monitored natural recovery and institutional controls are not active cleanup actions for purposes of sediment cleanup only.

(2) "Applicable ~~local, state, and federal~~ laws" means all legally applicable requirements specified in WAC 173-340-710(3) and those requirements that the department determines, based on the criteria in WAC 173-340-710(4), are relevant and appropriate requirements. Relevant and appropriate requirements may also include those requirements established under local or tribal laws that the department determines meet the criteria in WAC 173-340-710(4).

(3) "Beneficial reuse" means reuse of sediment from the site, or a separated portion of the sediment (such as the gravel

fraction), ~~with low levels of contamination~~ that utilizes the physical characteristics and properties of the sediment ~~to replace~~ in place of other ~~another uncontaminated~~ material without requiring the use of engineered or institutional controls to protect human health or the environment. Examples of beneficial reuse include habitat restoration or enhancement, ~~strip~~ mine reclamation, landfill cover material, ~~aggregate in~~ asphalt or concrete aggregate, or use of organic fines in manufactured topsoil.

(4) "Biologically active zone" means the sediment depth determined by the department where the species critical to the function, diversity, and integrity of the benthic community are located. Metrics such as biomass and abundance may be used to define the vertical extent of the biologically active zone. These species can include endemic and keystone animals, plants, or other species. Abiotic factors such as groundwater upwelling, salt wedges, water temperature, dissolved oxygen, and hyporheic flow can affect the vertical distribution of organisms in the biologically active zone.

(5) "Cleanup action" means any remedial action, except an interim action, taken at a sediment site or sediment cleanup unit to eliminate, render less toxic, stabilize, contain, immobilize, isolate, treat, destroy, or remove ~~contaminated sediment~~ contaminants ~~to achieve~~that complies with sediment cleanup standards and other applicable laws. A remedial action that does not comply with sediment cleanup standards and other applicable laws is an interim action.

(6) "Cleanup screening level" means the maximum allowed concentration of any contaminant and level of biological effects permissible at the site or sediment cleanup unit per procedures in WAC 173-204-560(4) after completion of the cleanup action. Cleanup screening levels are also used to identify and assess the hazard of sites under WAC 173-204-510 and 173-204-520.

(7) "Contaminant" means any hazardous substance ~~or other toxic, radioactive, biological, or deleterious substance~~ that does not occur naturally or occurs at greater than natural background levels.

(8) "Enhanced natural recovery" means a ~~remedy~~ cleanup action that uses human intervention to accelerate the process of natural recovery. An example of enhanced natural recovery is the placement of a thin clean layer of sediment over an area of contaminated sediment to naturally mix with the contaminated sediment and reduce the contaminant concentrations or toxicity followed by a period of monitoring to determine the effectiveness.

(9) "Include" means included, but not limited to.

(10) "Monitored natural recovery" means a cleanup action that is a form of natural recovery that includes regular monitoring of sediment quality, tissue, benthic infauna, and/or biota as appropriate to assess the effectiveness of natural recovery to restore sediment quality.

(11) "Natural background" means the concentration of a hazardous substance consistently present in the environment that has not been influenced by localized human activities. For

example, several metals and radionuclides naturally occur in the bedrock, sediment, and soil of Washington state due solely to the geologic processes that formed these materials and the concentration of these hazardous substances would be considered natural background. Also, low concentrations of some particularly persistent organic compounds such as polychlorinated biphenyls (PCBs) can be found in surficial soils and sediment throughout much of the state due to global distribution of these hazardous substances. These low concentrations would be considered natural background. Similarly, concentrations of various radionuclides that are present at low concentrations throughout the state due to global distribution of fallout from bomb testing and nuclear accidents would be considered natural background.

(12) "Natural recovery" means physical, chemical or biological processes that act, without human intervention, to reduce the toxicity or concentration of contaminated sediment. ~~The most common form~~ An example of natural recovery is the natural deposition of a layer of clean sediment over an area of contaminated sediment resulting in burial over time of contaminated sediment below the biologically active zone. The natural process of sediment mixing, and degradation of some contaminants, such as polycyclic aromatic hydrocarbons, can also contribute to natural recovery.

(13) "Point of compliance" means the locations within a site or sediment cleanup unit where sediment cleanup levels must be met.

(14) "Practicable" means capable of being designed, constructed and implemented in a reliable and effective manner including consideration of cost. When considering cost under this analysis, an alternative shall not be considered practicable if the incremental costs of the alternative are disproportionate to the incremental degree of benefits provided by the alternative over other lower cost alternatives.

(15) "Practical quantitation limit" means the lowest concentration that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability during routine laboratory operating conditions, using department approved methods. When the limit for an analytical method is higher than the concentrations based on protection of human health or the environment, the department may require the use of another method to lower the practical quantitation limit.

(16) "Regional background" means the concentration of a contaminant within a department-defined geographic area that is primarily attributable to diffuse ~~nonpoint~~ sources, such as atmospheric deposition or storm water, not attributable to a specific source or release. See WAC 173-204-560(5) for the procedures and requirements for establishing regional background. ~~Regional background is generally expected to be greater than or equal to natural background, and less than area background as that term is defined in WAC 173-340-200.~~

(17) "Sediment cleanup level" means the concentration or level of biological effects for a contaminant in sediment that

must be achieved and is determined by the department to be protective of human health and the environment under the authority of chapter 70.105D RCW. The sediment cleanup level can be established between the sediment cleanup objective and cleanup screening level ~~is established~~ in accordance with the requirements in WAC 173-204-560(2).

(18) "Sediment cleanup objective" means the goal for protection of human health and the environment and is established under the authority of chapter 70.105D RCW. The sediment cleanup objective is established in accordance with the requirements in WAC 173-204-560(3). Sediment cleanup objectives are also used to identify and assess the hazard of sites under WAC 173-204-510 and 173-204-520.

(19) "Sediment cleanup standard" means the standards adopted under RCW 70.105D.030 (2)(e)~~ a department approved chemical concentration, or level of biological effects, in sediment that must be met within a site or sediment cleanup unit.~~. Establishing sediment cleanup standards requires specification of the following:

(a) The chemical concentration or level of biological effects for a contaminant in sediment that is determined by the department to be protective of human health and the environment (~~"~~sediment cleanup level~~s"~~);

(b) ~~the~~ The location ~~on~~ at the site or sediment cleanup unit where those sediment cleanup levels must be ~~attained~~ achieved (~~"~~point~~s~~ of compliance~~"~~); and

(c) ~~additional~~ Additional regulatory requirements that apply to a cleanup action because of the type of action and/or the location of the site. These requirements are specified in applicable ~~state and federal~~ laws and are generally established in conjunction with the selection of a specific cleanup action.

(20) "Sediment cleanup unit~~(s)~~" means a discrete subdivision~~(s)~~ of ~~((an individual contaminated))~~ a sediment site ~~((that are being evaluated))~~ designated by the department for the purpose of ~~((establishing cleanup standards))~~ expediting cleanups. ~~((Site units are based on consideration of))~~ A sediment cleanup unit may be established based on unique ~~((locational))~~ chemical concentrations or parameters, regional background, environmental, spatial, or contaminant source characteristics, or other ~~((conditions))~~ methods determined appropriate by the department, e.g., development-related cleanups, cleanup under piers, cleanup in eelgrass beds, and cleanup in navigational lanes.

(21) "Sediment recovery zone" means an area ~~((where))~~ ~~established~~ authorized by the department within a site or sediment cleanup unit where the department has determined the cleanup action~~s~~ cannot achieve the applicable sediment ~~((quality))~~ cleanup standards ~~((of WAC 173-204-320 through 173-204-340 are exceeded as a result of historical discharge activities, and authorized by the department as a result of a cleanup decision made pursuant to WAC 173-204-580, Cleanup action decision))~~ within ten years after ~~the start~~ completion of construction of the active components of the cleanup action. Sediment recovery zones must meet the requirements in WAC 173-

204-590 and be authorized by the department under WAC 173-204-~~580~~-575.

~~(40) "Sediment" means particulate matter settled or present as particles on the bed or bottom of a body of water to which biota or humans may potentially be exposed, and the surface water is present in the water body for a minimum of six contiguous weeks on an annual basis and the sediment is located at or below the ordinary high water mark. Sediment includes particulate matter located in the biologically active zone or exposed to the water column by human activity (e.g., dredging), pore water flux, or other hydrological or natural action.~~

(22) "Surface sediment" or "sediment" means settled particulate matter located at or below the ordinary high water mark, where the water is present for a minimum of six consecutive weeks, to which biota (including benthic infauna) or humans may potentially be exposed, including that exposed by human activity (e.g., dredging).

(23) "Technically possible" means capable of being designed, constructed and implemented in a reliable and effective manner, regardless of cost.

[]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-510 ((~~Screening~~)) Identifying sediment station clusters of potential concern. (1) ((~~Using the sediment quality standards inventory of WAC 173-204-350,~~)) **Data analysis.** The department shall analyze ~~the~~ sediment sampling data to identify station clusters of potential concern and station clusters of low concern ((~~per the standards of this section~~)). Station clusters of potential concern shall be further evaluated using the hazard assessment standards of WAC ((~~173-204-530~~)) 173-204-520. Station clusters of low concern shall remain on the inventory and no further cleanup action determinations shall be ((~~taken~~)) made by the department until the stations are reexamined per subsection (5) of this section.

(2) **Station clusters.** A station cluster is defined as any number of stations ((~~from the inventory of WAC 173-204-350~~)) that are determined by the department to be spatially and chemically similar. For the purpose of identifying a station cluster of potential concern ((~~per the procedures of this subsection~~)), three stations with the highest ~~contaminant~~ chemical concentration for any particular ~~contaminant~~ chemical or the highest degree of biological effects as identified in WAC ((~~173-204-520~~)) 173-204-562 ~~and~~ or 173-204-563, as applicable are selected from a station cluster. This procedure may be

repeated for multiple chemicals ((~~identified in WAC 173-204-520~~)), recognizing that the three stations with the highest concentration for each particular ~~contaminant~~ chemical may be different and the respective areas for all chemicals may overlap. The department shall ((~~review the inventory of WAC 173-204-350 to~~)) identify station clusters of potential concern ((~~via the following~~)) using the process((~~:~~)) specified in this subsection.

(a) Identify, if available, the three stations within a station cluster with the highest concentration of each chemical ~~contaminant~~ identified in WAC ((~~173-204-520, Cleanup screening levels criteria; and~~)) 173-204-562 ~~and~~ or 173-204-563, as applicable.

((~~(b)~~)) (i) For each ~~contaminant~~ chemical identified in (a) of this subsection, determine the average concentration for the ~~contaminant~~ chemical at the three stations identified ((~~in (a) of this subsection; and~~)).

((~~(c) Identify if available, three stations within the station cluster with the highest level of biological effects for the biological tests identified in WAC 173-204-315(1); and~~

~~(d)~~)) (ii) If the average chemical ~~contaminant~~ concentration for any three stations identified in (a) of this subsection((~~,~~)) exceeds the applicable cleanup screening level in WAC ((~~173-204-520~~)) 173-204-562 ~~and~~ or 173-204-563, then the station cluster ((~~is~~)) shall be defined as a station cluster of potential concern((~~; and~~)).

((~~(e)~~)) (b) Identify, if available, three stations within the station cluster with the highest level of biological effects for the biological tests identified in WAC 173-204-562 ~~and~~ or 173-204-563, as applicable. If the level of biological effects at each of the three stations from ((~~(c) of~~)) ~~(b) of~~ this subsection exceeds the applicable cleanup screening level in WAC ((~~173-204-520~~)) 173-204-562 ~~and~~ or 173-204-563, then the station cluster ((~~is~~)) shall be defined as a station cluster of potential concern((~~; and~~)).

((~~(f) If neither of the conditions of (d) or (e) of this subsection apply, then the station cluster is defined as a station cluster of low concern; and~~

~~(g)~~)) (c) If the department determines that ((~~any~~)) each of three stations within a station cluster exceed the ((~~sediment cleanup screening~~)) following criteria, then the station cluster shall be defined as a station cluster of potential concern:

(i) The applicable human health and regional background cleanup screening levels ((~~human health or background criteria or~~)) in WAC 173-204-560(4);

(ii) The other toxic, radioactive, biological, or deleterious substances criteria in WAC 173-204-562 ~~and~~ or 173-204-563, as applicable; or

(iii) The nonanthropogenically affected criteria of WAC ((~~173-204-520, then the station cluster is defined as a station cluster of potential concern~~)) 173-204-562 ~~and~~ or 173-204-563, as applicable.

(d) If ~~neither~~ none of the conditions of (a) through ~~(ii), or (b)(i) or~~ (c) of this subsection apply, then the station cluster ~~is~~ shall be defined as a station cluster of low concern.

(3) **Notification.** When a station cluster of potential concern has been identified, the department shall issue notification, as appropriate, to the landowners, lessees, onsite dischargers, adjacent dischargers, and other persons determined appropriate by the department ~~prior to~~if the ~~department's conducting a~~ hazard assessment as defined in WAC 173-204-530(3) results in identification of a cleanup site.

(4) **No further cleanup action.** No further cleanup action determinations shall be taken with station clusters of low concern until ((~~the inventory of WAC 173-204-350 is updated~~)) new information is available and the stations reexamined per subsection (5) of this section. Station clusters of low concern shall receive no further consideration for active cleanup, unless new information indicates an increase of chemical contamination at the stations in question. Station clusters of low concern shall be evaluated by the department for improved source control and/or monitoring requirements of this ((~~chapter~~)) part.

(5) **Reevaluation.** The department may at any time reexamine a station or group of stations to reevaluate and identify station clusters of potential concern following the procedures of subsection (2) of this section when new information demonstrates to the department's satisfaction that reexamination actions are necessary to fulfill the purposes of WAC 173-204-500 through 173-204-590.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-510, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-510, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-520 ((~~Cleanup screening levels criteria.~~)) Sediment cleanup levels based on protection of the benthic community in marine and low salinity sediment. (1) **Applicability.**

((~~(a) The marine sediment cleanup screening levels chemical criteria, and the marine sediment biological effects criteria, and the marine sediment other toxic, radioactive, biological, or deleterious substance criteria, and the marine sediment nonanthropogenically affected criteria of this section~~)) This section defines sediment cleanup objectives and cleanup screening levels for contaminants based on protection of the benthic community in marine and low salinity sediment. They are used to:

(a) Identify and assess the hazard of sites under WAC 173-204-510 and 173-204-520;

(b) Establish sediment cleanup levels for sites and sediment cleanup units under WAC 173-204-560.

(2) **Marine sediment - Chemical criteria.** The chemical concentration criteria in Table ~~IV~~ III establish the sediment cleanup objectives and cleanup screening levels chemical criteria for marine sediment. The criteria of this section shall apply to marine sediments ((~~within Puget Sound~~)) for toxicity to the benthic community.

(a) The sediment cleanup objectives of this section establish a no adverse effects level, including no acute or chronic adverse effects, to the benthic community. Chemical concentrations at or below the sediment cleanup objectives correspond to sediment quality that results in no adverse effects to the benthic community.

(b) The cleanup screening levels of this section establish a minor adverse effects level, including acute or chronic effects, ~~on~~ to the benthic community. Chemical concentrations at or below the cleanup screening level but greater than the sediment cleanup objective correspond to sediment quality that results in minor adverse effects to the benthic community. The marine chemical and biological cleanup screening levels establish minor adverse effects as the level above which station clusters of potential concern are defined and may be defined as potential cleanup sites for benthic community toxicity, and at or below which station clusters of low concern are defined, per the procedures identified in WAC 173-204-510((~~(2)~~)) and 173-204-520. ((~~The cleanup screening levels also establish the levels above which station clusters of potential concern are defined as cleanup sites, per the procedures identified in WAC 173-204-530,~~

~~Hazard assessment. The criteria in Table III and this section also establish minor adverse effects as the Puget Sound marine sediment minimum cleanup level to be used in evaluation of cleanup alternatives per the procedures of WAC 173-204-560, and selection of a site cleanup standard(s) per the procedures of WAC 173-204-570.~~

~~(b) Non-Puget Sound marine sediment cleanup screening levels and minimum cleanup levels criteria. Reserved: The department shall determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this chapter.~~))

(c) The cleanup screening level chemical criteria is exceeded when the sediment chemical concentration for an individual chemical is above the cleanup screening level in Table ~~IV~~III.

(d) The sediment cleanup objective chemical criteria is exceeded when the sediment chemical concentration for one or more chemicals is above the sediment cleanup objective in Table ~~IV~~III.

(e) Low salinity sediment cleanup screening levels ((~~and minimum cleanup levels~~)) criteria. Reserved: The department shall determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this ((~~chapter~~)) part.

((~~(d) Freshwater sediment cleanup screening levels and minimum cleanup levels criteria. Reserved: The department shall determine on a case-by-case basis the criteria, methods,~~

~~and procedures necessary to meet the intent of this chapter.~~

~~(2) Puget Sound marine sediment cleanup screening levels and minimum cleanup levels chemical criteria. The chemical concentration criteria in Table III establish the Puget Sound marine sediment cleanup screening levels and minimum cleanup levels chemical criteria.~~

~~(a)~~)) (f) For purposes of this section, where ~~laboratory~~ chemical ~~analysis~~ analyses indicates a chemical is not detected in a ((~~sediment~~)) sample, the method detection limit and the practical quantitation limit shall be reported and shall be at or below the ((~~Marine~~)) sediment ((~~Quality Standards~~)) cleanup objectives chemical criteria ((~~value set~~)) in ((~~WAC 173-204-320(2)~~)) Table ~~IV~~III.

((~~(b)~~)) (g) Where chemical criteria in ((~~this~~)) Table ~~IV~~III represent the sum of individual compounds or isomers, the following methods shall be applied:

(i) Where chemical analyses identify an undetected value for every individual compound/isomer, then the single highest detection limit shall represent the sum of the respective compounds/isomers; and

(ii) Where chemical analyses detect one or more individual compound/isomers, only the detected concentrations will be added to represent the group sum.

((~~(c)~~)) (h) For some chemical criteria in Table ~~IV~~III, the listed ((~~chemical parameter~~)) criteria represent concentrations in parts per million((~~,~~)) "normalized((~~,~~))" or expressed((~~,~~)) on a total organic carbon basis. To normalize to total organic carbon, the dry weight concentration for each parameter is divided by the decimal fraction representing the percent total organic carbon content (e.g., 0.01 means 1 percent) of the sediment per the equation: ppm OC = (ppb dry weight)/(percent total organic carbon x 1000).

((~~(d)~~)) (i) The LPAH criterion in Table ~~IV~~III represents the sum of the following "low molecular weight ~~polynuclear~~ polycyclic aromatic hydrocarbon" compounds: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, and Anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds as listed.

((~~(e)~~)) (j) The HPAH criterion in Table ~~IV~~III represents the sum of the following "high molecular weight ~~polynuclear~~ polycyclic aromatic hydrocarbon" compounds: Fluoranthene, Pyrene, Benz(a)anthracene, Chrysene, Total Benzofluoranthenes, Benzo(a)pyrene, Indeno(1,2,3,-c,d)pyrene, Dibenzo(a,h)anthracene, and Benzo(g,h,i)perylene. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.

((~~(f)~~)) (k) The ((~~TOTAL BENZOFLUORANTHENES~~)) total benzofluoranthenes criterion in Table ~~IV~~III represents the sum of the concentrations of the "B," "J," and "K" isomers.

Table ((~~III~~)) ~~IV~~III

((~~Puget Sound~~)) Marine Sediment

Sediment Cleanup Objectives and

Cleanup Screening Levels

((~~and~~

~~Minimum Cleanup Levels--~~))

Chemical Criteria

((~~CHEMICAL PARAMETER~~	~~MG/KG DRY WEIGHT (PARTS PER MILLION (PPM) DRY)~~
~~ARSENIC~~	~~93~~
~~CADMIUM~~	~~6.7~~
~~CHROMIUM~~	~~270~~
~~COPPER~~	~~390~~
~~LEAD~~	~~530~~
~~MERCURY~~	~~0.59~~
~~SILVER~~	~~6.1~~
~~ZINC~~	~~960~~

~~CHEMICAL PARAMETER~~	~~MG/KG ORGANIC CARBON (PPM CARBON)~~
~~LPAH~~	~~780~~
~~NAPHTHALENE~~	~~170~~
~~ACENAPHTHYLENE~~	~~66~~
~~ACENAPHTHENE~~	~~57~~
~~FLUORENE~~	~~79~~
~~PHENANTHRENE~~	~~480~~
~~ANTHRACENE~~	~~1200~~
~~2-METHYLNAPHTHALENE~~	~~64~~
~~HPAH~~	~~5300~~
~~FLUORANTHENE~~	~~1200~~
~~PYRENE~~	~~1400~~
~~BENZ(A)ANTHRACENE~~	~~270~~
~~CHRYSENE~~	~~460~~
~~TOTAL BENZOFLUORANTHENES~~	~~450~~
~~BENZO(A)PYRENE~~	~~210~~
~~INDENO (1,2,3, C,D) PYRENE~~	~~88~~

~~DIBENZO (A,H) ANTHRACENE~~	~~33~~
~~BENZO(G,H,I)PERYLENE~~	~~78~~
~~1,2-DICHLOROBENZENE~~	~~2.3~~
~~1,4-DICHLOROBENZENE~~	~~9~~
~~1,2,4-TRICHLOROBENZENE~~	~~1.8~~
~~HEXACHLOROBENZENE~~	~~2.3~~
~~DIMETHYL PHTHALATE~~	~~53~~
~~DIETHYL PHTHALATE~~	~~110~~
~~DI-N-BUTYL PHTHALATE~~	~~1700~~
~~BUTYL BENZYL PHTHALATE~~	~~64~~
~~BIS (2-ETHYLHEXYL) PHTHALATE~~	~~78~~
~~DI-N-OCTYL PHTHALATE~~	~~4500~~
~~DIBENZOFURAN~~	~~58~~
~~HEXACHLOROBUTADIENE~~	~~6.2~~
~~N-NITROSODIPHENYLAMINE~~	~~11~~
~~TOTAL PCB'S~~	~~65~~

~~CHEMICAL PARAMETER~~	~~UG/KG DRY WEIGHT (PARTS PER BILLION (PPB) DRY)~~
~~PHENOL~~	~~1200~~
~~2-METHYLPHENOL~~	~~63~~
~~4-METHYLPHENOL~~	~~670~~
~~2,4-DIMETHYL PHENOL~~	~~29~~
~~PENTACHLOROPHENOL~~	~~690~~
~~BENZYL ALCOHOL~~	~~73~~
~~BENZOIC ACID~~	~~650~~))

Chemical Parameter	**mg/kg Dry Weight (Parts per Million (ppm) Dry Weight)**	**mg/kg Dry Weight (Parts per Million (ppm) Dry Weight)**
	Sediment Cleanup Objective	**Cleanup Screening Level**
Arsenic	57	93
Cadmium	5.1	6.7
Chromium	260	270
Copper	390	390

Lead	450	530
Mercury	0.41	0.59
Silver	6.1	6.1
Zinc	410	960
Chemical Parameter	**mg/kg Organic Carbon (ppm carbon)**	**mg/kg Organic Carbon (ppm carbon)**
	Sediment Cleanup Objective	**Cleanup Screening Level**
LPAH	370	780
Naphthalene	99	170
Acenaphthylene	66	66
Acenaphthene	16	57
Fluorene	23	79
Phenanthrene	100	480
Anthracene	220	1200
2-Methyln-~~N~~aphthalene	38	64
HPAH	960	5300
Fluoranthene	160	1200
Pyrene	1000	1400
Benz(a)anthracene	110	270
Chrysene	110	460
Total Benzofluoranthenes	230	450
Benzo(a)pyrene	99	210
Indeno(1,2,3 c,d) Pyrene	34	88
Dibenzo (a,h) Anthracene	12	33
Benzo (g,h,i) Perylene	31	78
1,2 Dichlorobenzene	2.3	2.3
1,4 Dichlorobenzene	3.1	9
1,2,4 Trichlorobenzene	0.81	1.8
Hexachlorobenzene	0.38	2.3
Dimethyl Phthalate	53	53
Diethyl Phthalate	61	110

Di-n-butyl Phthalate	220	1700
Butyl Benzyl Phthalate	4.9	64
Bis (2-ethylhexyl) Phthalate	47	78
Di-n-octyl Phthalate	58	4500
Dibenzofuran	15	58
Hexachlorobutadiene	3.9	6.2
N-Nitrosodiphenylamine	11	11
Total PCBs	12	65
	ug/kg Dry Weight (Parts per Billion (ppb) Dry Weight)	**ug/kg Dry Weight (Parts per Billion (ppb) Dry Weight)**
Phenol	420	1200
2-Methylphenol	63	63
4-Methylphenol	670	670
2,4 Dimethyl Phenol	29	29
Pentachlorophenol	360	690
Benzyl Alcohol	57	73
Benzoic Acid	650	650

(3) **((~~Puget Sound~~)) Marine sediment ((~~cleanup screening levels and minimum cleanup level~~)) - Biological criteria.** The biological effects criteria ((~~of this subsection~~)) in Table ~~V~~ IV establish the ((~~Puget Sound~~)) marine sediment cleanup objectives and cleanup screening ((~~level, and the Puget Sound marine sediment minimum cleanup level criteria.~~

~~(a) The acute and chronic effects biological tests of WAC 173-204-315(1) shall be used to:~~

~~(i) Identify the Puget Sound marine sediment cleanup screening level for the purpose of screening sediment station clusters of potential concern using the procedures of WAC 173-204-510(2); and~~

~~(ii) Identify the Puget Sound marine sediment cleanup screening level for the purpose of identifying station clusters of low concern and/or cleanup sites using the hazard assessment procedures of WAC 173-204-530(4); and/or~~

~~(iii) Identify the Puget Sound marine sediment minimum cleanup level to confirm minimum cleanup level determinations using the procedures of WAC 173-204-570(3).~~

~~(b) When using biological testing to determine if station clusters exceed the cleanup screening level or to identify the minimum cleanup level for a contaminated site, test results from at least two acute effects tests and one chronic effects test shall be evaluated.~~

~~(c) The biological tests shall not be considered valid unless test results for the appropriate control and reference sediment samples meet the performance standards described in WAC 173-204-315(2).~~

~~(d)~~)) levels. The criteria of this section shall apply to marine sediments for toxicity to the benthic invertebrate community.

(a) The sediment cleanup objectives of this section establish a no adverse effects level, including acute or chronic adverse effects, to the benthic community. The sediment cleanup objective biological criteria for a sampling station is exceeded when one of the biological test results is above the sediment cleanup objective as described in Table ~~V~~IV.

(b) The cleanup screening levels of this section establish a minor adverse effects level, including acute or chronic adverse effects, to the benthic community. The cleanup screening level ((~~and minimum cleanup level~~)) biological criteria for a sampling station is exceeded when:

(i) Any two of the biological test((~~s~~)) results for a sampling station exceed the ((~~criteria of WAC 173-204-320(3); or one of the following test determinations is made:~~

~~(i) (A) Amphipod: The test sediment has a higher (statistically significant, t test, p<0.05) mean mortality than the reference sediment and the test sediment mean mortality is greater than a value represented by the reference sediment mean mortality plus thirty percent.~~

~~(ii) (B) Larval: The test sediment has a mean survivorship of normal larvae that is less (statistically significant, t test, p<0.05) than the mean normal survivorship in the reference sediment and the test sediment mean normal survivorship is less than seventy percent of the mean normal survivorship in the reference sediment (i.e., the test sediment has a mean combined abnormality and mortality that is greater than thirty percent relative to time-final in the reference sediment).~~

~~(iii) (C) Benthic abundance: The test sediment has less than fifty percent of the reference sediment mean abundance of any two of the following major taxa: Class Crustacea, Phylum Mollusca or Class Polychaeta and the test sample abundances are statistically different (t test, p<0.05) from the reference abundances.~~

~~(iv) (D) Juvenile polychaete: The test sediment has a mean~~

~~individual growth rate of less than fifty percent of the reference sediment mean individual growth rate and the test sediment mean individual growth rate is statistically different (t test, p<0.05) from the reference sediment mean individual growth rate.~~

~~(4) Puget Sound marine sediment cleanup screening levels and minimum cleanup levels human health criteria. Reserved: The department may determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this chapter.~~

~~(5) Puget Sound marine sediment cleanup screening levels and minimum cleanup levels~~)) sediment cleanup objective in Table ~~V~~IV; or

(ii) One of the biological test results for a sampling station exceeds the cleanup screening level in Table ~~V~~IV.

(c) The acute and chronic effects biological tests of Table ~~VI~~ V shall be used to:

(i) Confirm designation of marine sediments for benthic community toxicity. The department may require, or any person may perform, biological testing to confirm the designation of marine sediment which either passes or fails the chemical criteria established in subsection (2) of this section. If required, the sediment shall be tested using the procedures in (d) of this subsection~~.~~ ; and

(ii) Establish the marine sediment cleanup objective and cleanup screening level for identifying sediment station clusters of potential concern for benthic community toxicity using the procedures of WAC 173-204-510(2); and

(iii) Establish the marine sediment cleanup objective or cleanup screening level for identifying station clusters of low concern using the procedures of WAC 173-204-510(2).

(d) To designate sediment quality using biological criteria, a minimum of the following shall be included in the suite of biological tests for each sediment sample as described in Table ~~VI~~V:

(i) Two acute effects tests; and

(ii) One chronic test.

(e) The appropriate control and reference sediment samples shall meet the performance standards described in Table ~~V~~IV. Selection and use of reference sediment must be approved by the department ~~and shall meet the performance standards of Table VI~~. The department may approve a different performance standard based on latest scientific knowledge.

(f) Use of alternate biological tests may be required by the department and shall be subject to the review and approval of the department under WAC 173-204-130(4).

(g) Any person who designates test sediments using the procedures of this section shall meet the sampling and testing plan requirements of WAC 173-204-600 and records management requirements of WAC 173-204-610. Test sediments designated using the procedures of this section shall be sampled and analyzed using methods approved by the department, and shall use an appropriate quality assurance/quality control program, as determined by the department.

(4) **Marine sediment - Other toxic, radioactive, biological, or deleterious substances criteria.** "Other toxic, radioactive, biological, or deleterious substances" means substances not specified in Table ~~IV~~III, that are in, or on, sediments. They shall be at or below levels which cause minor adverse effects in marine biological resources((~~, or which correspond to a significant health risk to humans, as determined by the department~~)). The department shall determine on a case-by-case basis ((~~the~~)) other criteria, methods, and procedures, such as using the biological criteria of subsection (3)(a) through (g) of this subsection, necessary to meet the intent of this ((chapter)) part.

((~~(6) Puget Sound marine sediment cleanup screening levels and minimum cleanup levels nonanthropogenically affected sediment criteria. Whenever the nonanthropogenically affected sediment quality is of a lower quality (i.e., higher chemical concentrations, higher levels of adverse biological response, or posing a higher threat to human health) than the applicable cleanup screening levels or minimum cleanup levels criteria established under this section, the existing sediment chemical and biological quality shall be identified on an area-wide basis as determined by the department, and used in place of the standards of WAC 173-204-520.~~))

Table ~~V~~IV

Marine S~~s~~ediment C~~c~~leanup O~~o~~bjectives and C~~c~~leanup S~~s~~creening L~~l~~evels Biological Criteria, ~~and performance standards for each biological test~~

Biological Test/Endpoint	Performance Standard Control	Performance Standard Reference	Sediment Cleanup Objective for each biological test	Cleanup Screening Level for each biological test
Amphipod				
10-day Mortality	$M_C \leq 10\%$	$M_R \leq 25\%$	$M_T > 25\%$ Absolute and M_T vs M_R SD (p ~~=~~ ≤ 0.05)	$M_T - M_R \geq 30\%$ and M_T vs M_R SD (p ~~=~~ ≤ 0.05)
Larval				
Bivalve or Echinoderm Abnormality/Mortality	$N_C / I \geq 0.70$	$N_R/N_C \geq 0.65$	~~$N_T / N_R < 0.85$ and N_T vs. N_R~~ $(N_R - N_T) /N_C > 0.15$ and N_T/N_C vs N_R/N_C SD (p ~~=~~ ≤ 0.10)	~~$N_T / N_R > 0.70$ and N_T vs. N_R~~ $(N_R - N_T) /N_C > 0.30$ and N_T/N_C vs N_R/N_C SD (p ~~=~~ ≤ 0.10)
Juvenile Polychaete				
***Neanthes* ~~28~~ 20-day Growth**	$M_C \leq 10\%$ and $MIG_C \geq 0.72$ mg/individual/day (or case-by-case)	$MIG_R /MIG_C \geq 0.80$	$MIG_T /MIG_R \leq 0.70$ and MIG_T vs MIG_R SD (p ~~=~~ ≤ 0.05)	$MIG_T /MIG_R \leq 0.50$ and MIG_T vs MIG_R SD (p ~~=~~ ≤ 0.05)
Microtox				
Microtox Decreased Luminescence	case-by-case	case-by-case	$ML_T /ML_R \leq 0.80$ and ML_T vs ML_R SD ($p = 0.05$)	
Benthic Abundance				
Benthic Abundance	See Table IV legend		$A_T/A_R < 0.50$ For any one of three major taxa Class Crustacea, Phylum Mollusca, or Class Polychaeta	$A_T/A_R < 0.50$ For any two of three major taxa Class Crustacea, Phylum Mollusca, or Class Polychaeta

Table ~~V~~ IV Explanatory Notes:

A = Abundance;

AFDW = Ash free dry weight;

C = Control;

R = Reference;

T = Test;

I = Initial count;

M = Mortality;

N = Normal survivorship expressed as actual counts;

MIG = Mean individual growth rate expressed in mg/ind/day AFDW;

ML = Mean light output;

SD = Statistically significant~~ly different~~ difference;

~~BLD = Blank Corrected Light Decrease; F = Final~~

An exceedance of the criteria requires a statistically ~~significance~~ significant difference at p = ≤ 0.05 for Amphipod, Juvenile Polychaete, Microtox tests;

An exceedance of the criteria requires a statistically ~~significance~~ significant difference at p = ≤ 0.10 for the Larval tests.

Benthic Abundance: The reference benthic macroinvertebrate assemblage should be representative of areas removed from significant sources of contaminants and, to the extent possible, have the following characteristics:

(1) The taxonomic richness of benthic macroinvertebrates and the abundances of higher taxonomic groups that reflect seasonality and natural, physical, and chemical conditions (e.g., grain size composition, salinity of sediments, water depth) in a reference area and not be obviously depressed as a result of chemical toxicity;

(2) Normally abundant species that are known to be sensitive to chemical contaminants are present;

(3) Normally rare species that are known to become abundant only under chemically disturbed conditions are rare or absent; and

(4) The abundances of normally rare species that control benthic community structure through physical modification of the sediment are similar to those observed at the test sediment site.

Table V~~I~~V

Types of Marine Sediment Biological Tests, Species, and Applicable Endpoints.

Species/Class, biological test, and endpoint	Acute effects biological test	Chronic effects biological test
Amphipod: *Rhepoxynius abronius, Ampelisca abdita, Eohaustorius estuarius* 10-day Mortality	X	
Larval: *Crassostrea gigas* (Pacific oyster), *Mytilus (edulis) galloprovincialis* (Blue mussel), *Strongylocentrotus purpuratus* (Purple sea urchin), *Dendraster excentricus* (Sand dollar) Mortality/Abnormality	X	
Juvenile Polychaete: *Neanthes arenaceodentata*		

~~28~~ 20-day Growth	X
Microtox: *Vibrio fisheri*	
15-minute exposure; Decreased luminescence	X
Benthic Infauna: Class Crustacea, Polychaeta, Phylum Mollusca	X

(5) Low salinity sediment cleanup screening levels criteria. Reserved: The department shall determine on a case-by-case basis the criteria, methods, and procedures necessary to meet the intent of this ~~chapter~~ part.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-520, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-520, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-530 Hazard assessment and site identification. (1) **Purpose.** A hazard assessment shall be performed to gather existing and available information to further characterize each station cluster of potential concern identified per WAC 173-204-510.

(2) **Hazard assessment requirements.** ((~~Onsite~~)) On-site dischargers, lessees, landowners, and adjacent dischargers shall submit, upon the department's request, all existing and

available information or, if determined necessary by the department, shall perform sampling for a known or suspected release that would enable the department to:

(a) Determine the concentration and/or areal extent and depth of sediment contamination at the station cluster of potential concern by:

(i) Identifying the contaminants exceeding the applicable sediment ((~~quality standards~~)) cleanup objectives of WAC ((~~173-204-320 through 173-204-340~~)) 173-204-562 ~~and~~ or 173-204-563;

(ii) Identifying individual stations within the station cluster of potential concern ((~~which exceed~~)) exceeding the applicable sediment cleanup screening levels ((~~criteria~~)) of WAC ((~~173-204-520~~)) 173-204-562 ~~and~~ or 173-204-563;

(iii) Identifying the level of toxicity to the applicable biological test organisms of WAC ((~~173-204-320 through 173-204-340~~)) 173-204-562 ~~and~~ or 173-204-563;

(iv) Determining where the applicable sediment ((~~quality standards~~)) cleanup objectives of WAC ((~~173-204-320 through 173-204-340~~)) 173-204-562 ~~and~~ or 173-204-563, for any given ~~contaminant~~chemical, is met;

(v) Determining if concentrations of chemicals exist that ((~~potentially present a significant threat to human health~~)) exceed applicable cleanup screening levels of WAC 173-204-560; and

(vi) Defining the location where the ((~~minimum cleanup~~)) cleanup screening level as defined in WAC ((~~173-204-570~~)) 173-204-560 is not met.

(b) Identify and characterize the present and historic source or sources of the contamination((~~.~~));

(c) Identify the location of sediment impact zones authorized under WAC 173-204-415((~~.~~));

(d) Identify sensitive resources in the vicinity of the station cluster of potential concern((~~.~~));

(e) ((~~Provide~~)) Compile other information as determined necessary by the department for ((~~ranking~~)) evaluating sites under WAC ((~~173-204-540.~~

~~(3) The department shall also~~)) 173-204-530~~.~~ ; and

(f) Compile existing and available information from other federal, state, and local governments ((~~that pertain to the topics in subsection (2) of this section~~)).

((~~(4)~~)) (3) **Identification of cleanup sites.** To identify cleanup sites, the department shall use all available information of acceptable quality gathered from the hazard assessment to evaluate station clusters of potential concern identified pursuant to WAC 173-204-510(2). For the purpose of identifying a cleanup site per the procedures of this subsection, three stations with the highest ~~contaminant~~ chemical concentration for any particular ~~contaminant~~ chemical or the highest degree of biological effects as identified in WAC ((~~173-204-520~~)) 173-204-562 ~~and~~ or 173-204-563, as applicable, are selected from a station cluster of potential concern. This procedure may be repeated for multiple chemicals ((~~identified in WAC 173-204-520,~~)) recognizing that the three stations with the highest concentration for each particular ~~contaminant~~ chemical may be different and the respective areas for all chemicals may overlap. The department shall review the list of station clusters of potential concern to identify cleanup sites via the following process:

(a) ((~~Identify if available, three stations within the station cluster of potential concern with the highest level of biological effects for the biological tests identified in WAC 173-204-315(1).~~

~~(b)~~)) Station clusters of potential concern ((~~where the level of biological effects for any three stations within the station cluster of potential concern exceeds the cleanup screening levels of WAC 173-204-520(3)~~)) that meet the conditions in WAC 173-204-510 (2)(a)(ii) or (b)~~(i)~~ shall be defined as cleanup sites((~~.~~

~~(c) Identify if available, the three stations within a station cluster of potential concern with the highest concentration of each chemical contaminant identified in WAC 173-204-520, Cleanup screening levels criteria.~~)) if concentrations are above the regional background cleanup screening level in WAC 173-204-560(4), as applicable;

(b) For the purpose of identifying a cleanup site per the procedures of this subsection, stations that meet the biological standards of WAC ((~~173-204-520(3)~~)) 173-204-562(3) ~~through~~ or 173-204-563(3), as applicable, shall not be included in the evaluation of chemical contaminant concentrations((~~.~~

~~(d) For each contaminant identified in (c) of this subsection, determine the average concentration for the~~

~~contaminant at the three stations identified in (c) of this subsection.~~

~~(e) Station clusters of potential concern for which any average chemical concentration identified in (d) of this subsection exceeds the cleanup screening level chemical criteria of Table III shall be defined as cleanup sites.~~

~~(f)~~)) for benthic community toxicity~~.~~;

(c) After completion of the hazard assessment, if ((~~neither of~~)) the conditions of (a) or (b) ((~~or (c)~~)) of this subsection do not apply, then the station cluster is defined as a station cluster of low concern~~((.~~

~~(g) Station clusters of potential concern where))~~ for benthic community toxicity~~.~~; and

(d) If the department determines that ((~~any~~)) each of three stations within the station cluster of potential concern exceed any one of the ((~~sediment cleanup screening levels human health criteria or~~)) following criteria, then the station cluster of potential concern may be defined as a cleanup site or area for potential further investigation:

(i) The applicable human health and regional background cleanup screening levels ~~human health and background criteria~~ in WAC 173-204-560(4);

(ii) T~~t~~he other toxic, radioactive, biological, or deleterious substances criteria in WAC 173-204-562 or 173-204-563, as applicable; or

(iii) The nonanthropogenically affected criteria of WAC 173-204-562 ~~and~~ or 173-204-563, as applicable((~~173-204-520,~~

~~shall~~ ~~may be defined as cleanup sites or areas for potential further investigation~~)).

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-530, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-530, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending Order 90-41, filed 3/27/91, effective 4/27/91)

WAC 173-204-540 ((~~Ranking~~)) Evaluation and ((~~list~~)) listing of sites. (1) **Purpose.** The department shall prepare and maintain a list of contaminated sediment sites in the order of their relative ((~~hazard ranking~~)) risk to human health and the environment. From this list, the department shall select sites where action shall be taken.

(2) **Site ((~~ranking~~)) evaluation.** The department shall evaluate each sediment cleanup site identified by the procedures in WAC ((~~173-204-530~~)) 173-204-520 on a consistent basis using ((~~the procedure described in *Sediment Ranking System ("SEDRANK")*, *January 1990*, and all additions and revisions thereto or other~~)) procedures approved by the department. The purpose of ((~~ranking~~)) the evaluation is to estimate, based on technical information compiled during the hazard assessment procedures in

WAC ((~~173-204-530~~)) 173-204-520, the relative potential risk posed by the site to human health and the environment. Information obtained during the hazard assessment, ((~~plus any additional data specified in "SEDRANK,"~~)) shall be included in the site ((~~hazard ranking~~)) evaluation.

(3) **Considerations in ((~~ranking~~)) site evaluation.** In conducting sediment site ((~~ranking~~)) evaluations, the department shall assess both human health hazard and ecological hazard, and consider chemical toxicity, affected resources, and site characteristics for both types of hazards. The department shall also use best professional judgment and other information as necessary on a case-by-case basis to conduct site ((~~ranking~~)) evaluations.

(4) **Site ((~~reranking~~)) reevaluations.** The department may, at its discretion, ((~~rerank~~)) reevaluate a site. To ((~~rerank~~)) reevaluate a site, the department shall use any additional information within the scope of the ((~~hazard ranking~~)) evaluation criteria and best professional judgment to establish that a significant change ((~~in rank~~)) should result.

(5) **((~~List~~)) Listing of ((~~ranked~~)) sites.**

(a) Contaminated sediment sites ((~~that are ranked via "SEDRANK"~~)) shall be placed on a list ((~~in the order of their relative hazard ranking~~)). The list shall describe the current status of cleanup action at each site ((~~and be updated on an annual basis. The department may change a site's status to reflect current conditions on a more frequent basis. The status for each site shall be identified as one or more of the~~

~~following:~~

~~(i) Sites awaiting cleanup action;~~

~~(ii) Sites where voluntary, incidental, partial or department initiated cleanup actions, as defined in WAC 173-204-550, are in progress;~~

~~(iii) Sites where a cleanup action has been completed and confirmational monitoring is underway;~~

~~(iv) Sites with sediment recovery zones authorized under WAC 173-204-590; and/or~~

~~(v) Other categories established by the department~~)).

(b) The department shall routinely publish and make the list available to be used in conjunction with a review of ongoing and proposed regulatory actions to determine where and when a cleanup action should be taken. The department shall also make the list available to landowners and dischargers at or near listed sites, and to the public.

(6) **Site delisting.**

(a) The department may remove a site from the list only after it has determined that:

(i) All cleanup actions, ~~including~~ ~~except~~ except confirmational monitoring ((~~have been completed and compliance with the site cleanup study and report~~)) and all other actions required in the cleanup action plan or equivalent document under WAC 173-204~~-580~~-575, have been completed and all sediment cleanup ((~~standard(s) has~~)) standards have been achieved; or

(ii) The listing of the site was erroneous.

(b) A site owner or operator may request that a site be removed from the list by submitting a petition to the department. The petition shall state the reason for the site delisting request, and as determined appropriate by the department, shall include thorough documentation of all investigations performed, all cleanup actions taken, and all compliance monitoring data and results to demonstrate to the department's satisfaction that the ((~~site~~)) sediment cleanup standards have been achieved. The department may require payment of costs incurred((~~, including an advance deposit,~~)) for review and verification of the work performed. The department shall review such petitions, however the timing of the review shall be at its discretion and as resources may allow.

(c) The department shall maintain a record of sites that have been removed from the list under (a) of this subsection. This record shall be made available to the public on request.

(d) The department shall provide public notice and an opportunity to comment when the department proposes to remove a site from the list.

(7) **Site relisting ((~~of sites~~)).** The department may relist a site which has previously been removed if it determines that the site requires further cleanup action.

(8) ((~~**Delisting notice.** The department shall provide public notice and an opportunity to comment when the department proposes to remove a site from the list.~~

~~(9)~~)) **Relationship to hazardous sites list.** The department may additionally evaluate cleanup sites on the site list developed under subsection (5) of this section for possible inclusion on the hazardous sites list published under WAC 173-340-330.

[Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-540, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending Order 90-41, filed 3/27/91, effective 4/27/91)

WAC 173-204-550 Types of cleanup and authority. (1) **Purpose.** ((~~The department acknowledges that cleanups of contaminated sediment sites can occur under the authority of chapter 90.48 or 70.105D RCW. Sediment cleanups may also be initiated by~~)) ~~Cleanup actions at sites and sediment cleneaup units may be conducted under the authority of chatper 70.105D RCW or the federal government pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)(42 U.S.C. §§ 9601 et seq.). This section describes the department's role in~~ ((~~department initiated~~)) ~~these and other cleanup actions.~~)) This section describes the authorities and administrative options that may be used to address a release or threatened release of a contaminant to sediment that may pose a threat to human health or the environment. This section also describes the process for selecting an appropriate authority and administrative option.

(2) ~~Administrative~~ **Authority.** This part shall apply to a release or threatened release of a contaminant to sediment that may pose a threat to human health or the environment. The department recognizes that such a release may also be addressed under other authorities. The department shall use best professional judgment ((~~and other information as necessary~~)) on a case-by-case basis to determine the appropriate ((~~administrative~~)) authority for ((~~conducting, or requiring contaminated sediment cleanup actions based on, but not limited to,~~)) addressing such a release. The department may initiate ~~a cleanup~~ remedial actions under this ~~chapter~~ part or may determine that another authority is more appropriate. When determining the appropriate ~~administrative~~ authority ~~at a site~~, the department's decision may include the following considerations:

(a) Source of contaminants requiring cleanup including spills, dredging actions, and wastewater and/or storm water discharges;

(b) Significance of contamination threat to human health and the environment including the degree of contamination and types and number of contaminants;

(c) Public ((~~perception~~)) comments received concerning the contaminant threat to human health and the environment;

(d) ((~~Personal or corporate financial status of the landowner(s) and/or discharger(s);~~

~~(e)~~)) Enforcement compliance history of the landowner(s) and/or discharger(s);

((~~(f)~~)) (e) Status of existing or pending federal, state, or local legal orders or administrative actions; and

((~~(g)~~)) (f) Size of cleanup action proposed or determined necessary.

(3) ((~~The types of cleanup actions below establish scenarios recognized by the department which may occur to effect cleanup of contaminated sediment sites. All of these types of cleanup actions shall be subject to administrative review and approval of the department under chapters 90.48 and/or 70.105D RCW.~~

~~(a) Department initiated cleanup. Department initiated cleanup actions occur when the department uses its authority under chapter 90.48 and/or 70.105D RCW to conduct or require and/or otherwise effect cleanup to meet the intent of this chapter.~~

~~(b) Voluntary cleanup. Voluntary cleanup actions are initiated by parties other than the department. The department shall encourage voluntary cleanup actions whenever possible, and as early as possible, to meet the intent of this chapter.~~

~~(c) Incidental cleanup. Incidental cleanup actions are conducted when other state or federally permitted activities are ongoing in and/or around the contaminated sediment site. Early coordination of incidental cleanup actions with the department is encouraged to meet the intent of this chapter, chapter 70.105D RCW, and chapter 90.48 RCW, as appropriate.~~

~~(d) Partial cleanup. Partial cleanup actions may be conducted when completion of cleanup study requirements under~~

~~WAC 173-204-560 has identified and proposed discrete site units and cleanup standards, the department has approved the selection of the partial cleanup alternative per the standards of WAC 173-204-580, and the department has determined that awaiting action or decision on conducting a complete site cleanup would have a net detrimental effect on the environment or human health.~~

~~(c) CERCLA cleanup. Pursuant to the federal Comprehensive Environmental Response, Compensation and Liability Act, the department may identify chapter 173-204 WAC as an applicable state requirement for cleanup actions conducted by the federal government.~~)) **~~Types of cleanups~~** **Administrative options**. ~~The following administrative~~ Administrative options ~~may be~~ used to conduct ~~cleanup~~ remedial actions at sites and sediment cleanup units include:~~. These options shall be subject to review and approval by the department under chapter 70.05D RCW.~~

(a) **Department-conducted or supervised ~~cleanups~~ remedial actions**. The department may conduct or require others to conduct ~~cleanup~~ remedial actions at sites or sediment cleanup units under chapter 70.105D RCW~~.~~;

(b) **Federal-conducted or supervised ~~cleanups~~ remedial actions**. The federal government may conduct or require others to conduct ~~cleanup~~ remedial actions at sites or sediment cleanup units ~~under CERCLA~~ pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. Sec. 9601 et seq.). When evaluating federal ~~cleanup~~ remedial actions, the department shall consider all requirements in this ~~chapter~~ part ~~authorized under chapter 70.105D RCW~~ to be legally applicable requirements under 42 U.S.C. Sec. 9621(d). Federal ~~cleanup~~ remedial actions may be ~~used~~ considered by the department to meet the requirements of this ~~chapter~~ part provided:

(i) The ~~cleanup~~ remedial actions ~~is~~ are consistent with the requirements in this ~~chapter~~ part;

(ii) The state has concurred with the ~~cleanup~~ remedial action; and

(iii) An opportunity was provided for the public to comment on the ~~cleanup~~ remedial action.

(c) **Incidental ~~cleanups~~ remedial actions.** Incidental remedial actions may be conducted when other state or federally permitted activities are ongoing in and/or around the site. Early coordination of incidental ~~cleanup~~ remedial actions with the department is encouraged to ensure such actions meet the requirements in this ~~chapter~~ part and chapter 70.105D RCW.

[Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-550, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-560 ((~~**Cleanup**~~)) **Remedial investigation and feasibility study.** (1) **Purpose.** ((~~This section describes cleanup study plan and report standards which meet the intent of cleanup actions required under authority of chapter 90.48 and/or 70.105D RCW, and/or this chapter. Cleanup actions required under authority of chapter 70.105D RCW shall also meet all standards of chapter 173-340 WAC, the Model Toxics Control Act cleanup regulation. The cleanup study plan and report standards in this chapter include activities to collect, develop, and evaluate sufficient information to enable consideration of cleanup alternatives and selection of a site-specific sediment cleanup standard prior to making a cleanup decision. Each person performing a cleanup action to meet the intent of this chapter shall submit a cleanup study plan and cleanup study report to the department for review and written approval prior to implementation of the cleanup action. The department may approve the cleanup study plan as submitted, may approve the cleanup study plan with appropriate changes or additions, or may require preparation of a new cleanup study plan.~~)) The purpose of a remedial investigation/feasibility study is to collect, develop, and evaluate sufficient information regarding a site or sediment cleanup unit for the department to establish sediment cleanup standards and select a cleanup action under this ~~chapter~~ part.

(2) **Scope** ((~~**of cleanup study plan**~~))**.** The scope of a ((~~cleanup study plan shall~~)) remedial investigation/feasibility study depends on ((~~the specific site informational needs, the~~

~~site hazard,~~)) many factors, including the nature and extent of contamination, the exposure pathways of concern, the natural resources potentially impacted by the contamination, the characteristics of the site or sediment cleanup unit, and the type of cleanup action ((~~proposed, and the authority cited by the department to require cleanup. In establishing the necessary scope of the cleanup study plan, the department may consider cost mitigation factors, such as the financial resources of the person(s) responsible for the cleanup action~~)) alternatives likely to be evaluated under WAC 173-204-570 through 173-204~~-580~~-575 ~~and the authority cited by the department to require cleanup~~. In all cases, sufficient information must be collected, developed, and evaluated to enable the ((~~appropriate selection of a~~)) department to establish sediment cleanup standards ((~~under WAC 173-204-570 and a cleanup action decision under WAC 173-204-580. The sediment cleanup study plan shall address:~~)) and select cleanup actions under this ~~chapter~~ part.

(3) **Administrative requirements.**

(a) Unless otherwise directed by the department, a remedial investigation/feasibility study must be completed before a cleanup action is selected under WAC 173-204-570 and 173-204~~-580~~-575.

(b) Before conducting a remedial investigation, a work plan must be submitted to and approved by the department.

(c) As directed by the department, a remedial investigation and a feasibility study may be conducted as separate steps in the cleanup process and submitted as separate reports or combined into a single step and report.

(d) Remedial investigation and feasibility study reports must be submitted to the department for review and approval.

(4) **Remedial investigation work plan.** The remedial investigation work plan shall include the following ~~information~~:

(a) Public ((~~information/education~~)) participation plan;

(b) ((~~Site investigation and cleanup alternatives evaluation;~~

~~(c)~~)) A summary of available information regarding the site and data gaps needing to be addressed by the remedial investigation;

(c) A conceptual site model, including current and potential human and ecological receptors and exposure pathways;

(d) Cleanup action alternatives that are likely to be considered in the feasibility study;

(e) Sampling plan and recordkeeping in compliance with WAC 173-204-600 through 173-204-610 ~~and department guidance~~. Analytical methods and limits shall be sufficiently sensitive to measure concentrations at levels of potential regulatory concern. Proposed sampling locations should consider the movement and deposition patterns of sediments; ((~~and~~

~~(d)~~)) (f) Site safety((~~.~~

~~(3) Cleanup study plan public information/education requirements~~)) plan to meet the requirements of the Occupational Safety and Health Act of 1970 (29 U.S.C. Sec. 651 et seq.) and the Washington Industrial Safety and Health Act (chapter 49.17

RCW), and regulations promulgated pursuant thereto. These requirements are subject to enforcement by the designated federal and state agencies. Actions taken by the department under this ~~chapter~~ part do not constitute an exercise of statutory authority within the meaning of section (4)(b)(1) of the Occupational Safety and Health Act;

(g) A proposed schedule for completion of the remedial investigation/feasibility study; and

(h) Other information as required by the department.

(5) **Public participation plan requirements**. The ((~~cleanup study~~)) public participation plan shall encourage early, coordinated, and effective public involvement commensurate with the nature of the proposed cleanup action, the level of public concern, and the existence of, or potential for, adverse effects on biological resources and/or a threat to human health. The ((~~cleanup study~~)) plan shall ((~~address proposed activities for~~)) be consistent with WAC 173-340-600 and include the following ((~~subjects~~)) information:

(a) When public notice will occur, the length of the comment periods accompanying each notice, the potentially affected vicinity, and any other areas to be provided notice;

(b) Where public information ((~~repositories~~)) will be located to provide ((~~site~~)) information ((~~to the public~~)) about the site;

(c) Methods for identifying the public's concerns((~~, e.g.,~~)) such as interviews, questionnaires, and community group meetings((~~, etc.~~));

(d) Methods for providing information to the public((~~, e.g.,~~)) such as press releases, public meetings, fact sheets, ((~~etc.~~)) and listservs;

(e) Coordination of public participation requirements mandated by other ((~~federal, state, or local~~)) applicable laws;

(f) Amendments to the planned public involvement activities; and

(g) Any other ((~~elements that~~)) information required by the department ((~~determines to be appropriate for inclusion in the cleanup study plan~~)).

((~~(4) Cleanup study plan site investigation and cleanup alternatives evaluation requirements. The content of the cleanup study plan for the site investigation and cleanup alternatives evaluation is determined by the type of cleanup action selected as defined under WAC 173-204-550. As determined by the department, the cleanup study plan shall address the following subjects:~~)) (6) **Remedial investigation report.** The remedial investigation report shall include the following ~~information~~ as appropriate:

(a) General site information. General information, including: Project title; name, address, and phone number of project coordinator; legal description of the cleanup site; area and volume dimensions of the site; present and past owners and operators; present owners and operators of contaminant source discharges to the site((~~; chronological listing of past owners and operators of contaminant source discharges to the site~~)) and their respective operational history; and other pertinent information ((~~determined~~)) required by the department((~~.~~));

(b) Sediment cleanup unit. If applicable, the proposed sediment cleanup unit boundary and basis for the boundary;

(c) Sediment cleanup standards. For each contaminant, identify the following and the basis for the proposed values:

(i) The proposed sediment cleanup objective;

(ii) The proposed cleanup screening level;

(iii) The proposed sediment cleanup standard including the sediment cleanup level and point of compliance~~.~~;

(~~b~~d) Site conditions map. An existing site conditions map which illustrates site features as follows:

(i) Property boundaries((~~.~~));

(ii) The site boundary as defined by the individual contaminants exceeding the ((~~applicable~~)) proposed sediment ((~~quality~~)) cleanup standards ((~~of~~)) as ~~defined~~ specified in WAC ((~~173-204-320 through 173-204-340~~)) 173-204-560. Delineations shall be made at the point where the concentration of the contaminants would meet the((~~:~~

~~(A) Proposed sediment cleanup standards;~~

~~(B) Proposed sediment cleanup objectives; ((and~~

~~(B) Minimum cleanup level)) (C) Proposed cleanup screening levels;~~ ~~(A) Cleanup objective; and~~

~~(B) Minimum cleanup level; and~~

~~(C) Recommended cleanup standards.~~)) criteria in (c) of this subsection;

(iii) ~~(D)~~ Proposed sediment cleanup unit boundary, if applicable;

(~~iii~~ iv) Surface and subsurface structures topography((~~.~~

~~(iv) Surface and subsurface structures.~~));

(~~i~~v) Utility lines((~~.~~));

(vi) Navigation lanes((~~.~~

~~(vii) Current and ongoing sediment sources.~~

~~(viii)~~)); and

(vii) Other pertinent information determined by the department~~.~~;

((~~(c) Site~~)) (e) Investigation. Sufficient investigation to characterize the distribution of sediment contamination ((~~present at the site~~)), and the threat or potential threat to human health and the environment. Where applicable ((~~to the site~~)), these investigations shall address the following:

(i) Surface water and sediments. Investigations of sediment, surface water hydrodynamics, and sediment transport mechanisms to characterize significant hydrologic features such as:

((~~Site~~)) (A) ~~Site~~ Surface water drainage patterns, quantities and flow rates((~~,~~));

(B) Areas of sediment erosion and deposition including estimates of sedimentation rates((~~, and actual or potential~~));

(C) Contaminant migration routes ((~~to and from the site and within the site. Sufficient surface water and sediment sampling shall be performed to adequately characterize the~~));

(D) Areal and vertical distribution and concentrations of contaminants((~~.~~)) in sediment; and

(E) Recontamination potential of sediments which are likely to influence the type and rate of contaminant migration, or are likely to affect the ability to implement alternative cleanup actions ((~~shall be characterized~~));

(ii) Geology and groundwater system characteristics. Investigations of ((~~site~~)) the geology and hydrogeology to ((~~adequately~~)) characterize the physical properties and distribution of sediment types, and the characteristics of groundwater flow rate, groundwater gradient, groundwater discharge areas, and groundwater quality data which may affect ((~~site~~)) cleanup action alternatives evaluations;

(iii) Climate. Information regarding local and regional climatological characteristics which are likely to affect surface water hydrodynamics, groundwater flow characteristics, and migration of sediment contaminants such as: Seasonal patterns of rainfall; the magnitude and frequency of significant storm events; and prevailing wind direction and velocity;

(iv) Land use. Information characterizing human populations exposed or potentially exposed to sediment contaminants ((~~released at or from the site and~~)), the present and proposed uses ((~~and~~)) of the land, zoning for contiguous shoreline areas ((~~contiguous with the site~~)), and the aquatic state land use classification under chapter 332-30 WAC; and

(v) Natural resources and ((~~ecology~~)) habitat. Information to determine the impact or potential impact of sediment contaminants ((~~from the site~~)) on ecological receptors, natural resources and ((~~ecology~~)) sensitive habitat of the area such as((~~: Sensitive environment, local and regional habitat,~~))

spawning areas, nursery grounds, shellfish or eelgrass beds and other plant and animal species((~~, and other environmental receptors~~))~~.~~;

((~~(d) Sediment~~)) (f) ~~Current~~ Confirmed and suspected ~~potential~~ contaminant sources. A description of the confirmed and suspected sources, including the location((~~,~~)) and quantity, ((~~areal and vertical extent, concentration and sources of~~)) as well as ~~sources of~~ any active and inactive waste disposal ((~~and other sediment contaminant discharge sources which affect or potentially affect the site~~)) facilities. Where determined relevant by the department, the following information shall be obtained by the department from the responsible discharger:

(i) The physical and chemical characteristics((~~,~~)) and the biological effects of ((~~site~~)) sediment contaminant sources;

(ii) The status of source control actions for permitted and unpermitted ((~~site sediment~~)) contaminant sources; and

(iii) ((~~A recommended~~)) Existing compliance time frames for ((~~known~~)) permitted ((~~and unpermitted site sediment~~)) contaminant sources which affect or potentially affect implementation of the timing and scope of the ((~~site~~)) cleanup action alternatives~~.~~;

((~~(e)~~)) ~~Human health risk assessment. The current and potential threats to human health that may be posed by sediment site contamination shall be evaluated using a risk assessment procedure approved by the department.~~ (g) Human health risk assessment. The current and potential significant threats to human health posed by sediment contamination shall be evaluated under WAC 173-204-561; and

(~~f~~ h) Any other information required by the department.

(7) **Feasibility study report.** The feasibility study report shall include the following as appropriate:

(a) If the feasibility study is not combined with the remedial investigation in one report, a summary of the remedial investigation results including:

(i) Conceptual site model to provide the basis from which cleanup action alternatives are developed and evaluated;

(ii) If applicable, the proposed sediment cleanup unit boundary and the basis for the boundary;

(iii) The proposed biologically active zone and the basis for the zone;

(~~iii~~iv) For each contaminant ~~at the site~~, the proposed sediment cleanup standard~~s~~, including sediment cleanup level and point of compliance, and basis for the standard; and

(~~iv~~v) Maps, cross-sections, and calculations illustrating the location, estimated amount and concentration distribution of ~~hazardous substances~~ contaminants above proposed sediment cleanup ~~standards~~ levels and the proposed sediment cleanup objectives and cleanup screening levels;

(b) Results of any additional investigations or technology evaluations conducted after completion of the remedial investigation report;

(c) ~~Cleanup action alternatives.~~ Each ((~~cleanup~~)) feasibility study ((~~plan~~)) shall include an evaluation of alternative cleanup actions that protect human health and the environment by eliminating, reducing, or otherwise controlling risks posed through each exposure pathway and migration route. The number and types of alternatives to be evaluated shall take into account the characteristics and complexity of the site((~~.~~

~~(i) The proposed site cleanup alternatives may include establishment of site units, as defined in WAC 173-204-200(24), with individual cleanup standards within the range required by WAC 173-204-570, based on site physical characteristics and complexity, and cleanup standard alternatives established on consideration of cost, technical feasibility, and net environmental impact.~~

~~(ii) The proposed site cleanup alternatives may include establishment~~)) and be evaluated using the requirements in WAC 173-204-570;

(d) Identification and evaluation of a reasonable number and type of alternatives;

(e) Identification of alternatives eliminated that do not meet the requirements in WAC 173-204-570;

(f) Documentation of the alternatives evaluation process. For each alternative evaluated include the following:

(i) The location and estimated amount of each contaminant to be removed or treated by the alternative and the estimated time frame in which removal or treatment will occur; and

(ii) The location, estimated amount, and projected concentration distribution of each contaminant remaining ~~on site~~ above proposed sediment cleanup levels after implementation of the alternative;

(g) The preferred remedy and the basis for selection;

~~(h) Identification of proposed sediment cleanup units within the site, if applicable;~~

(~~i~~h) Applicable ~~local, state and federal~~ laws specific to the proposed preferred remedy, including a description of permit/approval conditions identified in consultation with the permitting agencies;

(~~j~~i) Identification of ((~~a~~)) any proposed sediment recovery zone ((~~as authorized~~)) and justification for this zone under WAC 173-204-590((~~, Sediment recovery zones. Establishment or expansion of a sediment recovery zone shall not be used as a substitute for active cleanup actions, when such actions are practicable and meet the ((standards)) requirements of WAC ((173-204-580)) 173-204-570. The cleanup study plan shall include the following information for evaluation of sediment recovery zone alternatives:~~

~~(A) The time period during which a sediment recovery zone is projected to be necessary based on source loading and net environmental recovery processes determined by application of the department's sediment recovery zone computer models "CORMIX," "PLUMES," and/or "WASP," or an alternate sediment recovery zone model(s) approved by the department under WAC 173-204-130(4) as limited by the standards of this section and the department's best professional judgment;~~

~~(B) The legal location and landowner(s) of property proposed as a sediment recovery zone;~~

~~(C) Operational terms and conditions including, but not~~

~~limited to proposed confirmational monitoring actions for discharge effluent and/or receiving water column and/or sediment chemical monitoring studies and/or bioassays to evaluate ongoing water quality, sediment quality, and biological conditions within and adjacent to the proposed or authorized sediment recovery zone to confirm source loading and recovery rates in the proposed sediment recovery zone.~~

~~(D) Potential risks posed by the proposed sediment recovery zone to human health and the environment;~~

~~(E) The technical practicability of elimination or reduction of the size and/or degree of chemical contamination and/or level of biological effects within the proposed sediment recovery zone; and~~

~~(F) Current and potential use of the sediment recovery zone, surrounding areas, and associated resources that are, or may be, affected by releases from the zone.~~

~~(G) The need for institutional controls or other site use restrictions to reduce site contamination risks to human health.~~

~~(iii) A phased approach for evaluation of alternatives may be required for certain sites, including an initial screening of alternatives to reduce the number of potential remedies for the final detailed evaluation. The final evaluation of cleanup action alternatives that pass the initial screening shall consider the following factors:~~

~~(A) Overall protection of human health and the environment, time required to attain the cleanup standard(s), and on-site and offsite environmental impacts and risks to human health~~

~~resulting from implementing the cleanup alternatives;~~

~~(B) Attainment of the cleanup standard(s) and compliance with applicable federal, state, and local laws;~~

~~(C) Short-term effectiveness, including protection of human health and the environment during construction and implementation of the alternative; and~~

~~(D) Long-term effectiveness, including degree of certainty that the alternative will be successful, long-term reliability, magnitude of residual, biological and human health risk, and effectiveness of controls for ongoing discharges and/or controls required to manage treatment residues or remaining wastes cleanup and/or disposal site risks;~~

~~(g) Ability to be implemented. The ability to be implemented including the potential for landowner cooperation, consideration of technical feasibility, availability of needed offsite facilities, services and materials, administrative and regulatory requirements, scheduling, monitoring requirements, access for construction, operations and monitoring, and integration with existing facility operations and other current or potential cleanup actions;~~

~~(h) Cost, including consideration of present and future direct and indirect capital, operation, and maintenance costs and other foreseeable costs;~~

~~(i) The degree to which community concerns are addressed;~~

~~(j) The degree to which recycling, reuse, and waste minimization are employed; and~~

~~(k)~~));

(~~k~~j) Proposed monitoring plan during and after cleanup consistent with the provisions in WAC 173-204-600;

(~~l~~k) Environmental impact. Sufficient information shall be provided to fulfill the requirements of chapter 43.21C RCW, the State Environmental Policy Act, for the proposed preferred remedy. Discussions of significant short-term and long-term environmental impacts, significant irrevocable commitments of natural resources, significant alternatives including mitigation measures, and significant environmental impacts which cannot be mitigated shall be included((~~.~~

~~(5) Cleanup study plan -- sampling plan and recordkeeping requirements. The cleanup study plan shall address proposed sampling and recordkeeping activities to meet the standards of WAC 173-204-600, Sampling and testing plan standards, and WAC 173-204-610, Records management, and the standards of this section.~~

~~(6) Cleanup study plan site safety requirements. The cleanup study plan shall address proposed activities to meet the requirements of the Occupational Safety and Health Act of 1970 (29 U.S.C. Sec. 651 et seq.) and the Washington Industrial Safety and Health Act (chapter 49.17 RCW), and regulations promulgated pursuant thereto. These requirements are subject to enforcement by the designated federal and state agencies. Actions taken by the department under this chapter do not constitute an exercise of statutory authority within the meaning of section (4)(b)(1) of the Occupational Safety and Health Act.~~

~~(7) Cleanup study report. Each person performing a cleanup~~

~~action to meet the intent of this chapter shall submit a cleanup study report to the department for review and written approval of a cleanup decision prior to implementation of the cleanup action. The sediment cleanup study report shall include the results of cleanup study site investigations conducted pursuant to subsection (4) of this section, and preferred and alternate cleanup action proposals based on the results of the approved cleanup study plan.~~

~~(8) Sampling access. In cases where the person(s) responsible for cleanup is not able to secure access to sample sediments on lands subject to a cleanup study plan approved by the department, the department may facilitate negotiations or other proceedings to secure access to the lands. Requests for department facilitation of land access for sampling shall be submitted to the department in writing by the person(s) responsible for the cleanup action study plan.~~))~~.~~; and

(~~m~~l) Any other information required by the department.

(8) Sampling access. In cases where the person(s) responsible for cleanup is not able to secure access to sample sediment on lands subject to a remedial investigation and feasibility study required by the department, the department may facilitate negotiations or other proceedings to secure access to the lands. Requests for department facilitation of land access for sampling shall be submitted to the department in writing by the person(s) responsible for the remedial investigation and feasibility study.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-560, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-560, filed 3/27/91, effective 4/27/91.]

NEW SECTION

WAC 173-204-561 Sediment cleanup levels based on protection of human health. (1) **Applicability.** This section defines sediment cleanup objectives and cleanup screening levels for contaminants based on protection of human health. They are used to:

(a) Identify and assess the hazard of sites under WAC 173-204-510 and 173-204-520; and

(b) Establish sediment cleanup levels for sites and sediment cleanup units under WAC 173-204-560.

(2) **Sediment cleanup objectives.** Sediment cleanup objectives based on protection of human health shall be calculated using the following:

(a) Target risk levels. Sediment cleanup objectives based on protection of human health shall be at least as protective as the following sediment concentrations:

(i) Noncarcinogens. For noncarcinogens, sediment concentrations that are estimated to result in no acute or chronic toxic effects ~~on~~ to human health as determined using a hazard quotient of one. If there are multiple noncarcinogens and/or exposure pathways at the site and the hazard index for the site exceeds one, then the sediment cleanup objectives shall be adjusted downward in accordance with WAC 173-340-708 or other methods approved by the department; and

(ii) Carcinogens. For known or suspected carcinogens, sediment concentrations for which the upper bound on the estimated lifetime excess cancer risk for individual carcinogens is less than or equal to one in one million (1×10^{-6}). If there are multiple carcinogens and/or exposure pathways at the site and the total lifetime excess cancer risk for the site exceeds one in one hundred thousand (1×10^{-5}), then the sediment cleanup objectives shall be adjusted downward in accordance with WAC 173-340-708 or other methods approved by the department~~.~~;

(b) Reasonable maximum exposure. Sediment cleanup objectives and cleanup screening levels for contaminants based on protection of human health shall be calculated using reasonable maximum exposure scenarios that reflect the highest exposure that is reasonably expected to occur under current and potential future site use conditions~~.~~;

(i) Default scenario. Except as provided under (b)(ii) of this subsection, the reasonable maximum exposure scenario for a site shall be tribal consumption of fish and shellfish. The department shall consider, as appropriate, the following information on a site-specific basis when selecting or approving the exposure parameters used to represent the reasonable maximum exposure scenario:

(A) Historic, current, and potential future tribal use of fish and shellfish from the general vicinity of the site;

(B) Relevant studies and best available science related to fish consumption rates~~.~~;

(C) The total fish and shellfish in an individual's diet that is obtained, or has the potential to be obtained, from the general vicinity of the site. This value depends on the ability of the aquatic habitat within the general vicinity of the site to support a department approved fish and shellfish consumption rate under current and potential future site use conditions;

(D) The fish and shellfish contaminant body burden acquired, or potentially acquired, from the general vicinity of the site ~~size of the site relative to the fish and shellfish home range.~~; and

(E) Other information determined by the department to be relevant~~.~~;

(ii) Site-specific scenario. The department may approve an alternate reasonable maximum exposure scenario for the site in accordance with WAC 173-340-708(3), 173-340-708(10), and 173-340-702 (14) through (16~~).~~);

(c) Toxicity parameters. For toxicological parameters, values established by the United States Environmental Protection Agency (USEPA) and available through the Integrated Risk Information System (IRIS) data base shall be used. If the value for a toxicological parameter is not available through IRIS, other sources shall be used. When evaluating the appropriateness of using other sources, the department may use the hierarchy in the following document: USEPA, Office of Solid Waste and Emergency Response, Directive 9285.7-53, "Human Health Toxicity Values in Superfund Risk Assessments."

(3) **Cleanup screening levels.**

(a) General. Cleanup screening levels based on protection of human health shall be calculated using the factors in (b) of this subsection and in subsection (2)(b) through (c) of this section.

(b) Target risk levels. Cleanup screening levels based on protection of human health shall be at least as protective as the following sediment concentrations:

(i) Noncarcinogens. For noncarcinogens, sediment concentrations that are estimated to result in no acute or chronic toxic effects ~~on~~ to human health as determined using a hazard quotient of one. If there are multiple noncarcinogens and/or exposure pathways at the site and the hazard index for the site exceeds one, then the cleanup screening levels shall be adjusted downward in accordance with WAC 173-340-708 or other methods approved by the department; and

(ii) Carcinogens. For known or suspected carcinogens, sediment concentrations for which the upper bound on the estimated lifetime excess cancer risk for individual carcinogens is less than or equal to one in one hundred thousand (1×10^{-5}). If there are multiple carcinogens and/or exposure pathways at the site and the total lifetime excess cancer risk for the site exceeds one in one hundred thousand (1×10^{-5}), then the cleanup screening levels shall be adjusted downward in accordance with WAC 173-340-708 or other methods approved by the department.

[]

NEW SECTION

WAC 173-204-563 Sediment cleanup levels based on protection of the benthic community in freshwater sediment. (1) **Applicability.** This section defines sediment cleanup objectives and cleanup screening levels for contaminants based on protection of the benthic community in freshwater sediment. They are used to:

(a) Identify and assess the hazard of sites under WAC 173-204-510 and 173-204-520; and

(b) Establish sediment cleanup levels for sites and sediment cleanup units under WAC 173-204-560.

(2) **Freshwater sediment - Chemical criteria.** The chemical concentration criteria in Table ~~VII~~ VI establish the sediment cleanup objectives and cleanup screening levels chemical criteria for freshwater sediment. The criteria of this section shall apply to freshwater sediments for toxicity to the benthic community.

(a) The sediment cleanup objectives of this section establish a no adverse effects level, including no acute or chronic adverse effects, ~~on~~ to the benthic community. Chemical concentrations at or below the sediment cleanup objectives correspond to sediment quality that results in no adverse effects to the benthic community.

(b) The cleanup screening levels of this section establish a minor adverse effects level, including acute or chronic effects, ~~on~~ to the benthic community. Chemical concentrations at or below the cleanup screening level but greater than the sediment cleanup objective correspond to sediment quality that results in minor adverse effects to the benthic community. The freshwater chemical and biological cleanup screening levels establish minor adverse effects as the level above which station clusters of potential concern are defined and may be defined as potential cleanup sites for benthic community toxicity, and at or below which station clusters of low concern are defined, per the procedures identified in WAC 173-204-510 and 173-204-520.

(c) The cleanup screening level chemical criteria is exceeded when the sediment chemical concentration for ~~a single~~an individual chemical is above the cleanup screening level in Table ~~VII~~VI.

(d) The sediment cleanup objective chemical criteria is exceeded when the sediment chemical concentration for ~~a single~~an individual chemical is above the sediment cleanup objective in Table ~~VII~~VI.

(e) For purposes of this section, where ~~laboratory~~ chemical analyses indicate a chemical is not detected in a sediment sample, the method detection limit and the practical quantitation limit shall be reported and shall be at or below the freshwater sediment cleanup objectives chemical criteria value in Table ~~VII~~VI.

(f) Where chemical criteria in Table ~~VII~~ VI represent the sum of individual compounds or isomers, the following methods shall be applied:

(i) Where chemical analyses identify an undetected value for every individual compound/isomer, then the single highest detection limit shall represent the sum of the respective compounds/isomers; and

(ii) Where chemical analyses detect one or more individual compound/isomers, only the detected concentrations will be added to represent the group sum.

(g) The chemical criteria in Table ~~VII~~ VI represent concentrations ~~in parts per million~~ as dry weight ~~normalized~~.

(h) The total polycyclic aromatic hydrocarbon (PAH) criterion in Table ~~VII~~ VI represents the sum of the following polycyclic aromatic hydrocarbon compounds: 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, benz(a)anthracene, benzo(a)pyrene, ~~benzo(b)fluoranthene,~~ benzo(ghi)perylene, ~~benzo(k)fluoranthene,~~ chrysene, dibenz(ah)anthracene, fluoranthene, fluorene, indeno(123-cd)pyrene, naphthalene, phenanthrene, pyrene, total benzofluoranthenes (b+k+j).

(i) The total benzofluoranthenes criterion in Table VI represents the sum of the concentrations of the "B," "J," and "K" isomers.

(j) The total dichlorodiphenyldichloroethane (DDDs) criterion in Table ~~VII~~ VI represents the sum of the following DDD isomers: o,p'-DDD~~,~~ and p,p'-DDD.

(~~j~~k) The total dichlorodiphenyldichloroethylene (DDEs) criterion in Table ~~VII~~ VI represents the sum of the following DDE isomers: o,p'-DDE~~,~~ and p,p'-DDE.

(~~k~~l) The total dichlorodiphenyltrichloroethane (DDTs) criterion in Table ~~VII~~ VI represents the sum of the following DDT isomers: o,p'-DDT, p,p'-DDT.

(~~l~~m) The total poly~~cyclic~~ chlorinated biphenyl (PCB) Aroclors criterion in Table ~~VII~~ VI represents the sum of the following Aroclors: 1016, 1221, 1242, 1248, 1254, 1260, 1268.

(~~m~~n) When the listed chemical criteria in Table ~~VII~~ VI have a ">" (greater than) value for the cleanup screening level, the ~~minor adverse effects~~cleanup screening level is unknown but is above the concentration shown. If test results show concentrations above this cleanup screening level, bioassays shall be conducted to evaluate potential benthic community toxicity.

(o) The department recognizes that, in the following types of freshwater sediment environments, the chemical criteria in Table ~~VII~~ VI may not ~~be~~ reliably predict~~ive of~~ benthic community toxicity:

(i) Sediment with unusual~~ique~~ geochemical or biochemical characteristics influencing toxicity (release or bioavailability of contaminants) including total organic carbon in environments such as bogs and alpine wetlands;

~~(ii) Sediment where chemicals not listed in Table VII are suspected of causing benthic toxicity;~~

(~~iii~~ii) Sediment with~~,~~ pore water~~,~~ or overlying water that has~~with~~ unusual geochemical or biochemical characteristics influencing toxicity (release or bioavailability of contaminants) including pH or hardness~~, total organic carbon, alkalinity, or other characteristics~~;

(~~iv~~iii) Sediment impacted by metals mining, metals milling, or metals smelting; and

(iv) Sediment impacted by other toxic, radioactive, biological, or deleterious substances as specified in subsection (4) of this section.

(p) ~~In these types of~~At a site where the freshwater sediment environment~~s~~ meets the categories specified in (o)(i) or (o)(ii) of this subsection, the department may require alternative methods for characterizing benthic community toxicity. At a site where the freshwater sediment environment meets the categories specified in (o)(iii) or (o)(iv) of this subsection, ~~shall be required, unless the department determines the chemical criteria in Table VII are predictive of benthic toxicity~~. ~~However, at a site where the freshwater sediment environment meets two or more of the characteristics identified in (o) of this subsection,~~ an alternative method~~s~~ for characterizing benthic community toxicity shall be required. The alternative method used shall be the biological criteria of subsection (3)(a) through (h) of this section, unless the department determines one of the following methods are consistent with the provisions in subsection (3)(a) through (h) of this section~~In order of preference, alternative methods include~~:

~~(A) Using the biological criteria of subsection (3)(a) through (h) of this section;~~

(~~B~~i) Establishing site-specific chemical criteria using site chemistry and the biological criteria of subsection (3)(a) through (h) of this section;

(~~C~~ii) Other biological methods approved by the department; or

(~~D~~iii) Other approaches in accordance with WAC 173-204-130.

Table ~~VIII~~VI

Freshwater Sediment Cleanup Objectives and Cleanup Screening Levels Chemical Criteria

Chemical Parameter	Dry Weight ~~Normalized~~ Sediment Cleanup Objective	Dry Weight ~~Normalized~~ Cleanup Screening Level
Conventional chemicals (mg/kg)		
Ammonia	230	300
Total sulfides	39	61
Metals (mg/kg)		
Arsenic	14	120
Cadmium	2.1	5.4
Chromium	72	88
Copper	400	1200
Lead	360	> 1300
Mercury	0.66	0.8
Nickel	26	110

Selenium	11	> 20
Silver	0.57	1.7
Zinc	3200	> 4200
Organic chemicals (µg/kg)		
4-Methylphenol	260	2000
Benzoic acid	2900	3800
Beta-Hexachlorocyclohexane	7.2	11
Bis(2-~~e~~Ethylhexyl) phthalate	500	22000
Carbazole	900	1100
Dibenzofuran	200	680
Dibutyltin	910	130000
Dieldrin	4.9	9.3
Di-n-butyl phthalate	380	1000
Di-n-octyl phthalate	39	> 1100
Endrin Ketone	8.5	~~0~~ > 8.5
Monobutyltin	540	> 4800
Pentachlorophenol	1200	> 1200
Phenol	120	210
Tetrabutyltin	97	> 97
Total PCB Aroclors	110	2500
Total DDDs	310	860
Total DDEs	21	33
Total DDTs	100	8100
Total PAHs	17000	30000
Tributyltin	47	320
Bulk Petroleum Hydrocarbons (mg/kg)		
Total Petroleum Hydrocarbon (TPH)-Diesel	340	510
Total Petroleum Hydrocarbon (TPH)-Residual	3600	4400

(3) **Freshwater sediment - Biological criteria.** The biological effects criteria in Table ~~VIII~~ VII establish the sediment cleanup objectives and cleanup screening levels

biological criteria for freshwater sediment. The criteria of this section shall apply to freshwater sediments for toxicity to the benthic invertebrate community.

(a) The sediment cleanup objectives of this section establish a no adverse effects level, including no acute or chronic adverse effects, to the benthic community. The sediment cleanup objective biological criteria for a sampling station is exceeded when one of the biological test results is above the sediment cleanup objective as described in Table ~~VIII~~VII.

(b) The cleanup screening levels of this section establish a minor adverse effects level, including acute or chronic effects, to the benthic community. The cleanup screening level biological criteria for a sampling station is exceeded when:

(i) Any two of the biological test results for a sampling station are above the sediment cleanup objective in Table ~~VIII~~VII; or

(ii) One of the biological test results for a sampling station is above the cleanup screening level as described in Table ~~VIII~~VII.

(c) The acute and chronic effects biological tests of Table ~~IX~~ VIII shall be used to:

(i) Confirm designation of freshwater sediment for benthic toxicity. The department may require, or any person may perform, biological testing to confirm the designation of freshwater sediment which either passes or fails the chemical criteria in subsection (2) of this section. ~~If required, t~~The sediment shall be tested using the procedures in (d) of this subsection;

(ii) Evaluate the freshwater sediment cleanup objective and cleanup screening level for identifying sediment station clusters of potential concern for benthic community toxicity using the procedures in WAC 173-204-510(2); and

(iii) Establish the freshwater sediment cleanup objective or cleanup screening level for identifying station clusters of low concern for benthic community toxicity using the procedures in WAC 173-204-510(2).

(d) To designate sediment quality using biological criteria, a minimum of the following shall be included in the suite of biological tests for each sediment sample as described in Table ~~IX~~VIII:

(i) Two different species;

(ii) Three endpoints;

(iii) One chronic test; and

(iv) One sublethal endpoint.

(e) The appropriate control and reference sediment samples shall meet the performance standards described in Table ~~VIII~~VII. Selection and use of reference sediment must be approved by the department and shall meet the performance standards of Table ~~VIII~~VII. The department may approve a different performance standard based on latest scientific knowledge.

(f) When sediment is collected to conduct the biological tests in Table ~~IX~~ VIII or other biological tests approved by the department, the overlying site water shall be collected and analyzed for pH, ~~alkalinity,~~ hardness, and temperature.

(g) Use of alternate biological tests may be required by the department and shall be subject to the review and approval of the department using the procedures of WAC 173-204-130(4). ~~When conditions in subsection (2)(n) of this section apply, and when determined appropriate by the department, the use of alternate biological tests in addition to the biological tests in Table IX shall be required and be subject to the review and approval by the department using the procedures of WAC 173-204-130(4)~~.

(h) Any person who designates test sediments using the procedures of this section shall meet the sampling and testing plan requirements of WAC 173-204-600 and records management requirements of WAC 173-204-610. Test sediments designated using the procedures of this section shall be sampled and analyzed using methods approved by the department, and shall use an appropriate quality assurance/quality control program, as determined by the department.

(4) **Freshwater sediment - Other toxic, radioactive, biological, or deleterious substances criteria.** "Other toxic, radioactive, biological, or deleterious substances" means substances not specified in Table VI that are in, or on, sediments and ~~shall be at or below levels which~~ cause minor adverse effects to biological resources, as determined ~~by the department~~ in subsection (3) of this section. The department shall determine on a case-by-case basis ~~the~~ other criteria, methods, and procedures, such as those listed in subsection (2)(p) of this section, necessary to meet ~~this requirement~~ the

criteria in subsection (3) of this section.

Table ~~VIII~~VII

Freshwater Sediment Cleanup Objectives and Cleanup Screening Levels Biological Criteria

Biological Test/ Endpoint*	Performance Standard*		Sediment Cleanup Objective for each biological test	Cleanup Screening Level for each biological test
	Control*	Reference		
Hyalella azteca				
10-day mortality	$M_C \leq 20\%$	$M_R \leq 25\%$	$M_T - M_C > 15\%$ and M_T vs M_C SD ($p \leq 0.05$)	$M_T - M_C > 25\%$ and M_T vs M_C SD ($p \leq 0.05$)
28-day mortality	$M_C \leq 20\%$	$M_R \leq 30\%$	$M_T - M_C > 10\%$ and M_T vs M_C SD ($p \leq 0.05$)	$M_T - M_C > 25\%$ and M_T vs M_C SD ($p \leq 0.05$)
28-day growth	$MIG_C \geq 0.15$ mg/individual	$MIG_R \geq 0.15$ mg/individual	~~$MIG_T/MIG_C < 0.75$~~ $(MIG_C - MIG_T)/MIG_C > 0.25$ and MIG_T vs MIG_C SD ($p \leq 0.05$)	~~$MIG_T/MIG_C < 0.60$~~ $(MIG_C - MIG_T)/MIG_C > 0.40$ and MIG_T vs MIG_C SD ($p \leq 0.05$)
Chironomus dilutus				
10-day mortality	$M_C \leq 30\%$	$M_R \leq 30\%$	$M_T - M_C > 20\%$ and M_T vs M_C SD ($p \leq 0.05$)	$M_T - M_C > 30\%$ and M_T vs M_C SD ($p \leq 0.05$)
10-day growth	$MIG_C \geq 0.48$ mg/individual	~~RF/CF~~ $MIG_R/MIG_C \geq 0.8$	~~$MIG_T/MIG_C < 0.8$~~ $(MIG_C - MIG_T)/MIG_C > 0.20$ and MIG_T vs MIG_C SD ($p \leq 0.05$)	~~$MIG_T/MIG_C < 0.7$~~ $(MIG_C - MIG_T)/MIG_C > 0.30$ and MIG_T vs MIG_C SD ($p \leq 0.05$)
20-day mortality	$M_C \leq 32\%$	$M_R \leq 35\%$	$M_T - M_C > 15\%$ and M_T vs M_C SD ($p \leq 0.05$)	$M_T - M_C > 25\%$ and M_T vs M_C SD ($p \leq 0.05$)
20-day growth	$MIG_C > 0.60$ mg/individual	~~RF/CF~~ $MIG_R/MIG_C \geq 0.8$	~~$MIG_T/MIG_C < 0.75$~~ $(MIG_C - MIG_T)/MIG_C > 0.25$ and MIG_T vs MIG_C SD ($p \leq 0.05$)	~~$MIG_T/MIG_C < 0.60$~~ $(MIG_C - MIG_T)/MIG_C > 0.40$ and MIG_T vs MIG_C SD ($p \leq 0.05$)

Table VII Explanatory Notes:

C = Control;

MIG = Mean individual growth at time final;

SD = Statistically significant difference;

R = Reference;

T = Test.

An exceedance of the sediment cleanup objective and cleanup screening level requires a statistically ~~significance~~ significant difference at p ~~=~~ ≤ 0.05. Reference performance standards are provided for sites where the department has approved a freshwater reference sediment site(s) and reference results will be substituted for control in comparing test sediments to criteria.

*The department shall use the most updated American Society for Testing and Materials and EPA protocols and performance standards.

Table ~~IX~~VIII

Types of Freshwater Sediment Biological Tests, Species, and Applicable Endpoints

Species, Biological Test, and Endpoint	Acute Effects Biological Test	Chronic Effects Biological Test	Lethal Effects Biological Test	Sublethal Effects Biological Test
Amphipod *Hyalella azteca*				
10-day Mortality	x		x	
28-day Mortality		x	x	
28-day Growth		x		x
Midge *Chironomus dilutus*				
10-day Mortality	x		x	
10-day Growth	x			x
20-day Mortality		x	x	
20-day Growth		x		x

Table VIII Explanatory Notes:

The department shall use the most current American Society for Testing and Materials and EPA protocols for establishing appropriate biological tests.

[]

NEW SECTION

WAC 173-204-564 Sediment cleanup levels based on protection of higher trophic level species. (1) **Applicability.** This section defines sediment cleanup objectives and cleanup screening levels for contaminants based on protection of species at trophic levels not addressed in WAC 173-204-562 and 173-204-563 (hereafter called "higher trophic level species"). They are used to establish sediment cleanup levels for sites and sediment cleanup units under WAC 173-204-560.

(2) **Requirements.** Sediment cleanup objectives and cleanup screening levels based on protection of higher trophic level species shall be established at concentrations that ~~do not~~ have ~~the potential for minor~~ no adverse effects. To establish such concentrations, a site-specific ecological risk assessment meeting the requirements of this subsection must be performed.

(a) Approval by the department. Prior to performing the assessment, the department must approve the criteria, methods, and procedures to be used in the assessment.

(b) Species evaluated. The assessment must evaluate higher trophic level species that currently utilize, may potentially inhabit, or have historically inhabited the site.

(c) Factors considered. The assessment must consider factors such as:

(i) ~~For higher trophic level species protected under the Federal Endangered Species Act, Title 77 RCW, or Title 79 RCW, a minor adverse effect means a significant disruption of normal behavior patterns such as breeding, feeding, or sheltering. For all other higher trophic level species, minor adverse effects are effects~~ Effects that impair the higher trophic level species reproduction, growth, or survival;

(ii) The species life history, feeding and reproductive strategy, population numbers, home range, and the potential for recruitment or immigration of individuals to the site~~.~~; and

(iii) The potential for the contaminant to bioaccumulate or biomagnify through the food chain. A contaminant will be presumed to have this potential if any of the following conditions are met:

(A) The contaminant is listed as a persistent, bioaccumulative, or toxic (PBT) contaminant on the department's PBT list in WAC 173-333-310; or

(B) The log of the contaminant's octonal-water partitioning coefficient is greater than 3.5 (log K_{ow} > 3.5~~).~~);

(iv) Whether contaminants are present at the site at concentrations that are known or suspected to ~~have~~ cause adverse or minor adverse effects on higher trophic level species.

(d) Coordination. Coordination with the appropriate state and federal agencies should be conducted if species protected under the federal Endangered Species Act (16 U.S.C. 1531 et seq.), Title 77 or 79 RCW are present at the site or the site is within the critical habitat of a protected species.

[]

AMENDATORY SECTION (Amending Order 90-41, filed 3/27/91, effective 4/27/91)

WAC 173-204-570 Sediment cleanup standards--General requirements. (1) **Applicability and purpose.** This section ((~~establishes the~~)) specifies the methods for establishing sediment cleanup standards ((~~requirements for cleanup actions required~~)) under ((~~authority of~~)) chapter ((~~90.48 and/or~~)) 70.105D RCW((~~, and/or this chapter, and describes the process to determine site-specific cleanup standards~~)) for sites where there has been a release or threatened release of contaminants to sediment. ~~The methods specified in this section shall not be used to establish the sediment quality standards under Part III of this chapter.~~

(2) ~~**Method for establishing**~~ **Sediment cleanup levels.** The sediment cleanup level is the concentration or level of biological effects of a contaminant in sediment determined by the department to be protective of human health and the environment.

(a) **Method for establishing sediment cleanup levels.** The sediment cleanup level shall be established in accordance with the following requirements:

(i) **Initial level.** The sediment cleanup level shall initially be established at the ~~The~~ sediment cleanup objective ~~shall be used to establish the sediment cleanup level~~;

(ii) **Upward adjustments.** The sediment cleanup level may be adjusted upward from the sediment cleanup objective based on the following site-specific factors:

(A) Whether it is technically possible to achieve the sediment cleanup level at the applicable point of compliance within the site or sediment cleanup unit; and

(B) Whether meeting the sediment cleanup level will have a~~n~~ net adverse environmental impact on the aquatic environment, taking into account the short- and long-term positive effects on natural resources, ~~and~~ habitat restoration, and habitat enhancement and the short- and long-term adverse impacts on natural resources and habitat caused by cleanup actions~~.~~;

(~~ii~~iii) **Limit on upward adjustments.** A sediment cleanup level may not be adjusted upward above the cleanup screening level.

(b) **Establishment of more stringent sediment cleanup levels.** The department may establish sediment cleanup levels more stringent than those established under (a) of this subsection when, based on a site-specific evaluation, the department determines that such levels are necessary to protect human health and the environment. The sediment cleanup level may not be established below the sediment cleanup objective.

(3) **Sediment cleanup objectives.** ((~~The sediment cleanup~~

~~objective shall be to eliminate adverse effects on biological resources and significant health threats to humans from sediment contamination. The sediment cleanup objective for all cleanup actions shall be the sediment quality standards as defined in WAC 173-204-320 through 173-204-340, as applicable. The sediment cleanup objective identifies sediments that have no acute or chronic adverse effects on biological resources, and which correspond to no significant health risk to humans, as defined in this chapter.~~

~~(3) Minimum cleanup~~)) The sediment cleanup objective for a contaminant shall be established as the highest of the following levels:

(a) The lowest of the following risk-based levels:

(i) The concentration of the contaminant based on protection of human health as ~~defined~~ specified in WAC 173-204-561(2);

(ii) The concentration or level of biological effects of the contaminant based on benthic toxicity as ~~defined~~ specified in WAC 173-204-562 ~~and~~ or 173-204-563, as applicable;

(iii) The concentration or level of biological effects of the contaminant ~~not~~ estimated to result in ~~minor~~ no adverse effects to higher trophic level species as ~~defined~~ specified in WAC 173-204-564; and

(iv) Requirements in other applicable ~~federal, state, and local~~ laws;

(b) Natural background; and

(c) Practical quantitation limit.

(4) **Cleanup screening level**s. The ((~~minimum cleanup level is the maximum allowed chemical concentration and level of biological effects permissible at the cleanup site to be achieved by year ten after completion of the active cleanup action.~~

~~(a) The minimum cleanup levels criteria of WAC 173-204-520 shall be used in evaluation of cleanup alternatives per the procedures of WAC 173-204-560, and selection of a site cleanup standard(s) per the procedures of this section.~~

~~(b) The Puget Sound marine sediment minimum cleanup level is established by the following:~~

~~(i) Sediments with chemical concentrations at or below the chemical criteria of Table III shall be determined to meet the minimum cleanup level, except as provided in (b)(iv) of this subsection; and~~

~~(ii) Sediments with chemical concentrations that are higher than the chemical criteria of Table III shall be determined to exceed the minimum cleanup level, except as provided in (b)(iii) of this subsection; and~~

~~(iii) Sediments with biological effects that do not exceed the levels of WAC 173-204-520(3) shall be determined to meet the minimum cleanup level; and~~

~~(iv) Sediments with biological effects that exceed the levels of WAC 173-204-520(3) shall be determined to exceed the minimum cleanup level; and~~

~~(v) Sediments which exceed the sediment minimum cleanup level human health criteria or the other toxic, radioactive,~~

~~biological, or deleterious substances criteria or the nonanthropogenically affected criteria of WAC 173-204-520 as determined by the department, shall be determined to exceed the minimum cleanup level.~~

~~(4) Sediment cleanup standard. The sediment cleanup standards are established on a site-specific basis within an allowable range of contamination. The lower end of the range is the sediment cleanup objective as defined in subsection (2) of this section. The upper end of the range is the minimum cleanup level as defined in subsection (3) of this section. The site specific cleanup standards shall be as close as practicable to the cleanup objective but in no case shall exceed the minimum cleanup level. For any given cleanup action, either a site-specific sediment cleanup standard shall be defined, or multiple site unit sediment cleanup standards shall be defined. In all cases, the cleanup standards shall be defined in consideration of the net environmental effects (including the potential for natural recovery of the sediments over time), cost and engineering feasibility of different cleanup alternatives, as determined through the cleanup study plan and report standards of WAC 173-204-560.~~

~~(5) All cleanup standards must ensure protection of human health and the environment, and must meet all legally applicable federal, state, and local requirements.~~)) cleanup screening level for a contaminant shall be established as the highest of the following levels:

(a) The lowest of the following risk-based levels:

(i) The concentration of the contaminant based on protection of human health as ~~defined~~ specified in WAC 173-204-561(3);

(ii) The concentration or level of biological effects of the contaminant based on benthic toxicity as ~~defined~~ specified in WAC 173-204-562 ~~through~~ or 173-204-563, as applicable;

(iii) The concentration or level of biological effects of the contaminant ~~that are not~~ estimated to result in ~~minor~~ no adverse effects to higher trophic level species as ~~defined~~ specified in WAC 173-204-564; and

(iv) Requirements in other applicable ~~federal, state and local~~ laws; ~~and~~

(b) Regional background as defined in subsection (5) of this section; and

(c) Practical quantitation limit.

(5) **Regional background.** ~~Regional background is the concentration of a contaminant within a department-defined geographic area that is primarily attributable to atmospheric deposition or diffuse nonpoint sources not attributable to any source.~~ Regional background for a contaminant shall be established by the department in accordance with the requirements of this subsection.

~~(a) In an area with no established regional background, a person is required to provide samples or demonstrate that sufficient data exists. The department will determine if the data is sufficient to establish a regional background~~

(a) The department will determine the geographic area for establishing regional background for a contaminant.

(b) If a site or sediment cleanup unit is located within a geographic area where regional background for a contaminant has not been established, the department may:

(i) Compile and collect sufficient sampling data to establish regional background;

(ii) Require any potentially liable person to compile and collect sufficient sampling data, as determined by the department, to establish regional background; or

(iii) If there is currently insufficient sampling data to establish regional background, after consulting with any potentially liable person, establish regional background at natural background.

(c) The department expects that regional background will usually be greater than natural background. If the department determines, based on sampling data, that regional background is not greater than natural background, the department will establish regional background at natural background.

(d) ~~(b) Sampling of contaminants within a department-defined geographic area may be conducted to establish a regional background.~~ Calculation of regional background for a contaminant must exclude samples from areas with an elevated level of contamination due to the direct impact of known or suspected contaminant sources, including areas within a sediment cleanup unit or depositional zone of a discharge.

(~~c~~e) The department will determine the appropriate statistical analyses, number and type of samples, and analytical methods to establish a regional background on a case-by-case basis.

(~~d~~f) If a water body is not beyond the direct influence of a significant contaminant source, the department may use alternative geographic approaches to determine regional background for a contaminant. Several factors must be evaluated when determining an alternate geographic approach including:

(i) Proximity of sampling locations to the site;

(ii) Similar geologic origins as the site sediment;

(iii) Similar fate and transport and biological activities as the site; and

(iv) Chemical similarity with the site.

(6) **Point of compliance.** The point of compliance shall be established at a location that is protective of both aquatic life and human health. To protect aquatic life, the point of compliance shall be established within the biologically active zone. If that location is not sufficient to protect human health, then the point of compliance shall be established at a different location that is also protective of human health.

(~~6~~7) **Compliance monitoring.**

(a) **General.** The methods used to determine compliance with sediment cleanup standards shall be determined by the department on a site-specific basis.

(b) **Use of tissue analysis.** At the department's discretion, and when determined to provide appropriate protection for human health or the environment, contaminants in tissue may be used to identify and screen chemicals of concern in sediment during the remedial investigation/feasibility study and to evaluate compliance with sediment cleanup standards.

(i) **Risk assessment requirements.** Assessments of risk to human health or the environment from tissue chemical concentrations must be consistent with the procedures of WAC 173-204-560, 173-204-561, and 173-204-564.

(ii) **Species and tissue type selection.** The methods and procedures used to select the appropriate species and tissue types shall be determined by the department on a site-specific basis.

(c) **Monitoring approaches.** For sediment cleanup standards based on the benthic criteria in WAC 173-204-562 or 173-204-563, as applicable, the department will determine compliance on an individual station by station approach. For sediment cleanup standards based on other criteria, the department will determine compliance by area weighted or other averaging approach, individual station by station approach, or a combination of both. The department will determine the most appropriate monitoring approach based on exposure pathways and receptors.

(~~7~~8) **Data reporting.** Any person~~(s)~~ who samples sediment and/or tissue to assess compliance with this ~~P~~part ~~V of this chapter~~ shall comply with the following conditions:

(a) Where analytical results indicate a chemical is not detected in a sample, the data shall be reported as "non detect" at the method detection limit and the method detection limit reported~~.~~; and

(b) Where analytical results indicate a chemical is detected between the method detection limit and the practical quantitation limit in a sample, the data shall be reported and qualified as "estimated."

[Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-570, filed 3/27/91, effective 4/27/91.]

NEW SECTION

WAC 173-204-575 Cleanup action decisions. (1) **Purpose.** The department shall use the remedial investigation/feasibility study report and other appropriate information to establish sediment cleanup standards and select cleanup actions for a site or sediment cleanup unit. These decisions must be consistent with this ~~chapter~~ part and ~~the underlying administrative authority~~ chapter 70.105D RCW.

(2) **State cleanup sites.** For sites or sediment cleanup units being cleaned up under the authority of chapter 70.105D RCW, the department shall prepare a cleanup action plan documenting its cleanup decisions. The cleanup action plan shall be prepared consistent with the pertinent requirements and procedures specified in WAC 173-340-380. The decisions in the cleanup action plan shall be incorporated into any enforcement order, agreed order, consent decree, or other binding legal

document issued under chapter 70.105D RCW. The public review process for the department's decisions shall comply with the requirements and procedures in chapter 173-340 WAC.

(3) **Federal cleanup sites.** For sites or sediment cleanup units being cleaned up under the authority of the federal Comprehensive Environmental Response, Compensation and Liability Act (42 U.S.C. ~~§§~~ Sec. 9601 et seq.), a record of decision, administrative order, consent decree, or other binding legal document issued under the federal cleanup law may be used by the department to meet the requirements of this section provided:

(a) The ~~cleanup~~ remedial action is consistent with the requirements in this ~~chapter~~ part;

(b) The state has concurred with the ~~cleanup~~ remedial action; and

(c) An opportunity was provided for the public to comment on the ~~cleanup~~ remedial action.

(4) **Other authorities.** For sites or sediment cleanup units being cleaned up under other authorities, the department expects that cleanup decisions ~~shall~~ will be incorporated into the permit, administrative order, or other appropriate binding legal document. The public review process, and documentation for the department's decisions, shall be consistent with the requirements and procedures for the underlying administrative authority.

(5) **Public involvement.** The department shall provide public notice and an opportunity for review and comment on its sediment cleanup decisions under this ~~chapter~~ part.

(a) Where the underlying administrative authority used to implement the ~~cleanup~~ remedial action provides an adequate public notice and comment opportunity prior to implementation of the ~~cleanup~~ remedial action, separate public notice and comment is not required under this ~~chapter~~ part.

(b) If the underlying administrative authority does not provide adequate public notice and comment opportunity, then the department shall provide for this prior to implementation of the ~~cleanup~~ remedial action.

(c) Where more than one public notice and comment period is needed to fulfill the requirements of this ~~chapter~~ part and those in other laws, the department may combine public notice and comment periods, hearings, and other public involvement opportunities to streamline the public review process.

[]

AMENDATORY SECTION (Amending Order 90-41, filed 3/27/91, effective 4/27/91)

WAC 173-204-580 Selection of cleanup actions ((~~decision~~)). ((~~(1) Each person performing a cleanup action to meet the intent of this chapter shall comply with the standards of WAC 173-204-560(7), Cleanup study report. Except for cleanups conducted under chapter 70.105D RCW, the department shall review each cleanup study report and issue a written approval of one or more of the cleanup action alternatives described in the cleanup study report, or issue a written disapproval of all alternatives described in the cleanup study report. The department's approval of one or more cleanup study report cleanup action alternatives shall constitute the cleanup decision and shall be referenced in one or more permit or administrative authorities established under chapter 90.48 or 70.105D RCW, Section 401 of the federal Clean Water Act, chapter 173-225 WAC, establishment of implementation procedures of application for certification, or other administrative authorities available to the department. The department may approve the cleanup alternative recommended in the cleanup study report, may approve a different alternative discussed in the report, or may approve an alternative(s) with appropriate conditions. The department's disapproval of all cleanup study report cleanup action alternatives shall be issued by certified mail, return receipt requested, to the cleanup action proponent(s). The procedures for department review of the cleanup study report and selection of a cleanup action under chapter 70.105D RCW shall be in accordance with the procedures of chapter 173-340 WAC.~~

~~(2) All cleanup actions conducted under this chapter shall~~

~~meet the following requirements:~~

~~(a) Receive department review and written approval of the preferred and/or alternate cleanup actions and necessary sediment recovery zones proposed in the cleanup study report prior to implementing a cleanup action(s);~~

~~(b) Achieve a degree of cleanup that is protective of human health and the environment;~~

~~(c) Achieve compliance with applicable state, federal, and local laws;~~

~~(d) Achieve compliance with site cleanup standards;~~

~~(e) Achieve compliance with sediment source control requirements pursuant to WAC 173-204-400 through 173-204-420, if necessary;~~

~~(f) Provide for landowner review of the cleanup study plan and report, and consider public concerns raised during review of the draft cleanup report; and~~

~~(g) Provide adequate monitoring to ensure the effectiveness of the cleanup action.~~

~~(3) Cleanup time frame.~~

~~(a) The cleanup action selected shall provide for a reasonable time frame for completion of the cleanup action, based on consideration of the following factors:~~

~~(i) Potential risks posed by the site to biological resources and human health;~~

~~(ii) Practicability of achieving the site cleanup standards in less than a ten-year period;~~

~~(iii) Current use of the site, surrounding areas, and~~

~~associated resources that are, or may be, affected by the site contamination;~~

~~(iv) Potential future use of the site, surrounding areas, and associated resources that are, or may be, affected by the site contamination;~~

~~(v) Likely effectiveness and reliability of institutional controls;~~

~~(vi) Degree of, and ability to control and monitor, migration of contamination from the site; and~~

~~(vii) Natural recovery processes which are expected to occur at the site that will reduce concentrations of contaminants.~~

~~(b) The department may authorize cleanup time frames that exceed the ten-year period used in deriving the site cleanup standards of WAC 173-204-570(4) where cleanup actions are not practicable to accomplish within a ten-year period.~~

~~(4) In evaluating cleanup action alternatives, the department shall consider:~~

~~(a) The net environmental effects of the alternatives, including consideration of residual effects, recovery rates, and any adverse effects of cleanup construction or disposal activities;~~

~~(b) The relative cost-effectiveness of the alternatives in achieving the approved site cleanup standards; and~~

~~(c) The technical effectiveness and reliability of the alternatives.~~

~~(5) Public participation. The department shall provide~~

~~opportunity for public review and comment on all cleanup action study plans, reports, and decisions reviewed and approved by the department, for cleanup actions conducted under this chapter.~~

~~(6) Land access. In cases where the person(s) responsible for cleanup is not able to secure access to lands subject to a cleanup action decision made pursuant to this section, the department may facilitate negotiations or other proceedings to secure access to the lands. Requests for department facilitation of land access shall be submitted to the department in writing by the person(s) named in the cleanup action approval.~~)) (1) **Purpose.** This section establishes the minimum requirements and criteria for selecting sediment cleanup actions under chapter 70.105D RCW. This section applies both to sediment-only cleanup sites and to the sediment portion of any combined upland and sediment cleanup site.

(2) **General requirements.** The department shall review and provide written approval of cleanup actions and sediment recovery zones under WAC 173-204-575 prior to implementation of a cleanup action.

(3) **Minimum requirements for sediment cleanup actions.** The requirements in this subsection and the requirements for establishing ~~the~~ sediment cleanup standards under WAC 173-204-560 shall be considered concurrently. All sediment cleanup actions ~~conducted under this chapter~~ shall meet the following minimum requirements:

(a) Protect human health and the environment;

(b) Comply with all applicable ~~state, federal, and local~~

laws;

(c) Comply with the sediment cleanup standards specified in WAC 173-204-560 through 173-204-564;

(d) Use permanent solutions to the maximum extent practicable, as ~~defined~~ specified in subsection (4) of this section;

(e) Provide for a reasonable restoration time frame as ~~defined~~ specified in subsection (5) of this section. Preference shall be given to alternatives with a shorter restoration time frame; ~~that restore the site sooner. Unless otherwise determined by the department, cleanup actions that achieve compliance with the sediment cleanup standards at a site or sediment cleanup unit within ten years from the start of the cleanup action shall be presumed to have a reasonable restoration time frame.~~

(f) Where source control measures are ~~proposed~~ necessary as part of a cleanup action, preference shall be given to alternatives ~~with~~ that include source control measures that are more effective in minimizing the accumulation of contaminants in sediment ~~due to~~ caused by ~~current and future~~ discharges;

(g) If a sediment recovery zone is necessary as part of the cleanup action, meet the requirements in WAC 173-204-590;

(h) Cleanup actions for a site shall not rely ~~primarily~~ exclusively on monitored natural recovery or institutional controls and monitoring where it is technically possible to implement a more permanent cleanup action. Where institutional controls are used, they must comply with WAC 173-340-440 and the department shall, as appropriate, consider any aquatic state land use classification under chapter 332-30 WAC. Preference shall be given to ~~the types of~~ institutional controls with a demonstrated ability to control exposures and ensure the integrity of the cleanup action;

(i) Provide an opportunity for review and comment by affected landowners and the general public, consistent with the public participation plan, and consider concerns identified in these comments; ~~and~~

(j) Provide adequate monitoring to ensure the effectiveness of the cleanup action. Preference will be given to alternatives with a greater ability to monitor the effectiveness of the cleanup action~~, institutional controls, and any migration of residual contamination~~; and

(k) Provide for periodic review to determine the ~~long-term~~ effectiveness and protectiveness of ~~remedies~~ cleanup actions that utilize containment, enhanced natural recovery, monitored natural recovery, institutional controls, sediment cleanup levels based on practical quantitation limits, or a sediment recovery zone. When required by this provision, the periodic review shall follow the process and requirements specified in WAC 173-340-420.

(4) **Using permanent solutions to the maximum extent practicable.**

(a) This subsection ~~describes~~ specifies the requirements for determining whether a cleanup action consists of permanent solutions to the maximum extent practicable, as required under subsection (3)(d) of this section. When making this determination, the process and criteria in WAC 173-340-360(3) shall be used, except as provided in (b) of this subsection.

(b) The evaluation of cleanup action alternatives under WAC 173-340-360(3) requires consideration of several criteria. One of those criteria is long-term effectiveness. Cleanup actions may consist of a combination of cleanup action components. ~~However,~~ When assessing the relative degree of long-term effectiveness of cleanup action ~~alternatives~~ components, the following ~~hierarchy~~ types of components~~, in descending order, shall~~ may be used as a guide, in descending order, in place of the ~~hierarchy~~ components listed in WAC 173-340-360 (3)(f)(iv):

(~~a~~i) Source controls in combination with other cleanup technologies;

(~~b~~ii) ~~Dredging and beneficial~~ Beneficial reuse of the sediments;

(~~c~~iii) ~~Dredging and~~ Treatment to immobilize, destroy, or detoxify contaminants;

~~(d) In-situ treatment to immobilize, destroy, or detoxify contaminants;~~

(~~e~~iv) Dredging and disposal in an upland engineered facility that minimizes subsequent releases and exposures to contaminants;

(~~f~~v) Dredging and disposal in a nearshore, in-water, confined aquatic disposal facility;

(~~g~~vi) Containment of contaminated sediments in-place with an engineered cap;

(~~h~~vii) Dredging and disposal at an open water disposal site approved by ~~the department~~ applicable state and federal agencies;

(~~i~~viii) Enhanced natural recovery;

(~~j~~ix) Monitored natural recovery; and

(~~k~~x) Institutional controls and monitoring.

(5) **Providing a reasonable restoration time frame.** This subsection ~~describes~~ specifies the requirements and procedures for determining whether a cleanup action provides for a reasonable restoration time frame, as required under subsection (3)(e) of this section.

(a) **Presumption.** Unless otherwise determined by the department, cleanup actions that achieve compliance with the sediment cleanup standards at the site or sediment cleanup unit within ten years of completion of construction of the active components of the cleanup action shall be presumed to have a reasonable restoration time frame.

(b) **Relationship to sediment recovery zone.** If the restoration time frame for a cleanup action is longer than ten years after completion of construction of the active components of the cleanup action, then a sediment recovery zone must be established as part of a cleanup action in accordance with WAC 173-204-590.

(~~a~~c) **Factors.** When determining whether a cleanup action provides a reasonable restoration time frame, the following factors shall be considered:

(i) The length of time it will take for the cleanup action to achieve the sediment cleanup standards at the site or sediment cleanup unit. Preference shall be given to alternatives that achieve sediment cleanup standards at the site or sediment cleanup unit sooner~~.~~;

(~~i~~ii) Potential risks posed by the site or sediment cleanup unit to biological resources and human health;

(~~ii~~iii) Practicability of achieving the site or sediment cleanup unit-specific cleanup standards in less than a ten-year period;

(~~iii~~iv) Current use of the site or sediment cleanup unit, surrounding areas, and associated resources that are, or may be, affected by residual contamination;

(v) The aquatic state land use classification under chapter 332-30 WAC of the lands encompassing the site or sediment cleanup unit;

(~~iv~~vi) Potential future use of the site or sediment cleanup unit, surrounding areas, and associated resources that are, or may be, affected by residual contamination;

(~~v~~vii) Likely effectiveness of source control measures to reduce the time to achieve cleanup standards;

(viii) Likely effectiveness and reliability of institutional controls;

(~~vi~~ix) Degree of, and ability to, control and monitor migration of residual contamination; and

(~~vii~~x) The degree to which natural recovery processes are expected to reduce contamination.

~~(b) **Time frames longer than ten years.** The department must~~

~~authorize any restoration time frame longer than ten years after the start of the cleanup action. To be authorized, the proponent must demonstrate that cleanup actions cannot practicably achieve sediment cleanup standards at the site or sediment cleanup unit within ten years after the start of the cleanup action. If the department approves a longer restoration time frame, the department must also establish a sediment recovery zone in accordance with WAC 173-204-590.~~

[Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-580, filed 3/27/91, effective 4/27/91.]

AMENDATORY SECTION (Amending WSR 96-02-058, filed 12/29/95, effective 1/29/96)

WAC 173-204-590 Sediment recovery zones. (1) **Applicability.** ((~~The purpose of this section is to set forth the requirements for establishment and monitoring of sediment recovery zones to meet the intent of sediment quality dilution zones authorized pursuant to RCW 90.48.520.~~

~~The standards of this section are applicable to cleanup action decisions made pursuant to WAC 173-204-580 where selected actions leave in place marine, low salinity, or freshwater sediments that exceed the applicable sediment quality standards of WAC 173-204-320 through 173-204-340.~~)) This section specifies requirements governing the establishment and monitoring of sediment recovery zones. Sediment recovery zones are ~~necessary~~ required at sites and sediment cleanup units where:

(a) The department has determined under WAC 173-204-570 that the selected cleanup actions cannot ~~practicably~~ achieve sediment cleanup standards within ~~a~~ ten years ~~restoration time frame from the start~~ after completion of construction of the active components of the cleanup action; and

(b) Performance monitoring or a periodic review indicates a cleanup action has not achieved, or is projected to not achieve, sediment cleanup standards within ten years after completion of construction of the active components of the cleanup action.

(2) **General requirements.** ((~~Authorization of~~)) A sediment recovery zone ((~~by the department~~)) shall ((~~require compliance~~)) comply with the following general requirements:

(a) ((~~The sediment recovery zone shall be determined by application of the department's sediment recovery zone computer models "CORMIX," "PLUMES," and/or "WASP," or an alternate sediment recovery zone model(s) approved by the department under WAC 173-204-130(4) as limited by the standards of this section and the department's best professional judgment.~~

~~(b) The department shall provide specific authorization for a sediment recovery zone within the written approval of the cleanup study report and cleanup decision required under WAC 173-204-580.~~

~~(c) The time period during which a sediment recovery zone is authorized by the department shall be so stated in the~~

~~department's written approval of the cleanup study report and cleanup decision.~~

~~(d) The department's written sediment recovery zone~~)) When the department determines during the remedy selection process under WAC 173-204-570 that a sediment recovery zone is necessary, the sediment recovery zone shall be described in the cleanup action plan or other decision document issued under WAC 173-204-575;

(b) When the department determines that a sediment recovery zone is necessary as a result of performance monitoring or a periodic review, the sediment recovery zone shall be described in a new or amended decision document issued under WAC 173-204-575;

(c) Once established, the duration or boundary of a sediment recovery zone may only be adjusted during the periodic review process under WAC 173-204-570(3) or during the renewal of the sediment recovery zone. Any change in the duration or boundary of a sediment recovery zone is subject to public involvement under subsection (7) of this section;

(d) Specific authorization for the sediment recovery zone, any extension, or change to the duration or boundary of that zone, must be provided in an enforceable document (permit, order, consent decree, etc.);

(e) Establishment or expansion of a sediment recovery zone shall not be used as a substitute for active cleanup actions, when such actions are determined to be practicable under WAC 173-204-570;

(~~b~~f) The areal extent of the sediment recovery zone shall be as small as practicable, as determined under WAC 173-204-570 ~~not extend beyond the area within the site or sediment cleanup unit where the department has determined the cleanup action cannot practicably achieve sediment cleanup standards within a ten year restoration time frame from the start of the cleanup action~~;

(~~e~~g) The chemical concentrations within the sediment recovery zone shall be as close to the sediment cleanup standard as practicable, as determined under WAC 173-204-570;

(~~d~~h) ~~Best management practices shall be used for activities resulting in diffuse, nonpoint discharges within the sediment recovery zone~~ Appropriate source control measures shall be implemented to minimize contaminant loading on the sediment recovery zone from ongoing discharges; and

~~e) The department shall ((provide specific authorization for a)) describe the sediment recovery zone ((within the written approval of the cleanup study report and cleanup decision required)) in the cleanup action plan, or other decision document prepared under WAC 173-204-580.~~

~~(d) The department's written sediment recovery zone~~)) ~~Specific authorization for the sediment recovery zone must be provided in an enforceable document (permits, orders, settlements, etc.); and~~

(~~f~~i) Any authorization for a sediment recovery zone shall identify the legal location and landowners of property proposed as a sediment recovery zone.

((~~(e) Operational terms and conditions for the authorized sediment recovery zone pursuant to subsection (5) of this section shall be maintained at all times.~~

~~(f) Where cleanup is not practicable pursuant to the analysis under WAC 173-204-570(4), sediment recovery zones~~)) (3) **Criteria.** When considering whether to authorize, extend or change a sediment recovery zone, the department shall consider the criteria in subsection (2) of this section and the following factors:

(a) Limitation of any modeling used to project the areal extent and time period needed for the sediment recovery zone;

(b) Potential risks posed by the sediment recovery zone to human health and the environment;

(c) The technical practicability of ~~elimination or reduction of~~ eliminating or reducing the size and degree of chemical contamination ~~and/~~or level of biological and human health effects within the proposed sediment recovery zone as determined under WAC 173-204-570;

(d) Current and potential future use of the sediment recovery zone, surrounding areas, and associate resources that are, or may be, affected by releases from the zone including any aquatic state land use classification under chapter 332-30 WAC; and

(e) The need for institutional controls or other site use restrictions to reduce ~~site contamination~~ risks to human health while the sediment recovery zone is in place.

(4) **Duration.** ~~Sediment recovery zones~~ The department may

((~~be authorized~~)) authorize a sediment recovery zone for ((~~periods in excess~~)) an initial duration of up to ten years and, upon application by a potentially liable person, ~~subsequently reviewed and extended~~ authorize extensions in increments not to exceed ten years. When a potentially liable person has made timely and sufficient application, as specified in the authorizing document, for the renewal of a sediment recovery zone, the expiring authorization remains in effect and enforceable until the department either denies the application or reauthorizes the sediment recovery zone.

((~~(3)~~)) The areal extent and time period during which a sediment recovery zone is projected to be necessary will be based on the source loading rate and the recovery rate. The source loading rate and recovery rate shall be determined by application of the department's models "CORMIX," "PLUMES," and/or "WASP," or an alternate method approved by the department under WAC 173-204-130(4), as limited by the requirements of this section and the department's best professional judgment.

~~(b) The time period during which a sediment recovery zone is authorized by the department shall be stated in the cleanup action plan, or other decision document prepared under WAC 173-204-580, and implementing documents.~~

(5) **Operational terms and conditions.** Operational terms and conditions for the authorized sediment recovery zone shall be maintained at all times. These terms and conditions may include:

(a) Chemical, bioassay, benthic infauna, or tissue monitoring of discharges, receiving water column, organisms, and sediment;

(b) Confirmation of sediment source(s) loading rates, chemical quality and biological toxicity;

(c) Monitoring contaminant bioaccumulation; and

(d) Ongoing evaluation of the water quality, sediment quality, biological conditions, and human health impacts within and adjacent to the proposed or authorized sediment recovery zone.

(6) **Trespass not authorized.** A sediment recovery zone authorization issued by the department under the authority of chapter ((~~90.48 or~~)) 70.105D RCW((~~, or other administrative means available to the department,~~)) does not constitute authorization to trespass on lands not owned by the applicant. These requirements do not address, and in no way alter, the legal rights, responsibilities, or liabilities of the permittee or landowner of the sediment recovery zone for any applicable requirements of proprietary, real estate, tort, and/or other laws not directly expressed as a requirement of this ((~~chapter~~)) ~~chapter~~ part.

((~~(4)~~)) (7) **Public involvement.** Prior to authorization, the department shall make a reasonable effort to identify and notify all landowners affected by the proposed sediment recovery zone. The department shall issue a sediment recovery zone notification letter to any person it believes to be a potentially affected landowner, the Washington state department of natural resources, the U.S. Army Corps of Engineers, affected port districts, affected tribes, local governments with land use planning authority for the area, and other parties determined appropriate by the department. The notification letter shall be sent by certified mail, return receipt requested, or by personal service. The notification letter shall provide:

(a) The name of the person the department believes to be the affected landowner; ((~~and~~))

(b) The names of other affected landowners to whom the department has sent a proposed sediment recovery zone notification letter; ((~~and~~))

(c) The name of the sediment recovery zone applicant; ((~~and~~))

(d) A general description of the proposed sediment recovery zone, including the chemical(s) of concern by name and concentration, and the area of affected sediment; ((~~and~~))

(e) The determination of the department concerning whether the proposed sediment recovery zone application meets the ((~~standards~~)) requirements of this section; ((~~and~~))

(f) The intention of the department whether to authorize the proposed sediment recovery zone; and

(g) ((~~Notification that the affected landowner may~~)) Invite comments on the proposed sediment recovery zone. Any landowner comments shall be submitted in writing to the department within thirty days from the date of receipt of the notification letter, unless the department provides an extension.

((~~(5) As determined necessary by the department, operational terms and conditions for the sediment recovery zone~~

~~may include completion and submittal to the department of discharge effluent and/or receiving water column and/or sediment chemical monitoring studies and/or bioassays to evaluate ongoing water quality, sediment quality, and biological conditions within and adjacent to the proposed or authorized sediment recovery zone.~~

~~(6)~~)) (8) **Enforcement.** The department shall review all data or studies conducted ((~~in accordance with~~)) under a sediment recovery zone authorization to ensure compliance with the terms and conditions of the authorization and the ((~~standards~~)) requirements of this section. Whenever, in the opinion of the department, the ((~~operational~~)) terms and conditions of a sediment recovery zone or the ((~~standards~~)) requirements of this section are violated or there is a potential to violate the sediment recovery zone authorization or the ((~~standards~~)) requirements of this section, or new information or a reexamination of existing information indicates the sediment recovery zone is no longer appropriate, the department may at its discretion:

(a) Require additional chemical or biological monitoring as necessary;

(b) Revise the sediment recovery zone authorization as necessary to meet the ((~~standards~~)) requirements of this section;

(c) Require active contaminated sediment maintenance actions, including additional cleanup in accordance with the standards of WAC 173-204-500 through 173-204~~-580~~-575; and/or

(d) Withdraw the department's authorization of the sediment recovery zone.

[Statutory Authority: RCW 90.48.220. 96-02-058, § 173-204-590, filed 12/29/95, effective 1/29/96. Statutory Authority: Chapters 43.21C, 70.105D, 90.48, 90.52, 90.54 and 90.70 RCW. 91-08-019 (Order 90-41), § 173-204-590, filed 3/27/91, effective 4/27/91.]

NEW SECTION

The following section of the Washington Administrative Code is decodified as follows:

Old WAC Number	New WAC Number
173-204-520	173-204-562
173-204-530	173-204-520
173-204-540	173-204-530
173-204-550	173-204-540
173-204-560	173-204-550
173-204-570	173-204-560
173-204-580	173-204-570

Appendix E

Additional Freshwater Benthic Criteria Analyses

Appendix E: Additional Freshwater Benthic Criteria Analyses

After peer review, Ecology conducted analyses with paired chemistry and bioassay data from the Environmental Information Management System (EIM) to answer questions related to the proposed freshwater criteria calculated using the Floating Percentile Model (FPM). These analyses focused on how the proposed CSL chemical criteria, within the framework of the SMS rule, would identify cleanup sites compared to other freshwater values and the biological criteria.

Several approaches were undertaken to determine whether the proposed CSL chemical criteria were as effective at identifying metals, mining, and smelting sites as other values that are in use, such as the Probable Effects Concentrations (PECs). Given that the adopted rule language allows the use of other methods approved by Ecology to establish site-specific cleanup standards, this evaluation was focused on how identification of metals, mining, and smelting sites would differ between the different chemical criteria (PEC and CSL) and the biological criteria. Special emphasis was given to eastern Washington projects, due to the greater concern in that region on impacts of mining, milling, and smelting activities (see Section E.1).

Additionally, an analysis was conducted to address concerns regarding the potential influence of high metals concentrations with no associated toxicity in slag. Concern was expressed that these higher concentrations influenced the resulting copper, lead, and zinc chemical criteria (see Section E.2).

During and after the public comment period on the proposed SMS rule revisions, prior to adoption of the freshwater sediment biological and chemical criteria, Ecology conducted additional analyses on the proposed freshwater chemical and biological benthic criteria to address questions and comments raised. These issues largely centered around whether the benthic chemical and biological criteria were protective enough, particularly with respect to As, Cu, Pb, and Zn. The comments also suggested that alternative derivation and/or interpretative approaches could be used (see Sections E.3–E.8).

The analyses that were conducted are summarized in the following sections, including the question being addressed, the methods used, and the results and conclusions of the analysis.

E.1 Site Identification

This set of analyses was conducted to evaluate whether the chemical CSL criteria would identify the same sites as the PECs and/or the biological CSL criteria. The biological test results are considered to represent the "true" toxicity of the sediments.

Under the SMS, site identification is conducted as follows:

- Using chemical data, if the average of the three highest concentration stations exceeds the chemical CSL criteria for one or more chemicals, that group of stations is considered a site.

- Using biological data, if at least three stations exceed the biological CSL criteria, that group of stations is considered a site.

- The results of the biological tests, if available, override the chemical concentrations for determining that a group of stations is or is not a site. Therefore, the chemical CSL criteria should ideally accurately predict biological CSL criteria failures.

The chemical and biological CSL criteria and PEC values were evaluated in the context of this existing rule framework.

Methods

Site identification was conducted using several different data sets:

1. The entire data set from Washington and Oregon used to calculate the chemical criteria.

2. Data from the same areas that were excluded from those calculations due to limited analyte lists or poor quality assurance.

3. All projects in eastern Washington included in the FPM data set to calculate the chemical criteria.

4. Seven reaches of the Upper Columbia River, as a representative MMS site.

In each case, the chemical CSL criteria, the PECs, and the biological CSL criteria were used to identify sites as described above and the results were compared.

Results

SITE LISTING EVALUATION

CSL results in false positive- site identified, not confirmed by bioassays
CSL results in false negatives- site identified by CSL, nor confrimed by bioassays
CSL and bioassays agree

WESTERN WASHINGTON PROJECTS FPM DATASET ONLY.

		Biological Assay Results	
		SITE	**NON-SITE**
Chemical (CSL site identification)	**SITE**	LKWA00 (N=28) SALIII97 (N=22) QUEBAX97 (N=3) LKUNDRK (N=4)	QUEBAC1 (N=4) LUUCSO00 (N=6) LKUNION (N=9)
	NON-SITE	TRISTAR (N=3)	WEYLONG (N=3) SEACOMB94 (N=3) FWLUN01(N=5) CEDARIV (N=5) CARGIL01 (N=3)

"MISSED" SITES

TRISTAR (N=3) NPDES sampling, WA ship canal by the locks.

EASTERN WASHINGTON PROJECTS FPM DATASET ONLY.

		Biological Assay Results	
		SITE	**NON-SITE**
Chemical (CSL site identification)	**SITE**	FWSPOR00 (n=8) FWCRUP05 (n=50)	SPOKNR94 (n=3)
	NON-SITE		BOISECAS (n=4)

no "Missed" sites

WESTERN WASHINGTON PROJECTS FPM DATASET ONLY

		Biological Assay Results	
		SITE	**NON-SITE**
Chemical (PEC site identification)	**SITE**	LKWA00 (N=28) SALIII97 (N=22) LKUNDRK (N=4)	LKUNION (N=9) LUUCSO00 (N=6)
	NON-SITE	QUEBAX97 (N=3)	WEYLONG (N=3) SEACOMB94 (N=3) FWLUN01(N=5) CEDARIV (N=5) QUEBAC1 (N=4) TRISTAR (N=3) CARGIL01 (N=3)

"MISSED" SITES
QUEBAX97 (N=3)

EASTERN WASHINGTON PROJECTS FPM DATASET ONLY

		Biological Assay Results	
		SITE	**NON-SITE**
Chemical (PEC site identification)	**SITE**	FWSPOR00 (n=8) FWCRUP05 (n=50)	SPOKNR94 (n=3)
	NON-SITE		BOISECAS (n=4)

1. Using the entire data set:

    - The chemical CSL criteria identified all of the same sites that the biological CSL criteria did (12 sites), except for one small site in western Washington (3 samples). This one site represents about 0.5% of the data in the data set and is the only site that would have been missed.

    - The chemical CSL criteria identified 4 smaller sites (<10 samples) as toxic that were not confirmed by the biological CSL criteria. This result confirms the need for the bioassay override.

    - The PECs had very similar results, with one small site being missed, and 3 fairly small sites (<10 samples) being identified as toxic that were not confirmed by the biological CSL criteria.

    - Therefore, the two approaches appear equally conservative in identifying sites, with each approach missing one site with very few samples (3). This indicates the importance of taking an appropriate number of samples to properly characterize a site rather than relying on the minimum number of samples required to identify a site when conducting an initial evaluation.

2. Using excluded data:

    - The chemical CSL criteria and the PECs produced the same results for site listing at 23 of 28 sites.

    - Three projects in western Washington would have been listed by the chemical CSL criteria that were not identified by the PECs.

    - Two projects in western Washington would have been listed by PECs that were not identified by the chemical CSL criteria. However, these two sites were not confirmed by the biological CSL criteria.

    - Therefore, the chemical CSL criteria were at least as conservative in identifying actual sites as the PECs in this data set, most likely because the suite includes criteria for some chemicals contributing to toxicity that are not included in the PECs.

3. Using eastern Washington data:

    - Both chemical CSL criteria and PECs identified the same projects as toxic or nontoxic, although often for different chemicals.

    - Two of the sites were correctly predicted to be toxic compared to the bioassay results, and one site was correctly predicted to be nontoxic. One project exceeded site identification criteria using both chemical CSL criteria and PECs that was not confirmed by the bioassays.

4. Using the Upper Columbia River data:

- One reach was correctly predicted by both chemical CSL criteria and the PECs to be toxic. Three reaches were also correctly predicted by both chemical CSL criteria and the PECs to be nontoxic.

- Two reaches were predicted to be toxic by PECs that were actually nontoxic. These reaches were correctly predicted to be nontoxic by the chemical CSL criteria.

- One reach was correctly predicted to be toxic by the PECs, but not the chemical CSL criteria. However, in this reach, the one station predicted to be toxic by the PECs was not among the stations that were actually toxic.

- Overall, for Upper Columbia River, the PECs missed 8 stations that were toxic, and the chemical CSL criteria missed 9 stations that were toxic. The PECs identified 18 stations as toxic that were not, and the chemical CSL criteria identified 3 stations as toxic that were not. Therefore, the two methods had a similar false negative rate (toxic stations identified as non-toxic), but the PECs had a much higher false positive rate (non-toxic stations identified as toxic).

Upper Columbia River Reach evaluation results

	biological site ID	PEC site ID	CSL site ID	*# samples in reach*
Reach 1 upstream swift river	no	no	no	*5*
Reach 2: upper reservoir reach	no	no	no	*5*
Reach 3, middle resservoir reach	no	no	no	*6*
Reach 4a lower middle reach (wide portion)	yes	yes*	no	*8*
Reach 4b lower middle reach narrow portion)	no	yes	no	*4*
Reach 5: upper lower reservoir	no	yes	no	*8*
Reach 6- lower reservoir reach	yes	yes**	yes**	*14*

* the single sample with PEC exceedance did not correlate to biological assay hits

** 3 of 4 biological hits were accompanied by SL exceedances (for both PEC and CSL)

Upper Columbia River reliability evaluation

	BIOLOG HIT	BIOLOG NO HIT
CSL HIT	3	3
CSL NO HIT	9	35

	BIOLOG HIT	BIOLOG NO HIT
PEC HIT	4	18
PEC NO HIT	8	20

	COLOR KEY	
	BIOLOG HIT	*BIOLOG NO HIT*
SL HIT	*true positive*	*false positive*
SL NO HIT	*false negative*	*true positive*

E.2 Effects of Cu, Pb, and Zn

This set of analyses was conducted to evaluate the potential effect of high-concentration, low-toxicity data (as may be found in mining wastes) on the resulting chemical CSL criteria. The CSL criteria are relatively high for these three metals compared to the PECs. This analysis was conducted in response to expressed concerns that data from the Upper Columbia River may have unduly influenced the data set and the resulting chemical CSL criteria.

Methods

Two evaluations were conducted:

1. As representative of an area with mining wastes and high concentrations of these three metals, data for the Upper Columbia River (UCR) was examined station by station to evaluate the relative performance of the PECs and chemical CSL criteria in predicting bioassay results.

2. The entire FPM data set was examined for these three metals, focusing on false negative results (toxic stations that would be missed) by the PECs or chemical CSL criteria for these metals.

Results

It should be noted that it is not possible to know which chemical criteria are in error when biological toxicity is not accurately predicted. It is also possible that none of the criteria are in error, but that biological toxicity is caused by chemicals not included in the criteria set or by physical factors, such as the type of habitat provided by slag, which cannot be addressed through chemical criteria. Therefore, focusing on individual chemicals represents an assumption that they may be involved in toxicity that is difficult to confirm or definitively reject. However, the relative performance of different criteria sets may provide useful information.

1. Upper Columbia River (UCR)

    - As presented in Analysis 4 of E.1 above, the PECs and chemical CSL criteria had a similar number of false negatives for the UCR. This suggests that the two criteria sets have a similar ability to identify toxic stations, even though some of the metals criteria are quite different.

    - In addition, the PECs predicted a much larger number of stations to be toxic that were not actually toxic.

2. Complete FPM Data Set

    - For Cu, there were 38 false negatives associated with the chemical CSL criteria, and 34 with the PECs. Twelve of these samples were from the UCR area.

- For Pb, there were 41 false negatives associated with the chemical CSL criteria, and 38 with the PECs. Twelve of these samples were from the UCR area.

- For Zn, there were 25 false negatives associated with the chemical CSL criteria, and 25 with the PECs. None of these samples was from the UCR site.

- Overall, out of the entire data set, there were 0–4 samples that differed in their false negative status between the two criteria sets for these metals, suggesting that there is little difference in protectiveness between the PECs and chemical CSL criteria for these metals.

- It should be noted that there are chemical CSL criteria for some metals that are lower than the PECs, and the chemical CSL criteria also include some chemicals that the PECs do not. When all chemicals are considered and included, the chemical CSL criteria have fewer false negatives and fewer false positives than the PECs.

- Because there is little difference in benthic toxicity predictiveness between the PECs and the CSLs, the toxic observed but not predicted is likely due to chemicals not measured, physical factors associated with the slag matrix, water chemistry, or other site-specific factors not addressed by these chemical values. This result supports the provisions for the bioassay override and the provision allowing development of site-specific cleanup standards in the adopted rule.

E.3 Alternative False Negative Rates

A commenter suggested that SCO and CSL levels for As, Cu, Pb, and Zn may have been set too high based on the use of a 20% false negative rate target for individual bioassay endpoints.

Methods

Two of the endpoints that had the greatest effect on setting the criteria for these metals were the *Hyalell*a 28-day growth (HY28G) and *Hyalella* 28-day mortality (HY28M) endpoints. Therefore, Ecology chose these endpoints to test with an alternative approach, as follows:

- The entire FPM model was rerun for all chemicals for these two endpoints.

- The same data set was included and the model was run in exactly the same manner as the original FPM model runs, except the target false negative rate was set to 10% and 15% rather than 20%, as suggested by the commenter.

Results

The resulting concentrations for all of these chemicals were the same as or higher than the previous results (a higher concentration can be obtained at a lower false negative rate if another associated chemical simultaneously has a lower concentration). Therefore, lowering the false negative rate would not change the SCO or CSL criteria for these metals.

When the model results for a chemical are insensitive to changes in the false negative rate, this typically means that it is not strongly associated with toxicity in the data set, or that another covarying chemical is more strongly associated with toxicity.

E.4 Alternative Biological Interpretive Criteria

A commenter suggested that the SCO and CSL levels for As, Cu, Pb, and Zn may have been set too high due to biological interpretive criteria that were not conservative enough.

Methods

Two of the endpoints that had the greatest effect on setting the chemical criteria for these metals were the *Hyalella* 28-day growth (HY28G) and *Hyalella* 28-day mortality (HY28M) endpoints. Therefore, Ecology chose these endpoints to test with an alternative approach, as follows:

- The entire model was rerun for all chemicals for these two endpoints.,
- The same data set was included and the model was run in exactly the same manner as the original FPM model runs, except the biological interpretive criteria were changed to statistical significant difference only, as suggested by the commenter, as well as adding thresholds in 10% increments.

Results

For some chemicals, there were small reductions in the resulting chemical concentrations at the statistically significant difference only level. However, when combined with the other endpoints in selecting the overall SCO and CSL, the criteria values would not change. This is because these lower values were already reflected in other endpoints and were the same as or higher than the proposed SCO and CSL values. The SCO is the lowest of the values for all the endpoints, and the CSL is the second lowest.

In addition, when combined with the analysis in E.3, lowering both the false negative rate and the biological interpretation criterion at the same time did not change the chemical criteria.

HY28G Results

False Negatives	**10.4%**	**10.3%**	**11.5%**	**20.8%**	**20.5%**	**19.2% (proposed SQVs)**
Bioassay hit definition	**SS only**	**SS + 15%**	**SS + 25%**	**SS only**	**SS + 15%**	**SS + 25%**
Cu	969 ppm	969 ppm	1240 ppm	969 ppm	969 ppm	1240 ppm
Pb	1390 ppm	1390 ppm	1390 ppm	1390 ppm	1390 ppm	1390 ppm
Zn	8410 ppm	3190 ppm	3190 ppm	2290 ppm	2290 ppm	3190 ppm

HY28M Results

False Negatives	10%	10%	20%	20% (proposed SQVs)
Bioassay hit definition	**SS only**	**SS + 10%**	**SS only**	**SS + 10%**
As	10.7 ppm	10.7 ppm	34 ppm	15.8 ppm
Cu	1920 ppm	1920 ppm	1920 ppm	1920 ppm
Pb	1390 ppm	1390 ppm	1390 ppm	1390 ppm
Zn	12300 ppm	14400 ppm	2290 ppm	3190 ppm

E.5 Biological Interpretive Criteria Normalization

A commenter stated that the biological endpoints for mortality should be control-normalized rather than subtracted from the control, and that this would be a more conservative approach that might change the metals (and other) values.

Methods

The following approach was taken to assess this comment:

- All mortality data for the *Hyalella* 10-day (HY10M), *Hyalella* 28-day (HY28M), and *Chironomus* 10-day (CH10M) mortality tests were control-normalized.
- The number of hits and no-hits were recalculated using the normalized data and compared to the subtraction method used to develop the criteria. The overall percentage of the data set that changed was determined.
- For any endpoint where the number of hits (exceedances of the criteria) changed, the model was rerun to determine whether the chemical concentrations and/or their reliability would change.
- The surveys and locations of the affected samples were reviewed to identify any possible patterns in the data and the significance of the changes.

Results

The following results were obtained:

- The number of hit samples increased by 1.7–3.0% for HY10M and CH10M. There were no differences in the hits and no-hits for the HY28M test between the two methods. Ecology considers these values well within the uncertainty range of bioassay test results.
- These slight differences in the numbers of hits for the CH10M and the HY10M endpoints did not result in changes to the FPM metals values when the model was rerun using the control-normalized results.
- The reliability of the HY10M endpoint was about the same, given that so few stations changed. The reliability of the CH10M endpoint decreased somewhat, with 5–15% higher false positives and overall reliability 3–10% lower. This suggests that this normalization procedure introduces noise in the test result interpretation.
- The individual stations that made up the new hits were examined to determine whether there was any pattern. Each station was from a different survey, and the surveys were distributed among Washington and Oregon, east and west of the Cascades, and between cleanup and dredging projects. No identifiable pattern could be found; the additional hits appeared to be random.

E.6 Use of TEC/PEC Values for Cu, Pb, and Zn

A commenter proposed that the TEC/PEC values for Cu, Pb, and Zn be substituted for the proposed criteria for these metals.

Methods

The model spreadsheets allow any alternative values to be substituted into the results and their reliability calculated. The TEC/PEC values for these metals were substituted for the proposed criteria for these metals (with all other values remaining the same). The results were compared to the proposed criteria in terms of false negatives, false positives, and overall reliability for the same data set.

Results

The results of this analysis are shown below. False negative rates for both the PEC and TEC metals substitutions remained the same as those of the proposed criteria. However, the false positive rates were higher for PECs and to a greater extent for TECs, while overall reliability decreased by 17–35%. Therefore, there does not appear to be any advantage to this substitution, as it would not result in values that are more protective of the benthic community and greatly increases the number of false positives.

Table F.3. Results of TEC/PEC Substitution

Reliability	CSLs	PECs	TECs
False negatives	19.2%	19.2%	19.2%
False positives	18.9%	43.4%	69.8%
Overall reliability	81%	64.6%	46.8%

E.7 Univariate vs. Multivariate Approach

Because the issues raised by the commenters did not explain the differences between the TECs/PECs and the proposed criteria for these metals, Ecology was interested in determining the reason for the differences. Ecology hypothesized that it might be related to whether the chemicals were assessed individually or in combination when developing the criteria.

Methods

To simulate univariate approaches such as the TECs/PECs, the following approach was taken:

- The FPM model was rerun as if there was only one chemical in the data set. The data for the other chemicals were removed. Otherwise, the model was run with the same false negative targets, the same biological interpretation criteria, and in all other ways exactly as the model is normally run.

- The model was run separately for As, Cu, Pb, and Zn for the *Hyalella* 28-day growth and mortality endpoints.

- Additional runs were conducted with all four of these metals at the same time, but no other analytes.

- The resulting chemical concentrations and their reliability were compared with those of the proposed criteria.

Results

The following results were obtained:

- Concentrations in the individual chemical runs were similar to or below TEC values for these metals, even with the 20% false negative target and the proposed biological endpoints that include toxicity thresholds in addition to statistically significant difference.

- This result demonstrates that the model is capable of replicating univariate approaches and therefore, the model is mathematically sound.

- However, using the single-chemical approach, false positives were high (typically 75% or above) and overall reliability was generally well below 50%. This result illustrates why univariate approaches tend to be significantly over-conservative.

- When the four metals were run at the same time, all of the concentrations increased and some became similar the proposed for these endpoints.

- Reliability for the four-metal model generally increased, although only to 37-50% (compared to 75-80% for the full FPM with all chemicals). This result illustrates that the more additional chemicals that can be included in the multivariate approach, the more realistic and predictive the resulting concentrations will be. However, it is clearly not sufficient to use individual chemicals or only a few metals, as was done here for illustration purposes.

- In summary, it appears the differences between the TECs/PECs and the proposed criteria result mainly from the type of model used, univariate or multivariate. In other words, the difference is between conducting calculations for one chemical at a time or multiple chemicals. The multivariate model better reflects the manner in which chemicals are actually found in the sediments and has greater reliability in predicting benthic toxicity.

***Hyalella* 28-day Growth Individual Chemical Runs**

	Concentration	False positives	Overall Reliability
As	2.5 ppm	79.2%	40.5%
Cu	22.3 ppm	60.4%	53.2%
Pb	7.48 ppm	88.7%	34.2%
Zn	64 ppm	81.1%	40.5%

***Hyalella* 28-day Growth 4-Chemical Runs**

	Concentration	False positives	Overall Reliability
As	5 ppm	64.2%	50.6%
Cu	28 ppm	64.2%	50.6%
Pb	1390 ppm	64.2%	50.6%
Zn	8410 ppm	64.2%	50.6%

***Hyalella* 28-day Mortality Individual Chemical Runs**

	Concentration	False positives	Overall Reliability
As	2.7 ppm	84.9%	24.4%
Cu	24.7 ppm	64.9%	42.0%
Pb	3.9 ppm	75.5%	33.0%
Zn	81.5 ppm	77.7%	31.7%

***Hyalella* 28-day Mortality 4-Chemical Runs**

	Concentration	False positives	Overall Reliability
As	3.7 ppm	71%	37%
Cu	35.5 ppm	71%	37%
Pb	17.3 ppm	71%	37%
Zn	14400 ppm	71%	37%

E.8 Reference Envelope Approach

A commenter stated the proposed biological interpretive criteria were not protective enough and further suggested that the reference envelope approach could be used as applied at Portland Harbor, OR and the Upper Columbia River site, WA to obtain biological interpretive criteria consistent with the narrative intent of the SMS. Several features of this method were recommended by the commenter, including 1) use of statistical differences only for comparison of biological test results to reference, 2) control-normalization of mortality endpoints, 3) use of biomass endpoints for growth, and 4) use of a reference area for comparison to test samples.

Methods

Recent reports for the Upper Columbia River, WA (MESL, 2012) and Portland Harbor, OR (Windward, 2011) along with other examples nationwide were reviewed to evaluate the use and results of the reference envelope approach. In particular, Ecology was interested in:

- The biological thresholds obtained using the reference envelope approach and how they compared to the proposed biological criteria.
- The consistency of the reference envelope approach among sites and endpoints.
- The applicability of the reference envelope approach to individual sites and/or state-wide.

Results

In reviewing the use of the reference envelope approach in the Pacific Northwest, we found:

- The biological thresholds generated by this approach vary widely for different endpoints and different sites. For example, at the Upper Columbia River, the growth threshold for the *Hyalella* 28-day test was 46% of the control. In contrast, the threshold for the *Chironomus* 10-day growth test was 98.5% of the control.
- Similarly, for Portland Harbor, reference envelope thresholds ranged between 93.9% and 73.6% for different test endpoints. In addition, decision thresholds of 10% and 20% lower than the reference range were also used to identify low/moderate and moderate/high toxicity stations. These decision thresholds also had a range of about 20% among test endpoints, with an overall range of 58.9–85%.
- Compared to the proposed biological criteria, some of these thresholds are more conservative, some are less conservative, and others are similar. The proposed biological criteria represent a more consistent range of thresholds across tests and endpoints, and will provide more consistent state-wide application.
- Use of the reference envelope approach requires identification and verification of appropriate reference areas, which has proven challenging in many freshwater areas. To achieve good statistical power, a significant number of reference samples should be

collected (>10–20) and it may be necessary to conduct more replicates per sample than normal. These data requirements will likely be feasible at only the largest of sites.

- Ecology has provided for the use of site-specific approaches in the adopted rule language, and expects that this could be one of the candidate approaches. However, because the method can produce widely varying thresholds, they should be carefully evaluated to ensure that they meet the narrative intent of “no adverse effects” and “minor adverse effects.”