Part 3 Responsiveness Summary

Record of Decision

Lower Duwamish Waterway

Superfund Site

November 2014

United States

Environmental Protection Agency

Region 10

[This page is intentionally left blank for double-sided printing.]

Parts 1 and 2 of the Record of Decision for the Lower Duwamish Waterway Superfund Site are contained in a separate volume.

[This page is intentionally left blank for double-sided printing.]

LOWER DUWAMISH WATERWAY RESPONSIVENESS SUMMARY

Contents

1 Overview and Background on Community Involvement 1

1.1 Activities Before Issuing the Proposed Plan 1

1.2 Activities after Issuing the Proposed Plan 3

2 Comments from the Public and Responses 5

2.1 Extent of Cleanup 5

2.1.1 Comment: Support for more extensive cleanup 5

2.1.2 Comment: Support for less cleanup 6

2.2 Community and Local Business and Concerns 7

2.2.1 Comment: Overall community concerns 7

2.2.2 Comment: General concerns related to ecological risk 8

2.2.3 Comment: Protection of freshwater resources 8

2.2.4 Comment: Retain local industries/jobs 8

2.2.5 Comment: Business cost burden 9

2.2.6 Comment: Hire locally for cleanup 10

2.2.7 Comment: Avoid disruption of waterfront businesses 11

2.3 Preliminary Remediation Goals (PRGs) and Cleanup Levels - General Comments 12

2.3.1 Comment: Proposed cleanup levels create uncertainty which may make it difficult to reach a settlement to perform the cleanup 12

2.3.2 Comment: Sediment PRGs should be based on anthropogenic background consistent with EPA guidance 15

2.3.3 Comment: EPA should issue a technical impracticability (TI) waiver in the ROD 15

2.3.4 Comment: EPA should not issue a Technical Impracticability Waiver 17

2.3.5 Comment: Natural Background-Based Cleanup Levels Have Not Been Required for State Sediment Cleanups 19

2.3.6 Comment: EPA is misleading the public by suggesting that natural background-based cleanup levels could be achieved 19

2.3.7 Comment: The goal of the cleanup should be safe consumption of resident fish and shellfish 20

2.3.8 Comment: Recommendations for alternative approaches to setting sediment PRGs 21

2.3.9 Comment: Revise sediment PRGs to be consistent with MTCA 22

2.3.10 Comment: Approach for measuring PRG compliance in clamming areas is problematic 24

2.4 Surface Water PRG and ARARs 25
2.4.1 Comment: The surface water PRG for PCBs should not be a cleanup level in the ROD; it should have been developed during the RI/FS; and has not been consistently applied at other Superfund sites 25
2.4.2 Comment: Surface water ARARs should be waived 26
2.4.3 Comment: Surface water PRG will result in overlap with the CWA 28
2.4.4 Comment: Comparisons of water quality data to AWQC are inappropriate 29
2.4.5 Comment: Support surface water PRGs 30
2.5 Tissue PRGs 31
2.5.1 Comment: Tissue concentrations should not be cleanup levels, they should be used only for comparison to monitoring results 31
2.5.2 Comment: Fish Tissue contaminant concentrations should be regulated by the FDA 33
2.5.3 Comment: Tissue PRGs were not developed in the RI/FS and the fish tissue data are too limited and lacking in uniformity to support tissue cleanup levels 34
2.5.4 Comment: Proposed tissue PRGs are not achievable and are excessively stringent 35
2.5.5 Comment: Tissue RBTCs should be presented as a range of values 37
2.5.6 Comment: Collection of additional background tissue data should be performed by EPA and Ecology 37
2.5.7 Comment: Sediment remediation will not reduce clam tissue COC concentrations 38
2.5.8 Comment: Support fish tissue PRGs 38
2.6 Use of Washington Sediment Management Standards 39
2.6.1 Comment: Incorporate Sept 1, 2013 revisions to the SMS into the LDW ROD 39
2.6.2 Comment: Provide flexibility for benthic SCO compliance 40
2.6.3 Comment: Reduce the number of contaminants for which there is an SMS-based RAL 40
2.6.4 Comment: Provide flexibility for ubiquitous chemicals unassociated with readily controlled sources 41
2.6.5 Comment: Benthic SCO (formerly SQS) values are overly conservative 42
2.7 Remedial Action Levels 43
2.7.1 Comment: Disagree with intertidal depth of compliance 43
2.7.2 Comment: No subsurface RALs outside of Recovery Category 1 44
2.7.3 Comment: Do not require active remediation above the CSL 46
2.7.4 Comment: Recovery Category 1 subsurface RALs should be for HH COCs only 46
2.7.5 Comment: Simplify dioxin/furan and cPAH RALs 47
2.8 Remedial Action Objectives 47
2.8.1 Comment: Remedial Action Objectives should be modified 47

2.9 Miscellaneous Regulatory Comments 48
2.9.1 Comment: Cleanup should meet the goals of the Clean Water Act 48
2.9.2 Comment: Water Quality ARARs should be action-specific 48
2.9.3 Comment: ROD should be for an interim remedy 49
2.9.4 Comment: Definition of Site is too broad 50
2.9.5 Comment: It is not necessary to include source control areas in the definition of the Site 51
2.9.6 Comment: Support for EPA's Decision to Address the Whole Waterway 51
2.10 Cleanup Technologies - Capping and Dredging 51
2.10.1 Comment: Selection of dredging versus capping 51
2.10.2 Comment: Partial dredge and cap should not require 4 feet of dredging 53
2.11 Cleanup Technologies - ENR 54
2.11.1 Comment: Tribal concerns about ENR 54
2.11.2 Comment: Community concerns about ENR 54
2.11.3 Comment: EPA should consider allowing ENR or ENR/in-situ technologies in areas subject to scour 54
2.12 Innovative Technologies 55
2.12.1 Comment: Consideration of innovative technologies 55
2.13 Monitored Natural Recovery 55
2.13.1 Comment: Disagree With MNR Below Benthic SCO (formerly MNR Below SQS) 55
2.13.2 Comment: MNR pros and cons 57
2.14 Monitoring/Contingency Actions 58
2.14.1 Comment: Support extensive monitoring program 58
2.14.2 Comment: Insufficient data to support a Proposed Plan 58
2.14.3 Comment: Increased sampling density in Supplemental Scenarios not warranted 59
2.15 Comparative Analysis of Alternatives– Overall Protection of Human Health and the Environment 60
2.15.1 Comment: The cleanup will not result in unrestricted use for seafood consumers. 60
2.15.2 Comment: The Selected Alternative will not reduce concentrations sufficiently to meet the tissue goals for unrestricted Tribal or recreational seafood consumption, and all alternatives have risk-equivalent outcomes above PRGs 61
2.16 Comparative Analysis of Alternatives– Long-term Effectiveness and Permanence 63
2.16.1 Comment: Maximum dredging with ENR elsewhere is more permanent than the Selected Remedy and may be comparable in cost 63

2.16.2 Comment: EPA's Preferred Alternative is not significantly different than less expensive alternatives in the time to reduce surface sediment contaminant concentrations and potential for disturbance of subsurface sediments to increase surface sediment concentrations 64

2.16.3 Comment: EPA is elevating "mass removal" above "risk management" principles in selecting an alternative; other alternatives perform similarly but are less sediment-disturbing. 68

2.16.4 Comment: Update FS with latest data and exclude natural recovery during construction... 69

2.17 Comparative Analysis of Alternatives– Short-term Effectiveness..... 70

2.17.1 Comment: EPA should put more emphasis on short-term risks associated with dredging in its analysis of alternatives 70

2.17.2 Comment: EPA should select a remedy with more dredging than called for in the Preferred Alternative, using best management practices to mitigate releases and resuspension 70

2.17.3 Comment: EPA should re-evaluate selection considering Green and Sustainable Remediation metrics..... 71

2.17.4 Comment: EPA should consider risks associated with PCB releases and transport during dredging activities as these affect alternative selection..... 75

2.17.5 Comment: Dredging and capping are disruptive to benthic communities 78

2.18 Comparative Analysis of Alternatives– Cost 78

2.18.1 Comment: Cost-effectiveness 78

2.18.2 Comment: Presentation of a 2.3% discount rate for net present value (NPV) alone is unrealistic and incomplete..... 79

2.18.3 Comment: Additional, unaccounted costs significantly increase the cost of the Preferred Alternative, and biases its selection 80

2.18.4 Comment: Costs of cleanup are justified 82

2.19 Paying for Cleanup..... 82

2.19.1 Comment: Paying for cleanup..... 82

2.20 Flexibility in Implementing the Cleanup..... 83

2.20.1 Comment: Flexibility 83

2.20.2 Comment: Provide flexible cleanup process for individual businesses 84

2.20.3 Comment: Role of location-specific information in remedial design 84

2.21 Coordination with Early Action Areas..... 85

2.21.1 Comment: NRD Early Action Area remedies in relation to preferred alternative 85

2.21.2 Comment: Clarify authority under which King County-led Early Actions were conducted85

2.22 EPA's Cleanup Plan for Specific Areas of the Waterway 86

2.22.1 Comment: Recovery Categories related to assignment of cleanup technologies..... 86

2.22.2 Comment: Technology assignments must be compatible with waterway use 88

2.22.3 Comment: Additional areas should be designated as eligible for MNR 88
2.22.4 Comment: ENR is inappropriately proposed in some areas 89
2.23 Source Control and Sediment Recontamination 90
2.23.1 Comment: Define recontamination and state the methodology for determining the source of recontamination and endpoints for monitoring compliance 90
2.23.2 Comment: Interagency coordination 91
2.23.3 Comment: Upstream source control 92
2.23.4 Comment: Source control goals are unachievable 92
2.23.5 Comment: Finish and evaluate source control 93
2.23.6 Comment: source control should be included in the ROD 95
2.23.7 Comment: ROD and Source Control Strategy should recognize that some contaminants are ubiquitous and uncontrollable 95
2.24 Institutional Controls 96
2.24.1 Comment: Against fish advisories 96
2.24.2 Comment: Ensure programs to discourage fishing are culturally appropriate 97
2.24.3 Comment: Remedy must include fish advisories 98
2.24.4 Comment: ICs are reliable 98
2.25 Remedy Compatibility With Current and Future Use of the LDW 99
2.25.1 Comment: Hindrance to authorized navigation channel maintenance 99
2.25.2 Comment: Capping in the federal navigation channel 101
2.25.3 Comment: Cleanup must not interfere with commercial use of waterway 102
2.25.4 Comment: Preferred Alternative fails to account for access limitations 102
2.25.5 Comment: Habitat restoration 103
2.25.6 Comment: Invasive species 104
2.26 Support for EPA’s Preferred Alternative 104
2.26.1 Comment: Support EPA’s alternative 104
2.27 Support for LDWG’s Preferred Alternative 104
2.27.1 Comment: LDWG’s “Key Elements” cleanup proposal 104
2.27.2 Comment: Support for LDWG’s cleanup plan 107
2.28 Support for DRCC’s Preferred Alternative 108
2.28.1 Comment: DRCC's preferred alternative 108
2.28.2 Comment: Support DRCC's recommendations 109
2.29 Proposed Plan Content 110
2.29.1 Comment: Proposed Plan content 110

2.30 Human Health Risk 110
2.30.1 Comment: Seafood consumption rates overestimated 110
2.30.2 Comment: PCBs are the risk driver at the Site 111
2.30.3 Comment: Beach play risks are overestimated 112
2.30.4 Comment: Tribal clamming exposure parameters are overestimated 113
2.30.5 Comment: Compliance depths for beach play and clamming scenarios are overestimated 114
2.30.6 Comment: Include Suquamish Tribe exposure parameters 114
2.31 Ecological Risk 115
2.31.1 Comment: Risks to fish overestimated in ERA 115
2.31.2 Comment: Disagree with conclusion of low risks to fish 116
2.31.3 Comment: Tributyltin (TBT) poses risk to fish and invertebrates 116
2.31.4 Comment: Shiner surfperch foraging ranges 117
2.32 Incorporation of Environmental Justice in the Proposed Plan 118
2.32.1 Comment: Support incorporation of environmental justice in the Proposed Plan 118
2.32.2 Comment: Establish pollution prevention and mitigation fund 118
2.32.3 Comment: Support offsets 118
2.32.4 Comment: Fish Advisories increase health inequities in impacted populations 119
2.32.5 Comment: It is not clear how the EJ Analysis was considered in the Proposed Plan 120
2.32.6 Comment: Proposed Plan does not address health inequities 120
2.32.7 Selected Remedy must address disproportionately impacted communities 121
2.32.8 Comment: Implement recommendations of health impact analysis 122
2.32.9 Comment: Health Impact Assessment recommendations should be interpreted with caution 123
2.32.10 Comment: Offsets are not authorized as part of CERCLA 124
2.32.11 Comment: Disagree with advisory group recommendation 127
2.33 Public Participation 128
2.33.1 Comment: Public meeting format and language 128
2.33.2 Comment: Future communication with the public 128
3 Comments from the State and from Tribes 129
3.1 Ecology comments: Acknowledge the Relationship Between the CERCLA Sediment Cleanup and Clean Water Act Obligations 129
3.1.1 Comment: The proposed CERCLA remedial action will not result in the attainment of designated uses and applicable water quality standards in Washington State. 129

3.1.2 Comment: Ecology, per EPA's delegated authority under the Clean Water Act, is obligated and will continue to implement Clean Water Act programs, including NPDES permitting, water quality assessment 305(b) and 303(d) reports, and Total Maximum Daily Loads (TMDLs) or other water pollution control plans 130

3.1.3 Comment (continued) 130

3.1.4 Comment (continued) 131

3.1.5 Comment: EPA suggests that a technical impracticability (TI) waiver is a potential future outcome under CERCLA. 131

3.2 Ecology Comments: Plan Needs Discussion of New Sediment Management Standards (SMS), Including How Sediment Recovery Zones (SRZs) Will Be Used and Regional Background Will Be Addressed 132

3.2.1 Comment: The state has adopted a rule revising Part V of the SMS rule, which will go into effect September 1, 2013 132

3.2.2 Comment: New SMS rule will clarify requirements for cleanup of contaminated sediments under MTCA and the Plan needs to reflect this improvement. 132

3.2.3 Comment (continued) 133

3.2.4 Comment (continued) 133

3.2.5 Comment (continued) 134

3.3 Ecology Comment: Site Monitoring Needs to be Expanded in the Plan 135

3.3.1 Comment: There are mutually beneficial, substantial, multi-media monitoring needs to provide early information for implementing source control activities necessary to ensure success of the cleanup. 135

3.3.2 Comment: Data gaps from the LDW Remedial Investigation (RI) need to be addressed. 135

3.3.3 Comment: The remedy selection for the site relies heavily on monitored natural recovery (MNR), so the Plan needs to establish periodic decision making criteria to assess the projected success of the remedy. 136

3.3.4 Comment: The Proposed Plan distinguishes two categories of Monitored Natural Recovery (MNR) with Different Objectives for Attaining Cleanup Goals. 136

3.3.5 Comment: [Ecology believes that Sediment Recovery Zones (required under the SMS rule) will be necessary] 136

3.4 Ecology Comment: Clarify How Any ROD provisions Relate To Cleanup Levels For Upland Sites 137

3.4.1 Comment: MTCA requires consideration of cross-media contamination when establishing cleanup levels. 137

3.5 Ecology Comment: Upland Source Control Needs to be Tied to the Cleanup in the Consent Decree 137

3.5.1 Comment: Ecology believes that EPA needs to provide active support, both legally and with additional resources, for the long-term source control efforts at this site. 137

3.6 Ecology Comment: The Plan Indicates this Cleanup Will be Sufficient for the ROD to be a Final Action 138

3.6.1 Comment: Under MTCA, a cleanup action that only partially addresses the cleanup of a site is considered an interim action. 138

3.7 Ecology Comments: Surface Water and Tissue Preliminary Remediation Goals (PRGs) need clarification 138

3.7.1 Comment: Ecology has some concerns about including surface water and/or tissue PRGs. 138

3.7.2 Comment (continued) 139

3.7.3 Comment 139

3.7.4 Comment (continued) 139

3.7.5 Comment: Surface water PRGs, if included, should be based upon an evaluation of background levels 140

3.7.6 Comment: Explain how the tissue and surface water PRGs will be used. 140

3.7.7 Comment (continued) 141

3.8 Ecology comments: Clarifications are Needed Regarding Source Control Sufficiency, Recontamination, and Designated Use/Water Quality Standards Attainment 142

3.8.1 Comment: Ecology and EPA continue to work together to bring clarity and definition to the concept of source control sufficiency. 142

3.8.2 Comment: Ecology and EPA will need to work together to define recontamination. 142

3.8.3 Comment: The Plan should acknowledge its relationship to the long-term goals of the river ecology. 142

3.9 Suquamish Tribe Comments 143

3.9.1 Comment: [Tribal trust responsibility] 143

3.9.2 Comment: Interim vs. final remedy 143

3.9.3 Comment: Technical impracticability (TI) waivers 144

3.9.4 Comment: Institutional controls 144

3.9.5 Comment: Activated carbon enhancement or in situ treatment 145

3.9.6 Comment: Environmental Justice Analysis (EJ Analysis) 145

3.9.7 Comment: Sediment Management Standards (SMS) as an Applicable or Relevant and Appropriate Requirement (ARAR). 145

3.9.8 Comment: Non risk driver chemicals of concern (COCs) 146

3.9.9 Comment: Tribal consultation/coordination 146

3.9.10 Comment: Human health risks 146

3.9.11 Comment: [Dioxins and furans] 147

3.9.12 Comment: [Environmental Justice Analysis] 147
3.9.13 Comment: Section 5.1. Early identification and cleanup of EAAs 147
3.9.14 Comment: Section 5.2. controlling sources of contamination 147
3.9.15 Comment: [Risks related to "other" contaminants of concern] 148
3.9.16 Comment: Section 7.2. Fish and Shellfish Tissue PRGs 148
3.9.17 Comment: Section 7.3. Surface water PRGs 148
3.9.18 Comment: Development of remedial alternatives 149
3.10 Muckleshoot Indian Tribe Comments 149

[This page intentionally left blank for double sided printing.]

1 Overview and Background on Community Involvement

This responsiveness summary provides a summary of the significant comments submitted by the public on EPA's February 28, 2013 Proposed Plan for the Lower Duwamish Waterway (LDW) Superfund Site (Site), and EPA's responses to those comments. A responsiveness summary is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 C.F.R. § 300.430(f)(3)(F). All comments summarized in this document have been considered in EPA's selection of a remedy to address the contamination at this Site.

The U.S. Environmental Protection Agency (EPA) has worked closely with Tribes, community members, and other stakeholders throughout the development of the Remedial Investigation (RI), Feasibility Study (FS), and Proposed Plan for the LDW Superfund site. Community participation played an essential role in the development of the Proposed Plan and Record of Decision (ROD) for the LDW.

From the time the site was added to the National Priorities List (NPL) in 2001, EPA has employed a host of outreach methods for engaging stakeholders to foster early and lasting stakeholder involvement. Enhanced public participation is appropriate at this site due to its complexity, environmental justice concerns as documented in EPA's *Environmental Justice Analysis for the Lower Duwamish Waterway Cleanup* (EPA 2014), two federally recognized Tribes with usual and accustomed fishing rights, and the many industrial, commercial, and recreational stakeholders who depend on the LDW.

During the public comment on the Proposed Plan, EPA and the Washington State Department of Ecology (Ecology) sought public comments on two additional documents: EPA's 2013 draft *Environmental Justice Analysis for the Lower Duwamish Waterway Cleanup* and Ecology's 2012 draft final *Lower Duwamish Waterway Source Control Strategy* (EPA 2013a; Ecology 2012). These documents, and responses to comments on EPA's Environmental Justice Analysis (EPA 2014b), are included in the Administrative Record, which also contains this Record of Decision (ROD) and other documents that form the basis for EPA's Selected Remedy.

1.1 Activities Before Issuing the Proposed Plan

Community Involvement Plan: EPA developed a community involvement plan in 2002 after conducting interviews with community members and other stakeholders. In recognition of the large number of Spanish-speaking residents living near the LDW, EPA translated the community involvement plan into Spanish, and produced a Hispanic community involvement supplement to the plan. This supplement focused on the Spanish-speaking community and the special challenges involved engaging this portion of the community.

Information Repositories: EPA established information repositories where the public can review documents associated with the site. One repository is located at EPA's office in Seattle and the other is located near the Site at the South Park Branch of the Seattle Public Library.

Community Advisory Group: The Duwamish River Cleanup Coalition was chosen as the Community Advisory Group (CAG) for the Site in 2002. The Coalition includes two neighborhood associations (South Park and Georgetown), the Duwamish Tribe (which is not federally recognized), the Environmental Coalition of South Seattle, and a number of other environmental and social justice groups. A separate entity, the Duwamish River Cleanup Coalition/Technical Advisory Group (DRCC/TAG) was formed to receive a Technical Assistance Grant from EPA. DRCC/TAG has used the grant to hire a technical advisor who reviews EPA documents, provides briefings to community members, and writes fact sheets explaining issues related to the cleanup of the LDW Superfund site.

Written Updates: EPA has mailed fact sheets and used neighborhood listserves (e-mail mailing lists) to provide updates and notices of meetings. EPA has established a listserve for the LDW and south Elliott Bay Superfund sites with over 900 subscribers as a method for sharing information quickly and efficiently. The RI and FS reports, EPA's Proposed Plan, and reports and updates related to the Early Action cleanups are available to the public on EPA's web site.

Tribal Consultation: The LDW is one of the locations of the Muckleshoot Tribe's commercial, ceremonial, and subsistence fishery for salmon, as part of its usual and accustomed fishing area. The Suquamish Tribe actively manages aquatic resources north of the Spokane Street Bridge, just north of the LDW study area. EPA met regularly with the Tribes' technical staff and has shared draft documents with them for review and feedback throughout the development of the RI, FS, and Proposed Plan, and briefed the Tribes' techical staff prior to issuing the ROD.

EPA provided information to the public and sought public input throughout the RI/FS and development of the Proposed Pan, including:

- From 2001 when the Site was listed on the NPL through 2006, EPA hosted 8 public meetings and open houses.
- EPA and Ecology staff attended neighborhood association meetings on a regular basis, as well as meetings with the business community, to provide project updates.
- EPA and Ecology hosted a workshop on contaminated sediment treatment technologies in June 2006.
- EPA held a public meeting and made the draft RI report available for public comment in 2007. EPA created summaries of the RI in advance of the public meeting and summarized comments received in a fact sheet.
- Starting in 2007, EPA established quarterly technical meetings which are open to the public. In these meetings, attended by a broad range of stakeholders, EPA and Ecology provided updates on the LDW RI/FS, Early Action Areas, and source control activities, and sought stakeholder input on the development of the RI, FS, and Proposed Plan.
- In 2010, EPA held an informal public comment period on the second draft of the FS. EPA made a summary of the FS available to the public and held two public meetings. EPA distributed a fact sheet summarizing the comments received after the meetings.
- During the public comment period for the draft FS, a significant number of comments from community members requested an environmental justice analysis of the alternatives described in

the FS. EPA agreed to develop an Environmental Justice Analysis in response to the comments received.

- EPA hosted a workshop in 2011 bringing together experts and stakeholders to discuss amendment of sediments with activated carbon to reduce bioavailability of contaminants.
- In addition to public involvement and tribal consultation activities centered on the RI/FS, EPA and Ecology developed fact sheets, held public meetings and offered many public comment periods on various aspects of source control and cleanup of Early Action Areas (EAAs).

EPA used a number of innovative approaches to provide outreach to community members who would not normally attend an EPA public meeting, including:

- EPA has been sponsoring and helping to organize the annual Duwamish River Festival in the South Park neighborhood since 2005. The Festival attracts hundreds of families each year and has become an important feature of the community. It provides an opportunity for EPA to interact with community members who would not normally attend a public meeting.
- EPA, public health agencies, and Ecology created a series of posters and handouts which show which fish are safe to eat and provide cooking recommendations. The agencies coordinated on outreach to a health clinic in South Park and participated in a Spanish language call-in program to raise awareness of fish contamination.
- In 2010, EPA sponsored an Environmental Health Fair in South Park, coordinating a host of environmental and health organizations to educate and empower South Park and Georgetown residents regarding environmental health issues and ways to address those issues. Topics included information about the dangers of eating contaminated resident fish from the Duwamish and the safest ways to prepare salmon, and raising awareness of household toxic substances and the importance of keeping toxics out of the Duwamish.

1.2 Activities after Issuing the Proposed Plan

The public comment period for the Proposed Plan was held from February 28 until June 13, 2013. EPA extended the comment period to 105 days from the 30 days required by the NCP due to high community interest and a request from the CAG. The Proposed Plan, along with maps and other supporting documents, were posted on EPA's web site. Hard copies and CDs of the Proposed Plan along with English, Spanish, and Vietnamese summaries of the Proposed Plan were made available at the information repositories.

The public comment period was announced in a number of locations to reach the widest audience possible. A public notice appeared in the Seattle Times on February 28, 2013. EPA sent announcements to neighborhood associations in and near the Duwamish Valley, to industry associations, health providers, environmental groups, and to news outlets that serve the Spanish, Vietnamese, Philippine, Chinese, African, and Japanese communities.

EPA held five formal public comment meetings, most of which were attended by over 100 people, during the public comment period, including the following activities:

- Afternoon and evening meetings were held in the Georgetown neighborhood and in downtown Seattle to accommodate the schedules of the greatest number of people. Spanish and Vietnamese simultaneous interpreters were provided for both sets of meetings. A court reporter transcribed oral comments.
- EPA held a public comment meeting entirely in Spanish in the South Park neighborhood. At that meeting, simultaneous interpretation was available for English speakers. Oral comments were recorded for later translation.
- In addition to EPA-sponsored meetings, EPA discussed the proposed plan at several meetings sponsored by the CAG or other organizations, including:
    - South Park and Georgetown neighborhood association meetings;
    - A panel discussion at the University of Washington;
    - A Vietnamese language boat tour;
    - A briefing to an Interfaith Coalition;
    - A "Duwamish cleanup in 3-D" event organized by a coalition of local artists to educate community members about the Duwamish by building a replica of the Duwamish in the sand at an indoor volleyball court.

During the public comment period, 2,327 written and oral submissions in 10 languages were received. All comments (including translations of comments submitted in languages other than English) are available as part of the Administrative Record.

EPA's efforts to provide opportunities for public participation have gone well beyond the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the NCP. The input EPA received from the public and other stakeholders throughout the RI/FS was instrumental in developing both the Proposed Plan and the ROD. Changes to the Selected Remedy as a result of public comment are documented in Section 12 of the ROD and in responses to comments in this Responsiveness Summary. The ongoing involvement of the community, Tribes, and other stakeholders will remain an important part of the cleanup as it moves forward.

2 Comments from the Public and Responses

This section provides summaries of significant comments received during the public comment period and responses to those comments.

2.1 Extent of Cleanup

2.1.1 Comment: Support for more extensive cleanup

EPA received hundreds of comments from individuals, including many from middle and high school students and area residents, urging a “more complete” or “more comprehensive” cleanup of the Lower Duwamish Waterway (LDW) than the plan proposed by EPA. Reasons cited included a concern for the health of fish and wildlife and for Native Americans and community members who use the beaches and catch fish and crabs in the LDW. Several cited concern that area residents statistically have higher rates of some diseases and shorter lifespans.

Some commenters specifically asked for maximum removal of contaminants by precision dredging as the only reliable method to ensure long-term safety, stating that leaving contaminants in place and relying on “natural recovery” and/or "unstable" caps that may be disrupted by flooding, earthquakes, ship traffic, or other disturbances presents an unacceptable risk. Others stated that if we do not clean the river up well enough, the river will have to be monitored in perpetuity, which will have a high long-term cost, and that a less than complete cleanup may result in the need for additional cleanup in the future.

Response

EPA shares commenters’ concerns about providing for a remedy that addresses risks to the health and well being of everyone who lives near or uses the LDW, inclucing low-income and minority communities and Native Americans who use the Duwamish for cultural and commercial practices, as well as protection of fish, wildlife and other organisms in the waterway. EPA has sought in its Selected Remedy to provide a balance between minimizing the time required to reduce contaminant concentrations in the waterway and providing a thorough and protective cleanup to minimize the risk to public health and the environment in the future.

The cleanup process selected in this Record of Decision (ROD), in conjunction with cleaning up the Early Action Areas and controlling sources of contamination to the waterway, is projected to reduce risks due to people eating contaminated fish and shellfish by 90% or more. Multiple lines of evidence available to EPA at the time of the ROD support the conclusion that removal or isolation of additional contamination beyond the extensive cleanup called for in the Selected Remedy may not be effective due to continuing inputs of low levels of contamination from other sources (e.g., atmospheric and upstream inputs to the waterway), despite ongoing efforts by Ecology and other parties to reduce sources of contamination discharging to the waterway.

Many of the commenters stated concern that the balance of cleanup technologies in the Proposed Plan is wrong—that more dredging, no or little capping, and widespread Enhanced Natural Recovery (ENR) should be selected instead. EPA considered and did not select a remedy that used dredging as the primary means of reducing contamination as requested by many commenters because to do so would have greatly

increased the time as well as the cost to reduce overall contamination in the waterway compared to the Selected Remedy. Dredging plays a significant role in the Selected Remedy, but so do capping, monitored natural recovery (MNR) and enhanced natural recovery (ENR), based upon engineering considerations of site conditions (such as potential for erosion, sedimentation from upstream, and observed trends in natural recovery). The Selected Remedy calls for the highest levels of contamination to be removed through dredging or to be isolated through capping. ENR and MNR are employed only in areas with lower levels of contamination. EPA's analysis of alternatives shows that a larger, removal-based remedy would not substantially improve public health and environmental protection, but would take a good deal longer, cost substantially more, and have greater short-term impacts to aquatic organisms in the waterway and to the community surrounding the waterway because of dredging activity. See also response to comment 2.28.1.

EPA's Selected Remedy includes large-scale remediation, and includes removal or containment of subsurface contamination that could cause recontamination of the surface. EPA believes, based upon regional and national experience (EPA 2005), that capping is a proven and viable technology for contamination under many circumstances (see also response to comment 2.10). EPA will use sampling and monitoring results to guide and refine the cleanup action to provide additional assurance that the process is reducing contaminant concentrations as predicted.

EPA recognizes that the communities surrounding the LDW are disproportionately impacted by a number of factors that lead to higher rates of disease including atmospheric pollution and diet, as well as contamination in the LDW. The Environmental Justice Analysis suggested to EPA a variety of ways to address or lessen community concerns. Responses to comments related to Environmental Justice are provided in Section 2.32.

Responses to many of the specific concerns raised in these comments are provided throughout this Responsiveness Summary.

2.1.2 Comment: Support for less cleanup

EPA received comments from the Lower Duwamish Waterway Group (LDWG) and a number of individuals and businesses who advocated for a less comprehensive cleanup of the LDW than proposed by EPA. Reasons cited centered around assertions that remedial alternatives that focused more on natural recovery and less on active cleanup, particularly alternatives with less dredging, would result in a faster, more cost-effective cleanup, coupled with arguments that the LDW will be recontaminated to levels above proposed cleanup levels due to stormwater and other ongoing sources of contamination that cannot be completely controlled.

Response

As stated in the Proposed Plan, the Selected Remedy for the In-waterway Portion of the Site is part of a series of actions to address the contamination in the LDW. These comments (as well as those that desire more intensive cleanup) highlight the need to consider and apply the remedy selection criteria in the NCP, and particularly the balancing criteria, that EPA is required to use, which are explained and applied in Section 10 of the ROD. They also highlight the need to recognize the limitations of natural recovery and corresponding projections of its effectiveness based on modeling as opposed to the greater certainty

inherent in active remediation. It is also critically important to recognize that the Selected Remedy relies on active cleanup only to achieve the sediment Remedial Action Levels (RALs) in this ROD. Monitored natural recovery (MNR) is being relied upon to further reduce contaminant concentrations to the more stringent cleanup levels, requirements, and targets. Many specific concerns related to this comment and EPA's responses are provided throughout this Responsiveness Summary.

2.2 Community and Local Business and Concerns

2.2.1 Comment: Overall community concerns

Many community members emphasized the importance of a clean Duwamish to the surrounding communities and expressed their concerns about specific issues important to community members. They stated that the health and well being of the people who live and work around the Duwamish should be a high priority when developing the cleanup plan. Some emphasized the importance of cleaning up the beaches and stated that they are currently reluctant to allow their children to play on the beaches or in the Duwamish due to the contamination.

Some commenters felt the communities around the Duwamish are currently underserved, and would like to see the cleanup include improvements that would yield more tangible benefits for these communities, such as community health clinics, food banks, boat access to the river, bike paths, parks, activity centers, and education and training for youth. However, some commenters were concerned that a cleaner Duwamish will lead to unacceptable gentrification in the area.

Commenters asked that the cleanup be compatible and promote recreational use of the river including kayaking and boating, including provisions for small boat access points. One commenter noted that the City has water sports programs for paddling and rowing on every other body of water in or around the City but not the Duwamish. One commenter asked that fishing decks be built on the shoreline. One commenter requested that EPA and Ecology enter into consultation with the Washington State Recreation and Conservation Office to request that they address needs for recreation in the South Park and Georgetown communities in the state Comprehensive Outdoor Recreation Plan as part of a comprehensive river cleanup program.

One member of a community group asked what community groups can do to support the cleanup of the Duwamish.

Response

EPA agrees that one of the primary objectives of the cleanup is to reduce risks to the communities surrounding the Duwamish. However, it is not within EPA's authority to provide or to require that parties responsible for cleanup provide benefits or address community issues that are not directly related to addressing contamination in the LDW.

The ROD includes cleaning up intertidal areas to make them safe for clammers and children playing in these areas. Currently, public beaches such as Duwamish Waterway Park are safe for recreational use. It is also currently safe to launch and use small boats in the LDW, except that areas near outfalls should be avoided after storms due to the potential for microbial and other contamination. EPA cannot require

parties to provide boat access points or other improvements to allow for more recreational use of the waterway but encourages voluntary efforts to improve public access to the LDW and may be able to design and implement the Selected Remedy in coordination with other efforts to improve public access to the waterway.

Individuals and groups who are interested in supporting the cleanup are encouraged to work with community organizations such as DRCC/TAG, who sponsor regular river cleanup and habitat restoration volunteer opportunities.

2.2.2 Comment: General concerns related to ecological risk

Some commenters expressed their concern that the cleanup address risks to fish and wildlife, and some stated concern that the cleanup be protective of specific species, including salmon, ospreys, ducks, and killer whales.

Response

Important functions of the LDW include providing an interface between fresh and marine waters and supporting salmon migration. As discussed in Section 7 of the ROD, the Ecological Risk Assessment (ERA) (LDWG 2010, Appendix A) selected 10 receptors of concern: benthic invertebrates, crabs, juvenile Chinook salmon, English sole, pacific staghorn sculpin, great blue heron, osprey, spotted sandpiper, river otter, and harbor seal. These organisms were selected to represent larger groups of organisms that may be affected by LDW contamination based on their potential to be exposed to LDW contamination and their sensitivity to contaminants found in the LDW.

The Selected Remedy is designed to address the impacts to benthic invertebrates, fish, and wildlife identified in the ERA. Killer whales do not migrate through the Duwamish and were not considered in the ERA; however, remediation of contaminated sediments in the LDW and other contaminated sites in Puget Sound and surrounding areas should contribute to improving the overall health of the entire Puget Sound ecosystem.

2.2.3 Comment: Protection of freshwater resources

EPA received many comments from schoolchildren who were concerned that the Duwamish should be cleaned up in order to protect increasingly scarce freshwater resources.

Response

The LDW Superfund Site includes the lower 5 miles of the Duwamish River. This part of the river is an estuary, meaning that fresh water entering the LDW from the Green River mixes with marine water entering from Elliott Bay. Estuaries like the Lower Duwamish Waterway are also scarce and important resources for fish and wildlife. EPA agrees they should be protected and believes the selected remedy is an important step in protecting this resource.

2.2.4 Comment: Retain local industries/jobs

Some local businesses, unions, business organizations, and private citizens expressed concern that EPA's proposed cleanup, in addition to the burden of complying with Ecology's source control requirements, could force some Duwamish businesses to move from the region, reduce their workforce, or close down.

They noted that even small incremental increases in the cost of cleanup will impact the ability of small- and medium-sized businesses to remain viable. They stressed the importance of local businesses to the regional economy, pointing out that this area has been designated by the City of Seattle as a manufacturing and industrial center and makes up 84 percent of the industrial lands within the city, and that these industries provide approximately 100,000 family-wage jobs.

Specific concerns included increased costs to businesses due to financial liability for the cleanup and compliance with source control requirements, and real estate titles and transactions clouded by unresolved Superfund issues. One commenter noted that cleaning up the Duwamish may have the effect of encouraging development further upstream in areas that have not been subjected to this kind of development, do not have the necessary infrastructure with utilities and roadways, and are not as contaminated.

Many of these commenters also acknowledged that cleanup of the Duwamish is needed and some noted that the cleanup of the LDW will have benefits for local business and workers, and the region's economy. They asked that the Duwamish workforce be an important voice in cleanup decisions.

Response

EPA's primary criteria for selection of a Superfund remedy are protection of human health and the environment and compliance with the substantive requirements of federal and state environmental laws. Once these criteria are satisfied, EPA considers other balancing criteria, one of which is cost, and modifying criteria, including community acceptance which includes a wide spectrum of often competing concerns. EPA appreciates the concerns of the local workforce and businesses as important segments of the community, as well as the desire expressed in many comments to retain the industrial/manufacturing base in this area. EPA has considered these concerns in the context of its remedy selection criteria. EPA considered future land use when developing the Selected Remedy to ensure that the remedy will be protective in the long term and will work with local landowners and businesses through the design and implementation of the Selected Remedy.

It is EPA policy not to become involved in private property transactions. However, upon request, EPA can provide general information to help community members and businesses understand the Superfund process so they may make informed decisions concerning their private property. EPA understands the concern that landowners have regarding clouded real estate titles and these are not unique to this site. EPA has seen that these issues often go away after cleanup has been completed and anticipates that to happen at this site.

2.2.5 Comment: Business cost burden

Some local business, property owners, and sewer utility districts commented that the proposed remedy would have a significant economic impact on local businesses, property owners, and taxpayers. In their view, EPA should consider the economic impact of the proposed remedy, and choose one that minimizes adverse financial impact on businesses, while concurrently achieving cleanup objectives.

The preliminary remediation goals (PRGs) in the Proposed Plan were mentioned by many businesses as particularly burdensome. They believe that the Proposed Plan set goals that cannot be met and will create uncertainty for taxpayers and businesses. They are concerned there will still be uncertainty for businesses once the Selected Remedy is complete, because the Proposed Plan raises the specter of additional cleanup to achieve the low PRGs with additional liability and additional costs for businesses.

Some of these businesses claimed that they had not contributed to the contamination in the Duwamish and were concerned that they would be required to pay for part of the cleanup regardless of their role in contributing to the contamination. They are concerned that the additional cost burden of contributing to the cleanup, in addition to the source control work being required by Ecology, may cause some businesses to declare bankruptcy or cause them to move out of the area.

Response

EPA evaluated costs among the remedial alternatives developed in the FS as one of the balancing criteria described in response to comment 2.2.4. See Sections 2.3, 2.4, and 2.5 for comments and responses regarding all the PRGs for the Preferred Alternative, including a response to the many comments from the business community about uncertainties and potential additional costs associated with the Selected Remedy.

The purpose of any public comment period on any CERCLA Proposed Plan is to solicit comments on EPA's proposed cleanup. CERCLA liability, including any responsibility of particular parties, is a matter of law and generally beyond the scope of comment on any specific proposed cleanup alternative. For this reason, comments about liability are acknowledged but are not responded to in this Responsiveness Summary.

2.2.6 Comment: Hire locally for cleanup

DRCC/TAG and many community members commented that the cleanup should be used to generate living wage and “green” jobs in the local community. They asked that, given the contribution of the Duwamish Superfund site to cumulative impacts and risks to the community, EPA ensure that local residents be given the tools and opportunity to benefit from jobs associated with the cleanup, emphasizing that employment is one of the strongest favorable determinants of health, and has the potential to mitigate or offset the cumulative health impacts burdening the local community. Commenters praised EPA's recent efforts to train community members through the Superfund Jobs Training Initiative, and asked that this program be continued throughout life of the LDW Superfund cleanup.

Response

EPA sponsored training through the Superfund Jobs Training Initiative (Super JTI) in 2013 to train and help place local residents in cleanup-related jobs related to the Duwamish Early Action Area cleanup projects. EPA hopes to continue training through the Superfund Jobs Training Initiative periodically throughout the cleanup process if funds continue to be available for the program. EPA will encourage potentially responsible parties (PRPs) and contractors to hire locally but cannot require parties to do so. However, parties responsible for the early action cleanups were supportive of the Super JTI effort in 2013.

2.2.7 Comment: Avoid disruption of waterfront businesses

Many Duwamish businesses asked that the cleanup take into account the current uses of each waterfront parcel and protect water-dependent uses. They asked that cleanup accommodate current and future operational needs of waterfront businesses both during and after the cleanup including but not limited to maintenance dredging, anchoring or utilizing spuds (vessel-mounted metal poles that are sunk into sediment for stabilizing vessels), and maneuverability of vessels, as well as any property improvements that are needed to meet future operational needs. They asked that any remedial work adjacent to upland properties be conducted in coordination with property owners' and tenants' operational needs. In addition, the cleanup must not impede or foreclose future operational improvements to the property.

Local businesses asked that environmental covenants or similar institutional controls put in place along the shoreline adjoining properties be coordinated with upland property owners and tenants and not burden or restrict operations. Institutional controls should not include restrictions on vessel use or mooring restrictions to the detriment of shipping operations. They stated that any remedy that restricts maintenance dredging in front of their property, their ability to drop an anchor or spud to secure a tugboat or barge, or restricts prop wash from working tugboats, will render the waterway unusable by water-dependent businesses. Any institutional controls should be carefully crafted to address area-specific circumstances, including existing and anticipated water-dependent uses in differing areas of the LDW, sediment conditions in each area, and the remedial technologies used in each area.

They also asked that the duration of construction be as short as possible because increased traffic in the waterway and upland due to construction will have a significant impact on Duwamish businesses. They noted that waterway and upland traffic is already congested, with resultant negative impacts on freight mobility and productivity.

Response

EPA agrees that existing uses must be considered when developing institutional controls for the waterway, and incompatibility of the institutional controls needed for a particular cleanup technology with waterway use in a particular area may require a modification of the assigned cleanup technology for that area. EPA intends to work with property owners during the remedial design phase to ensure that the Selected Remedy is compatible with current and reasonably anticipated future use of waterfront properties to the maximum extent practicable. As discussed in ROD Section 13.2.3, EPA will survey waterway users to gather detailed information about waterway use, including maneuvering and anchoring of ships, barges and tugs, use of spuds, and other activities such as berth and wharf maintenance.

As an example of technology assignments that may change in remedial design, EPA considers that spudding or anchoring is not compatible with most cap designs. The FS notes that some capped areas may require use restrictions: "At cleanup sites, covenants and easements commonly control or prevent current and future owners from conducting or allowing activity that could result in the release or exposure of buried contamination as long as necessary. Potential activities controlled or prohibited may include in-water activities (e.g., anchoring, spudding, vessel or tug maneuvering) and construction activities (e.g., pile driving and pulling, dredging, and filling) where buried contamination may become exposed as a result of the activity, as long as it is an activity the owner may legally control." However, such covenants

may not be compatible with the current or further use of the waterway, which may change some technology assignments during design phase. See also responses to comments in Section 2.25.

2.3 Preliminary Remediation Goals (PRGs) and Cleanup Levels - General Comments

2.3.1 Comment: Proposed cleanup levels create uncertainty which may make it difficult to reach a settlement to perform the cleanup

LDWG and many businesses and consultants commented that the Preferred Alternative requires cleanup levels that they believe are unachievable. They state generally that there are no achievable standards by which to know when remediation will be complete, and the type and scope of additional actions that might be required are not defined, and remedial implementation costs and duration are therefore wholly unpredictable. One commenter contended that the Proposed Plan does not sufficiently define EPA's Preferred Alternative for public comment.

LDWG and other PRPs also commented that setting the PRGs at levels they believe are unachievable (i.e., below anthropogenic or regional background concentrations) without incorporation of a technical impracticability (TI) waiver in the ROD will “complicate the cleanup process by setting unrealistic expectations, obscuring the process for achieving site closure, lead performing parties away from implementing cleanups, and potentially create an endless cleanup. A cleanup without a defined set of requirements and clear measures of when actions are complete (i.e., achievement of risk-based endpoints) is not implementable and will likely cause responsible parties to delay cleanup implementation. Responsible parties should not be expected to sign legally enforceable agreements obligating them to achieve the unachievable.”

The following comments are representative of the many comments on this theme:

"As currently written, there is no way for implementing parties to determine if and when they have successfully completed the cleanup. This blank check approach will delay implementation, keep risk to human health at current elevated levels, and have dramatic impacts on the local business community. The vague definitions in the PP, combined with technically infeasible cleanup levels, mean that scope and costs could be vastly underestimated, resulting in significant uncertainty and delay in the cleanup."

"The ROD should clarify that in the event additional actions beyond those specifically called for in the ROD should prove to be warranted (based on practicably providing significant additional risk reduction), the ROD would be re-opened and a new comment, decision, and consent decree process would be initiated by EPA. This would provide the clarity needed to determine what full implementation of the ROD requires. Without such clarity, EPA will be asking PRPs, including public entities, to make a potentially unbounded commitment by entering into a consent decree to implement the ROD. Neither private nor public entities can responsibly agree to an open-ended commitment of that kind."

“(If) unachievable cleanup goals are included in the Record of Decision, it will be more difficult, if not impossible, to reach a reasonable and fair allocation of cleanup costs outside of the courts. Litigating the

responsibility for cleanup will only delay the start of cleanup. We do not believe that is an outcome that will meet the needs of the local community, workers, and taxpayers who want to get the cleanup started quickly."

"Together, many of the elements in the Proposed Plan create a cleanup of potentially unlimited duration and cost. EPA's current proposal essentially gives the agency a blank check to require additional cleanup measures for decades in the hope that a technologically unachievable cleanup may one day be possible or that EPA, in its discretion, may issue a technical impracticability waiver at some undefined point in the distant future. Throughout the Proposed Plan, EPA states that future monitoring or analysis may prompt the agency to adjust cleanup goals or require additional active remediation measures. Furthermore, the Proposed Plan raises false expectations that may prompt community stakeholders to push EPA to require more action than is effective based upon the existing data, technology, and cost-benefit analysis. A "blank check" remedy is inconsistent with CERCLA, is fundamentally unfair, and will hamper the cleanup by creating a high degree of uncertainty. It is unlikely potentially responsible parties will voluntarily participate in such an open-ended cleanup. Such a cleanup is also certain to prevent many parties from entering into an implementing consent decree. EPA should prepare the ROD with the implementing consent decree in mind. The ROD must define what constitutes compliance and the process by which EPA will require additional action. Potentially responsible parties will only sign on to a consent decree that provides certainty as to the cost and timing of the required actions. Moreover, if the consent decree departs from the terms and requirements of the ROD, it would likely spur litigation and a challenge that the decree is arbitrary and capricious. Potentially responsible parties, stakeholders and/or the court itself are certain to challenge a consent decree that does not implement a ROD that is the product of more than a decade of studies and analysis. This would lead to unacceptable delays."

Response

Based on careful analysis of available information, as documented in the AR, EPA believes that the Selected Remedy is a defined and achievable cleanup plan. The Selected Remedy requires active cleanup to readily achievable Remedial Action Levels (RALs), then relies on MNR to further reduce contaminant concentrations to the cleanup levels, which are all based on CERCLA applicable or relevant and appropriate requirements (ARARs), in this case the substantive requirements of the Sediment Cleanup Objectives (SCOs) of the Washington State Sediment Management Standards (SMS) under the Model Toxics Control Act (MTCA). If the cleanup levels are not met, the Selected Remedy requires only continued monitoring and an analysis of the extent to which additional cleanup of the In-waterway Portion of the Site could practicably further reduce COC concentrations. Any additional in-waterway cleanup would be the subject of a ROD Amendment or Explanation of Significant Difference (ESD), and if any such additional work constitutes a significant change to the Selected Remedy, a new public comment period would be held, as required by the NCP and consistent with recommendations from commenters. Issues of CERCLA liability for the Site are generally beyond the scope of the ROD and this Responsiveness Summary. However, should any additional cleanup for the In-waterway Portion of the Site be selected through a ROD Amendment or ESD, EPA anticipates that such additional work will be incorporated and implemented through appropriate provisions of an applicable consent decree or unilateral order.

As stated in Section 13.4 of the ROD, EPA expects that, once the active components of the Selected Remedy (dredging, capping, ENR, and any additional actions needed to meet the benthic SCO criteria and human health-based RALs) have been completed and long-term monitoring shows COC concentrations have reached a steady state, COC concentrations will either be at cleanup levels for sediment and ARARs for water quality, or will represent practicable limitations in implementation of source control and active remediation. Data collection and analysis during long-term monitoring is intended to test this expectation.

However, if EPA determines that additional remedial action is appropriate for the In-waterway Portion of the Site, EPA will select such action in a ROD Amendment or ESD. If EPA or the state determines that further source control is appropriate, EPA or the state will address such sources with source control response action decisions separate from this ROD. If EPA determines that no additional practicable actions can be implemented under CERCLA to meet ARARs, EPA may issue a ROD Amendment or ESD providing the basis for a technical impracticability waiver for specified sediment and/or surface water quality based ARARs under Section 121(d)(4)(C) of CERCLA.

Changing from natural background-based cleanup levels to regional background-based cleanup levels under the SMS requires a finding that it is not technically possible (as defined in WAC 173-204-505(23)) to achieve SCO-based cleanup levels or doing so would have a net adverse impact on the aquatic environment (see WAC 173-204-560(2)(a)(ii)). It would also require that regional background levels be established for the LDW. The extent to which the new “not technically possible” SMS criterion may differ from technical impracticability as a standard for a waiver under CERCLA is difficult to assess because the SMS criterion is new and its definition has not yet been interpreted. It may be clarified in future Ecology decisions or guidance or it may be clarified by courts. EPA may have to undertake an analysis of how these terms compare if it decides to revise cleanup levels.

Nevertheless, with regard to either regional background or a TI waiver, the ROD makes clear that EPA is deferring such decision making until it has empirical data on which to more firmly base either or both determinations. The ROD makes clear that RI/FS modeling predicts that some cleanup levels will not be achieved, but the ROD also emphasizes that the modeling on which these projections are predicated is subject to uncertainty, and produces a wide range of predicted outcomes as input parameters are adjusted. There is significant disparity between the high, mid and low ranges of model-predicted outcomes and because of this, EPA does not have sufficient basis for a TI wiaver, and is unable to identify regional background values for the site at this time.

Modeling may be our best tool for predicting future outcomes, and it is extremely useful in making cleanup choices, but using modeling results as an alternative to actual data from the field still has significant limitations. EPA’s decision to wait in this instance until empirical data are available, and to use those data to refine model predictions to make any adjustments to cleanup levels, may appear to represent uncertainty for some parties. However, because the ROD limits active remediation to achievement of the RALs rather than cleanup levels that may or may not be achievable, no party agreeing to implement the Selected Remedy under a Consent Decree will be committed to a “blank check”.

Lastly, in this regard it is important to emphasize that the RALs are protective of all LDW ecological receptors and achievement of the RALs represents a very substantial reduction in human health risks. However, they still leave residual human health risks particularly for populations in our region that consume more fish, and they may not meet state SMS standards as explained above. EPA wants to be accurate if and when it modifies cleanup levels, and is committed to modifying them only to the extent the best data, science, and the law may dictate.

2.3.2 Comment: Sediment PRGs should be based on anthropogenic background consistent with EPA guidance

LDWG and other commenters stated that they believe the PRGs in the Proposed Plan are inconsistent with CERCLA guidance, which adjusts cleanup levels to anthropogenic background (e.g., EPA 2005), and that the sediment PRGs should be based on anthropogenic background, consistent with EPA guidance (EPA 2005).

Response

Final remedies under CERCLA must meet (or waive) the substantive requirements of applicable or relevant and appropriate federal or state environmental laws and regulations (ARARs). See the response to comment 2.3.1 for SMS requirements that must be met to allow cleanup to regional background rather than natural background. More stringent state ARARs supersede less stringent federal requirements. EPA guidance, which does allow for cleanup to anthropogenic background under some circumstances, is EPA's interpretation of federal requirements, and is in any case advisory rather than legally required like ARARs.

2.3.3 Comment: EPA should issue a technical impracticability (TI) waiver in the ROD

LDWG and many others commented that EPA has sufficient information and should issue a TI waiver in the ROD for applicable or relevant and appropriate requirements (ARARs) they consider unachievable. This would allow EPA to set higher cleanup levels instead of using the ARAR-based PRGs in the Proposed Plan that these commenters consider "unachievable." They cited the Grasse River, Hudson River, and Palos Verdes Shelf cleanup projects as examples of sites where EPA issued TI waivers in the ROD.

With respect to ARAR-based sediment PRGs, LDWG commented that the FS concluded that none of the remedial alternatives will comply with natural background sediment cleanup levels required under MTCA; therefore, TI waivers for sediment ARARs will be needed. LDWG disagrees with statements in the Proposed Plan that a TI waiver should not be implemented at this time because long-term model-predicted COC (contaminant of concern) concentrations are highly uncertain. They believe there is no uncertainty that the LDW will equilibrate to incoming upstream sediment concentrations, and potential future uncertainties are beyond the scope of the cleanup; thus, a TI waiver should be issued in the ROD. In their view, the FS demonstrated that the cleanup will get sediment concentrations as close as possible to natural background, and that even complete removal of contaminated sediments cannot achieve the proposed cleanup levels that are based on natural background because sediment concentrations will equilibrate to urban background concentrations consistent with the setting of the LDW.

They stated that "remedy decisions are to be made based on the information and technologies available at the time, not based on hoped-for future technological breakthroughs (see Preamble to the Proposed NCP, 53 FR 51394, 51439, December 21, 1988). In fact, TI waivers are appropriate where 'neither existing nor innovative technologies can reliably attain the ARAR in question.' Thus, the potential success of even unproven innovative technologies could be considered in a remedy decision—but not technologies that simply do not exist and may never exist. If a new technology is developed in the future that would practicably allow natural background levels to be met and would reduce site risks significantly, that would be the kind of new information that could form the basis for re-opening the site ROD to require additional remedial action. Because the criteria for a TI waiver have clearly been met, a waiver of the natural background cleanup levels should be included in the ROD, notwithstanding the possibility that unforeseeable technological breakthroughs could occur at some point in the future."

LDWG further stated that "EPA has stated in the past that a TI waiver at this point in the process would be premature, because we do not yet know what contaminant concentrations will be attained by the cleanup. However, following implementation of the ROD, the implementing parties will be responsible only for ensuring that the RALs (or the SQS [equivalent to benthic SCO in the ROD] where MNR is used) are maintained in surface sediments. Additional reductions in surface sediment contaminant concentrations may occur as a result of source control efforts, with the final equilibrium concentrations being determined primarily by the quality of sediment inputs to the system from upstream. Source control efforts need not be reduced or altered simply because a sediment ARAR has been waived. Dischargers must comply with the CWA requirement of applying "all known, available, and reasonable treatment" to discharges, so if practicable means are available to further reduce input concentrations; those should be applied in the permitting context. In short, there is no reason to believe that waiving the natural background standards and instead substituting a model-predicted concentration will result in higher future sediment concentrations or a future reduction in source control efforts. The existing data and analyses are adequate for issuing a TI waiver now and setting achievable long-term concentration goals in the ROD. The uncertainty surrounding the model-predicted long-term concentrations does not provide a valid rationale for delaying a waiver of cleanup levels that cannot be attained using any known technology."

Response

As discussed in EPA's response to comment 2.3.1, EPA has determined that there is insufficient information to issue a TI waiver at this time. As discussed in response to comment 2.3.6, model projections are based on limited information about current contaminant loading from the upstream Green/Duwamish River, and even a model with robust information about current conditions cannot reliably predict COC concentrations decades into the future. As stated in the ROD (Section 1), the Selected Remedy is intended to be implemented after cleanup in the EAAs has been completed, source control sufficient to minimize recontamination has been implemented, additional sampling and analysis has been conducted, and design of the remedy has been completed. As stated in Section 14.2 of the ROD, "because EPA cannot know whether or to what extent the SMS ARARs for various COCs will be achieved upon completion of remedial action (including natural recovery), consideration of such waiver(s) prior to the collection of monitoring data sufficient to inform TI waiver decisions, or upward adjustment of cleanup levels under the SMS, is neither warranted nor justifiable at this time."

ROD Section 4.3 acknowledges it may not be possible to attain all ARARs, and ROD Section 13.2.2 notes that sediment transport model (STM) and bed composition model (BCM) natural recovery predictions will be further evaluated using data collected during remedial design. ROD Section 13.4 states that EPA expects that, once the active components of the Selected Remedy (dredging, capping, ENR, and any additional actions needed to meet the benthic SCO criteria and human health-based RALs) have been completed and long-term monitoring shows COC concentrations have reached a steady state, COC concentrations will either be at cleanup levels for sediment and ARARs for water quality, or will represent practicable limitations in implementation of source control and active remediation. Data collection and analysis during long-term monitoring is intended to test this expectation.

However, if EPA determines based on the post-implementation assessment that additional remedial action is appropriate for the In-waterway Portion of the Site, EPA will select such action in a ROD Amendment or ESD. If EPA or the state determines that further source control is appropriate, EPA or the state will address such sources with source control response action decisions separate from this ROD. If EPA determines that no additional practicable actions can be implemented under CERCLA to meet ARARs, EPA may issue a ROD Amendment or ESD that would either: 1) change cleanup levels from SCO-based natural background levels to new Cleanup Screening Level (CSL)-based regional background levels under the SMS; or 2) provide the basis for a technical impracticability waiver for specified sediment and/or surface water quality based ARARs under Section 121(d)(4)(C) of CERCLA.

As is stated in many places in the ROD, the Selected Remedy is part of an overall strategy for the LDW which relies on source control that is not part of the Selected Remedy but is nevertheless critical to what the Selected Remedy may achieve. The FS did not analyze source control alternatives, or predict what source control may enable the Selected Remedy to ultimately achieve the cleanup goals with today's technology and without any further active in-waterway remediation. In response to comment 2.3.1, EPA explained its resulting strong preference for empirically-based decision making in these circumstances as opposed to reliance on speculative model predictions.

LDWG essentially speculates that a waiver allowing the substituting of current uncertain model predictions for SMS ARAR-based cleanup levels does no harm, and makes responsible parties feel there is more certainty. EPA reasserts that because the ROD will not commit anyone to perform active remediation to achieve more than the RALs, waiting for empirical data to support any ARAR waiver will allow EPA to confidently issue only one such waiver, if waiver proves necessary, and will not engender any more uncertainty than already exists as to potentially achievable future outcomes. Lastly, quoted in comment 2.3.1 above, "that the Proposed Plan raises false expectations that may prompt community stakeholders to push EPA to require more action than is effective…" is not a legitimate basis for EPA decision making. EPA acknowledges there may be unrealistic expectations among members of the public about what the cleanup can accomplish, and will continue to endeavor to provide clear information to the public about the Selected Remedy, its value to the environment, and its limitations.

2.3.4 Comment: EPA should not issue a Technical Impracticability Waiver

DRCC/TAG, the Suquamish Tribe, and several community members commented that a technical impracticability waiver should not be issued for the LDW site. DRCC/TAG stated: "The Lower

Duwamish Waterway Group has argued that it is unreasonable to set cleanup goals at natural background levels because they view these goals as unattainable for an urban/industrial sediment site, primarily because of loading from ongoing sources of pollution. However, ARARs may be waived if they are determined by EPA to be "technically impracticable," providing an avenue for a determination that the goals are unattainable and alleviating the responsible parties from the obligation to achieve them. However, LDWG's Feasibility Study asserts that existing data on past pollution loading from the upper Duwamish and Green Rivers should be considered the attainable goal, prior to the application of any targeted pollution source control efforts in those areas. This is not consistent with state or federal law. A "Technical Impracticability" (TI) waiver may only be granted when no additional remedial measures are available to meet applicable standards. Pollution source control is required by Superfund (CERCLA), and any determination that source control measures have been exhausted must follow the development and implementation of a source control program. TI waivers should not be considered preemptively, and may not replace legally-mandated establishment of the MTCA-based cleanup goals."

The Suquamish Tribe commented that they "do not support the use of TI waivers because it erodes treaty-reserved rights and resources. The Tribe strives to work diligently to restore resources and habitat throughout the U&A for future generations. We understand that it may not be technically possible to meet cleanup levels in the required timeline but we would prefer flexibility in the clean-up timeline (interim Record of Decision) over a TI waiver. Not only does a TI waiver set unacceptable precedent regarding sediment remedies but a TI waiver does not protect Tribal treaty rights for future generations and precludes future use of new, innovative technologies."

Response

EPA agrees that TI waivers should not be issued at this time, and that existing data on past pollution loading from the upper Duwamish and Green Rivers should not bound what may be attainable in the LDW decades from now. Source control is a necessary component of all remedies where there is ongoing COC loading and a featured consideration in EPA TI waiver guidance (EPA 1993) and sediment cleanup guidance (EPA 2005). However, what practicable source control may achieve, and what future changes in upstream, lateral, and aerial sources may occur, remain unknown. EPA therefore believes that it may become appropriate to consider empirically-based TI waivers for some sediment COCs and/or water pollutants in the future if long-term monitoring shows that such COC or pollutant concentrations reach a steady state at concentrations above ARAR levels after 10 or more years of natural recovery (following an analysis demonstrating that further practicable cleanup for the In-waterway Portion of the site would not reduce these concentrations to the ARAR, along with a finding that further source control cannot be practicably undertaken).

EPA believes that while tribal treaty-based fishing rights are not necessarily a barrier to TI waivers related to resident fish or shellfish consumption, they are a basis for EPA to be particularly cautious and conservative in the development of such waivers. In this instance, this factor reinforces EPA's preference, to the extent such waivers may be used, for basing waivers on empirical data which is less likely to require subsequent revision rather than waivers based on current modeling and its inherent comparative uncertainties.

2.3.5 Comment: Natural Background-Based Cleanup Levels Have Not Been Required for State Sediment Cleanups

LDWG commented that natural background sediment cleanup levels have not been required at Ecology-led sediment cleanups in the Puget Sound region in the past. Therefore, an ARAR waiver of the MTCA natural background cleanup level based on "inconsistent application of state requirements" would be appropriate in this instance.

Response

No examples were cited in the comments. Any such waiver would require full documentation. The MTCA rule requires that final cleanups achieve the cleanup level, that is established as the highest of a risk based concentration, practical quantitation limit, and natural background. These MTCA requirements are applicable to the SMS rule and sediment cleanup. Ecology has conducted sediment cleanups based on a natural background cleanup level in the past, for example, in Port Gamble and Fidalgo Bay. For further detail, see the Cleanup Action Plans for these areas (Ecology 2013b; Ecology 2013 [multiple dates]). In addition, the 2013 SMS rule revision now specifically includes this provision.

2.3.6 Comment: EPA is misleading the public by suggesting that natural background-based cleanup levels could be achieved

LDWG and several other commenters stated their view that that the proposed plan misleads the public by proposing sediment PRGs that are not technologically achievable, and further misleads the public regarding the ability of the sediment cleanup to achieve the proposed tissue and surface water PRGs. One commenter stated that "EPA's Remedial Action is proposed to (1) cleanup key chemicals to natural background by removing sediment even when it is clearly known that recontamination from diffuse, uncontrolled sources within the basin will prevent this goal from being met; and (2) restore surface water and seafood tissue to "safe" levels by removing sediment, even when adequate data exist to show that surface water and tissue concentrations are only poorly related to sediment concentrations. Proposing a remedial action that is not able to meet its goals is poor policy."

King County commented that the Proposed Plan inappropriately implies that the preferred alternative (or for that matter any of the other alternatives) combined with source control could achieve sediment PRGs based on natural background in an urban waterway. They stated that the range of bounding conducted during modeling in the Remedial Investigation and Feasibility Study (RI/FS) process covered the possible future scenarios and none of these model results meet ARARs for PCBs (LDWG 2008; LDWG 2012a), and that the language in the Proposed Plan suggesting that RI/FS projections did not reflect anticipated improvements in upstream or lateral inputs is, in their view, incorrect. They stated: "The data sets were specifically assessed to develop best estimates and low and high estimates that would provide examples of both source control success or the range of potential average inputs that could be possible considering existing data ranges. The sensitivity runs were purposefully designed to determine effects of source control or changes in future inputs. Best estimate and uncertainty bounding runs demonstrate the range that can possibly be achieved in the future. Those runs clearly demonstrate that under any probable future scenario, natural background concentrations for PCBs are not attained. Compared to the uncertainty inherent in setting any background number, anthropogenic or natural, the argument presented in the Plan is not a scientifically sound basis to retain natural background."

Response

EPA has retained natural background, along with the risk-based threshold concentrations (RBTCs), as the basis for cleanup levels for LDW sediments. The Proposed Plan and ROD clearly present FS model projections indicating that steady-state sediment COC concentrations in the LDW will exceed the natural background-based sediment cleanup levels 30 to 40 years in the future regardless of the alternative selected. They also state that the long-term projections of contaminant concentrations and the time to reach the lowest model-projected concentrations are based upon relatively few data and are subject to a high degree of uncertainty. The bed composition model (BCM) used in the FS provided a sufficient basis for comparison of alternatives and selection of the remedy. However, EPA does not believe that the BCM predictions are likely to be accurate, particularly when projecting up to 45 years in the future, and has reiterated in responses to several comments that waiting for empirical data to make more accurate and definitive decisions neither misleads anyone nor causes genuine additional uncertainty.

The BCM included estimates of upstream suspended sediment inputs to the LDW that account for about 95% by mass of the sediments coming into the LDW (shown in ROD Table 5). The data used to estimate these input values are shown in FS (LDWG 2012a) Tables 5-2a (for PCBs) and 5-2b through 5-2d (for other COCs). The number of data points used in these evaluations are small relative to the number of samples representing contaminant concentrations in LDW sediments, and they show considerable variability. Ecology and King County are currently conducting studies to refine estimates of contaminant inputs from the Green/Duwamish River, and to better understand upstream sources of contamination. Ecology in coordination with EPA will use this information to further assess upstream source control. If the sediment cleanup levels are not achieved, additional practicable in-waterway cleanup actions or cleanup level adjustments based either on the new regional background SMS criterion or an ARAR waiver, or perhaps both, would be considered and would be reflected in a future decision document(s).

2.3.7 Comment: The goal of the cleanup should be safe consumption of resident fish and shellfish

DRCC/TAG, the Suquamish Tribe, and many community members commented that the cleanup must achieve pollutant levels low enough to protect human health, with an ultimate goal of allowing safe consumption of resident fish and shellfish at tribal and subsistence consumption rates. The Suquamish Tribe states that “Risk management decisions should be protective of tribal rights to access and harvest and should not limit or restrict future expression of those rights based on current contaminated conditions. As a federal trustee of tribal treaty-reserved resources, the EPA has the responsibility of ensuring that tribes have the inexorable ability to exercise their constitutionally protected treaty rights (including the ability to harvest resources as well as protection of the habitat). The trust responsibility stems from various legal authorities including the U.S. Constitution, Treaties, statutes, executive orders, and historical relations with Indian tribes.”

Response

EPA's intent is for the Selected Remedy to achieve risk reduction and protectiveness while minimizing reliance on seafood consumption-related institutional controls to the extent practicable. EPA believes that the Selected Remedy will result in substantial risk reduction for seafood consumers, but does not believe it is possible to reduce LDW COC concentrations to levels low enough to allow for seafood consumption

at the Tribal and Asian Pacific Islander consumption rates based on published seafood consumption surveys that EPA has used.

The ROD estimated an adult Tribal RME excess cancer risk of 2×10^{-4} and noncancer HQ of 4 and a child Tribal RME excess cancer risk of 5×10^{-5} and noncancer HQ of 9 for PCBs at the model-predicted steady state after implementation of the cleanup. Even if the target tissue concentrations, which are based on risk-based threshold concentrations (RBTCs) and non-urban background where RBTCs are lower than background are achieved, excess cancer risks for PCBs are estimated to be 5×10^{-6} for the adult Tribal RME scenario and 1×10^{-6} for the child Tribal RME scenario and noncancer HQs are estimated to be less than 1 for both adult and child Tribal RME scenarios. Compared to the adult and child Tribal RME seafood consumption rate baseline risks presented in Section 7.1 of the ROD, these estimates of post-cleanup risks represent a reduction in PCB risks of approximately 90% at the model-predicted steady state and 99% at the target tissue concentration.

Similar to response to comment 2.3.4 with respect to ARAR waivers, EPA's decision not to raise cleanup levels in this ROD as requested by many commenters stems in part from its commitment to protect tribal consumers (as well as other seafood consumers in the community) to the extent practicable.

2.3.8 Comment: Recommendations for alternative approaches to setting sediment PRGs

Many commenters offered suggestions for alternative approaches for setting sediment cleanup levels for the LDW. One commenter noted: "We believe that the cleanup goals in the final record of decision should reflect the fact that the waterway is in a designated industrial center and influenced by many inputs, such as the Green River, which are not addressed in the proposed plan. The sediment PRGs should be set at a level that reflects typical waterways in the region, which can and should be achieved." Many commenters suggested that the sediment cleanup level for the LDW should be set at a value based on contaminant concentrations in the Green River. LDWG and other commenters suggested that EPA should estimate attainable long-term concentrations based on the FS modeling, taking into account lateral and Green River inputs. One commenter suggested that EPA make the pollution goal level a flexible value that reflects whatever the upstream pollutant level is (e.g., 40 ppb PCB in the Green River currently). Subsequently, if the Green River and other incoming water is made cleaner, the bar for the cleanliness level of the Duwamish River can also be adjusted to this new cleaner level over time.

Response

All cleanup levels in the ROD are based on the substantive requirements of SCO of the SMS. The suggestions in the comment would not comply with these state ARARs. See responses to comments 2.6.1 and 2.3.1 regarding the 2013 SMS revisions that allow cleanup levels to be raised to the substantive requirements of the SMS CSL, including regional background rather than natural background concentrations, if it is not technically possible to achieve the SCO requirements or if doing so would have a net adverse impact to the aquatic environment; this is why CSL-based cleanup levels were not selected in the ROD.

2.3.9 Comment: Revise sediment PRGs to be consistent with MTCA

LDWG and others commented that the MTCA statistical method (WAC 173-340-709 and Ecology 1992) for calculating natural background should be used for arsenic, rather than the 95% upper confidence limit on the mean (UCL95) methodology used by EPA. Commenters state that, if the requirement that natural background (rather than anthropogenic background) should be applied where RBTCs are more stringent than background comes from MTCA, the methodology in a MTCA rule for calculating natural background should be used as a matter of consistency. LDWG commented that if MTCA requires cleanups to achieve natural background instead of anthropogenic background (or "area background") when either risk-based levels or practical quantitation limits (PQLs) are below background levels, then the MTCA process should have been used in calculating natural background, as opposed to the process used in the Proposed Plan. They comment that WAC 173-340-709 states for log-normally distributed data sets, the background value shall be defined as the true upper 90th percentile or four times the true 50th percentile, whichever is lower. Commenters noted that the background arsenic data are log-normally distributed, the natural background concentrations in the Proposed Plan were based on the UCL95 values (which are lower than the 90th percentile values) of the OSV BOLD data [Editor's note: see the OSV BOLD report: EPA, 2009a], and that using a value based on a mean from a survey of relatively pristine areas results in a point-based cleanup level that would label large portions of those pristine areas as being above background and therefore "dirty" and in need of remediation. They believe that the 90th percentile value, in accordance with MTCA protocols, would result in less area being inaccurately deemed contaminated, and that the statistical approach required by EPA for the FS-determination of background concentrations (in the FS and PP) results in even greater portions of background areas being deemed contaminated (i.e., there is a higher chance of saying something is contaminated when in fact, it is not; also called a Type II error). In contrast, the 90th percentile better represents the upper range of the data from the OSV BOLD dataset, is less influenced by skewed data or a few hot spots, and helps minimize the potential for Type II errors. As described above and in MTCA guidance, the commenters believe that this is the appropriate method for calculating background concentrations.

They state that the method of calculation of natural background is particularly important for arsenic. If the Proposed Plan had applied a MTCA-based natural background value of 12 mg/kg dw (the 90th percentile value coverage calculated with MTCAStat) instead of 7 mg/kg dw (the UCL95 on the mean value calculated with ProUCL), all of the alternatives would have been expected to achieve the arsenic PRGs for all of the direct contact exposure scenarios after active remediation. They note that soil data in Ecology's Environmental Information Management Database for undeveloped properties, parks, child care centers, and schools in the LDW vicinity have a mean arsenic concentration of 10.4 mg/kg dw, a UCL95 of 13.0 mg/kg dw, and a 90th percentile value of 20.5 mg/kg dw. In addition, the MTCA Method A level for soils is 20 mg/kg dw. Establishing the sediment PRG as 12 mg/kg dw for arsenic would be more consistent with guidance, would apply ARARs more consistently, and would result in more realistic cleanup levels based on both practicability and required upland cleanup levels.

Response

While EPA may choose to use the calculation methods set forth in state regulations and guidance as best science, the calculation methods by themselves are not ARARs. EPA does not believe the MTCA statistical calculation methodology in WAC 173-340-709 represents current best science as a method for

determining natural background values. EPA believes that the UCL95 is the best statistic to represent natural background, consistent with risk methodology used for determining the risk at reasonable maximum exposure (EPA 1989). An additional concern is that Ecology did not adopt the calculation methods in WAC 173-340-709 in the 2013 revisions to the SMS or in its associated draft guidance. Ecology has proposed alternative approaches for background comparison in its December 2013 Draft Sediment Cleanup Manual II (SCUM II; Ecology 2013d). EPA disagrees with both of these approaches. Because Ecology did not include the MTCA test in the revised SMS, this response focuses on EPA concerns with the test being proposed under the 2013 SMS.

EPA guidance and practice at similar sites is commonly driven by comparison to a "bright line" based upon either a toxicological threshold or a background-based threshold. These thresholds have varied over time, in accordance with developing best science. The methods of calculating compliance have included the UCL95 on the mean, mean, and upper tolerance limits. The UCL95 on the mean is used in the Proposed Plan and ROD because this approach is appropriate for determining a health protective estimate of human exposure to environmental contaminants. If it is assumed that a receptor is moving about the site and encountering contamination, the average concentration of the contaminant is the best estimate of the exposure concentration. In order to be certain that the contaminant concentration is not underestimated, it is EPA's policy to use the UCL95. The UCL95 may be compared with a risk-based cleanup standard. In cases where a risk-based cleanup standard is below background, then the appropriate background statistic for comparison is also the UCL95 for the same reasons noted above. EPA is concerned about exposures above background and looking at the difference between UCL95-based values for background and site data sets allows assessment of incremental risks above background. EPA acknowledges commenters' concerns about the difficulty of attaining compliance with natural background; see responses to previous comments in this section regarding alternative approaches (regional background or TI waiver) proposed by commenters.

The comment suggests that EPA's bright line approach of comparison of an LDW UCL95 to a background UCL95 has a high probability of falsely declaring a site contaminated when it is not (Type II error). The draft SCUM II test involves comparison of the UCL95 for the site with the 90% upper tolerance limit on the 90th percentile of background. EPA is concerned that the draft SCUM II site vs background comparison has a high potential for falsely concluding a contaminated site is indistinguishable from a background (Type I error); i.e., that contaminated sites will be declared clean.

Type I and II errors associated with the draft SCUM II site vs. background comparison test test have not been adequately characterized and that it would be far more appropriate to use parametric or non-parametric group comparison tests that are well grounded in statistical theory. The draft SCUM II test is not based on statistical theory and is a non-standard comparison for which Type I and II error rates are unknown. Without a basis in sound statistical theory, Ecology needs to conduct simulation analysis with a wide variety of distributions to determine how accurately the test results in correct designations of sites as contaminated or clean.

EPA believes that, when sufficient data are available, the best approach to determine whether site data are equivalent to background data is a two-sample statistical comparison. Therefore the ROD (see Table 19 in

Section 8.2.1) allows for two approaches to determining compliance with RAOs 1, 2 and 4 cleanup levels: 1) comparison of the UCL 95 of LDW data with the RBTC or background-based cleanup level, or 2) for background-based cleanup levels, a statistical comparison of the distribution of LDW data to the OSV BOLD study background dataset (EPA 2009a) may be used. In either case, testing will use an alpha level of 0.05 and a beta level of 0.10. For details, see ProUCL technical manual (EPA 2013 or most current version). For either method, a sufficient number of samples must be collected to assure statistical power for the test.

The comment indicates that a MTCA-approach-derived sediment cleanup level of 12 mg/kg for total arsenic would be more achievable than that derived from a UCL95 comparison to the natural background concentration of 7 mg/kg (ROD Table 19). This is because the BCM predicts a steady-state arsenic concentration of 9.3 mg/kg. However, the arsenic risk-based threshold concentrations for direct contact risks at an excess cancer risk of 1×10^{-6} are 3.7, 2.8, and 1.3 mg/kg for the RME netfishing, beach play, and clamming scenarios, respectively, well below the natural background concentration of 7 mg/kg. In addition, the HHRA estimated that inorganic arsenic in clam tissue contributes approximately 50% of the total risk from shellfish consumption under current conditions. The natural-background-based eastern softshell clam (*Mya arenaria*) inorganic arsenic tissue level is 0.09 mg/kg ww, much lower than the actual tissue values in the LDW reported in the RI, even in the range of sediment data around 7-12 mg/kg dw arsenic. Given the importance of reducing arsenic risks to reduce seafood consumption and direct contact risks, choosing a less protective sediment cleanup level based upon MTCA background calculations not based upon best science would be not sufficient basis to make the change sought in the comment.

Therefore, based on consistency with EPA's approach to calculating natural background statistics at other sites, the ROD retains the natural background value of 7 mg/kg, based on the UCL95 of Puget Sound natural background values.

2.3.10 Comment: Approach for measuring PRG compliance in clamming areas is problematic

A business operating on the LDW commented that the statement in the Proposed Plan that PRGs must be met across all clamming areas is problematic because it appears to mean a remedy employed at an individual, discrete clamming area cannot be considered complete until all other clamming areas are remediated. They believe this provision could unfairly punish parties who take the initiative to take early action with respect to clamming areas. The ROD should amend the Preferred Alternative to expressly allow PRGs (cleanup levels in the ROD) for clamming areas to be addressed on an individual basis.

Response

Because the ROD requires active cleanup to the RALs, which must be met on a point-by-point basis, EPA does not see that the ROD creates a disincentive to early cleanup of individual clamming areas. Any cleanup in an individual clamming area must meet RALs, and then long-term monitoring will be required for all clamming areas to assure achievement of cleanup levels.

2.4 Surface Water PRG and ARARs

2.4.1 Comment: The surface water PRG for PCBs should not be a cleanup level in the ROD; it should have been developed during the RI/FS; and has not been consistently applied at other Superfund sites

LDWG and business community commenters generally favored having target surface water concentrations in the ROD as benchmarks to monitor the progress of the cleanup, but thought they should not be enforceable cleanup levels, notwithstanding that they are ARARs. They emphasized that the surface water concentrations achieved at the end of the cleanup are out of the control of the performing parties. They agreed that protection of surface water quality for those COCs exhibiting unacceptable risk should factor into calculation of sediment PRGs, but stated that there should not be any surface water cleanup levels.

They argued that although sediment concentrations can impact surface water concentrations, so can many other sources and mechanisms. They noted that in the LDW, the available scientific work defining a relationship between sediment concentrations and surface water (and tissue) concentrations found poor correlations. They opined that cleaning up legacy sediment contamination in the waterway and along the banks is well suited to the CERCLA program, while identifying the remaining basin-wide inputs to the system and how their inputs influence surface water quality is not.

Commenters also stated that surface water PRGs [PRGs in the Proposed Plan are cleanup levels in the ROD] are not required by MTCA, CERCLA, their implementing regulations, or agency guidance. LDWG prepared a table for its comments indicating that over time and around the country EPA has not been consistent in its decisions about application of and waivers for surface water quality ARARs at sites like the LDW where its remedial focus has been on contaminated sediments.

LDWG and others commented that the surface water PRG for PCBs was not developed in a manner consistent with the CERCLA PRG development process in the NCP at 40 CFR § 300.430(e)(2)(i), and that neither PRPs nor the public were provided with the opportunity to review and comment on the methods and assumptions used to develop this PRG. LDWG argued that, although the FS discusses a potential surface water PRG in Section 4.3.1, a surface water PRG was not established during the FS process; EPA added it only weeks before the PP was released. In contrast, the FS stated in Section 4.3.1 that surface water ARARs were not identified as PRGs and that a waiver would likely be needed:

"As described in Section 4.2, surface water quality criteria are ARARs for the site because the water column is part of the site. The water column is affected by the sediment contaminant concentrations, as well as other factors, including ongoing releases, inflowing water from the Green/Duwamish River system, direct discharges to the LDW, and aerial deposition. However, the water column cannot practicably be directly remediated. Thus, while surface water is included as a medium of concern to be addressed by RAOs 1 and 4, surface water quality ARARs have not been identified as numerical PRGs at the site. However, because the WQC are CERCLA ARARs, the quality of LDW surface water will have to meet the more stringent of the federal and state aquatic life and human health WQC (Table 4-3) or be waived at or before completion of CERCLA remedial action."

Response

The ROD does not contain any surface water cleanup levels. It does contain surface water ARARs as follows: consistent with CERCLA and the NCP and MTCA and its implementing regulations and as discussed in the FS and the Proposed Plan, LDW surface water will have to meet the more stringent of the federal and state human health (excluding drinking water criteria) and aquatic life water quality criteria at or before the completion of the Selected Remedy or else have this requirement waived. If EPA determines in the future that it is technically impracticable to achieve these criteria, it may waive them in a future ROD Amendment or ESD. See Table 26 in the ROD as well as Sections 8.2.2.2 and 14.2 in the ROD.

For PCBs this means the 0.064 ng/L level that EPA proposed as an ARAR-based PRG (proposed cleanup level) in the Proposed Plan has not been included as a cleanup level in the ROD, and that PCBs are not being treated any differently in the ROD than any other LDW hazardous substances that exceed federal or state water quality criteria as water pollutants. EPA added the designation of PRG to the PCB ARAR level in the Proposed Plan for emphasis. PCBs are the most wide spread of the hazardous substances in the LDW. The PCB level to be attained did not change. When PRGs or cleanup levels are more stringent than ARARs (or less stringent after an ARAR has been waived), designation as a PRG (and cleanup level) could be very significant. However, when a PRG or cleanup level is based upon and identical to a numerical ARAR concentration in a specified medium, the additional designation as PRG or cleanup level creates no additional remedial demand up front.

The choice that surface water presents for EPA CERCLA decision making in this context, which accounts for the differing ways EPA has addressed surface water quality at sites like the LDW, arises from the fact that achieving desired surface water concentrations is accomplished by reducing to the extent practicable the ongoing contaminant loading of surface water from all sources, including from contaminated sediments, as well as upstream and lateral inputs, and aerial deposition. EPA guidance (EPA 2002) calls for assessing and controlling ongoing sources of contamination to the extent practicable before initiating CERCLA cleanups. As the ROD makes clear, the only source of surface water contamination the Selected Remedy is addressing is contaminated sediments; all other sources are currently planned to be addressed by the state under state authorities, except for a few LDW upland facilities which are being addressed by EPA under CERCLA removal or RCRA corrective action orders. This sort of EPA-state partnership at sites like the LDW is typical of the management of many such sites around the country.

Lastly, the public had ample opportunity to comment on the surface water PRG and the information on which it was based during the public comment period on the Proposed Plan and Administrative Record on which the plan was based.

2.4.2 Comment: Surface water ARARs should be waived

LDWG and many other commenters stated that the PCB surface water ARAR should be waived, and surface water ARARs generally should be waived. LDWG stated: “The surface water ARAR (or "cleanup level," if included as such in the . . . ROD) for PCBs of 0.064 ng/L is based on the national recommended AWQC for the protection of human health for consumption of organisms. This ARAR should be waived in the Proposed Plan and ROD as being technically impracticable to achieve and also inconsistently applied. Enough information is available now to establish that this criterion is well below current surface

water inputs into the LDW from upstream of the CERCLA site, and even below some laboratory blank samples from previous investigations." (See next paragraph below.) "Providing a technical impracticability (TI) waiver in the ROD would be consistent with EPA's approach elsewhere, because waivers of unachievable surface water criteria have been granted at many other CERCLA sites . . . EPA has set unachievable cleanup goals that will likely keep PRPs from signing on to the cleanup, spurring litigation and delaying the cleanup and its benefits for years. Because it represents an unachievable goal, LDWG strongly suggests that EPA only require monitoring of water quality to track reductions associated with sediment cleanup and issue a TI waiver in the ROD for human health water quality ARARs (PCBs)."

LDWG included documentation that "surface water PCB concentrations from the Green River upstream of the LDW are higher than the surface water ARAR for PCBs used to establish the PRG (and) that the summer baseflow Green River surface water PCB concentrations are similar to those in other rivers in the region. (In) addition, total PCBs have been found in some laboratory blank samples from previous investigations that are above the criterion. The average total PCB concentration detected in the laboratory blank samples analyzed as part of the LDW and upstream investigations is 0.071 ng/L, which is higher than EPA's proposed surface water PRG of 0.064 ng/L (or 64 picograms per liter [pg/L]) . . . Therefore, there could be analytical challenges to even assessing compliance at the proposed surface water PRG for PCBs."

Another comment stated: "Factors related to the technical limitations and uncertainty of setting the surface water PRG based on the applicable or relevant and appropriate requirement (ARAR) were not considered in the Proposed Plan. According to EPA guidance, background data and practical quantitation limits (PQLs) should be considered in developing PRGs, and the CERCLA cleanup should not have goals or requirements that cannot be met by the remedial actions being required under CERCLA."

Response

The waiver allowed under Section 121(d)(4)(E) of CERCLA for inconsistent application is limited to "a state standard, requirement, criteria, or limitation, the state has not consistently applied…in similar circumstances at other remedial actions within the state(.)" While some state water quality aquatic life criteria are ARARs for the LDW as established by this ROD, the PCB criterion was established under Section 304 of the Clean Water Act by EPA, and is an ARAR in accordance with Sections 121(d)(2)(A)(ii) and (B)(i) of CERCLA. With respect to the application of state aquatic life criteria ARARs by the state, EPA is not aware of any inconsistent application by the State of Washington on which a TI waiver of any such state criterion could be based.

EPA understands that some measurements of upstream surface water concentrations for some contaminants (including PCBs) are currently higher than the water quality criteria established in the ROD as ARARs, including the 0.064 ng/L for PCBs. Any such waiver based on technical impracticability would require a reasonably accurate projection of incoming surface water quality at the time of completion of the Selected Remedy. Ecology in coordination with EPA is planning work over time to better understand Green River inputs and what measures can be taken to improve water quality in the Green River. It would be premature to waive surface water ARARs before any of this work is undertaken,

and in any case it would be extremely difficult to project these inputs decades into the future, and perhaps more significantly it is wholly unnecessary to try to do so. As the Selected Remedy is implemented over time, empirical data on which technical impracticability may be more reasonably assessed will be developed. As stated with respect to any potential waiver of SMS substantive requirements (see response to comment 28.1.3), given the lengthy projections for Selected Remedy implementation, including the monitored natural recovery phase, EPA has a strong preference with respect to the LDW for empirically-based TI waiver analyses rather than those based on modeling where inputs over time may be subject to such wide variation.

With respect to the analytical methodology, the commenters did not provide sufficient information for EPA to conclude that 0.064 ng/l (or 64 pg/L) is below practical quantitation limits. For example, the comment did not state which congeners showed potential blank contamination or how total PCB concentrations in blank samples were calculated. PCB water data collected by King County during the RI (Table E.6.4.2 of the RI Report [LDWG 2010]) shows reporting limits from less than 1 pg/L to approximately 20 pg/L, indicating that PCBs in water are measurable in the range of 64 pg/L.

2.4.3 Comment: Surface water PRG will result in overlap with the CWA

LDWG stated in their comments: **"**The [Proposed Plan] anticipates that the CERCLA sediment cleanup and Ecology-led source control efforts will reduce contaminant concentrations in surface water. However, the contaminant concentrations in surface water in the LDW are also determined by factors outside of the CERCLA sediment cleanup, including upstream surface water and lateral inputs that are regulated under other programs. Setting surface water PRG for this CERCLA cleanup will result in overlap with the CWA, which regulates lateral inputs to the LDW and the upstream Green River. Such an overlap will lead to significant confusion regarding source control (i.e., stormwater management and permitted discharges) in the LDW area. For example, National Pollutant Discharge and Elimination System (NPDES) permitting authority has been delegated to Washington state, and EPA indicates that only the state water quality criteria would apply to NPDES permits. The overlap between the surface water ARAR under CERCLA and NPDES permits may create unnecessary confusion and difficulties for both Ecology and NPDES permittees. The ROD should not include a surface water PRG and source control should be performed under other existing authorities."

"EPA is establishing a remedy for sediments, not surface water. New surface water standards are unwarranted and may conflict with regulated and permitted discharges. PCBs are currently present in upstream surface water in concentrations exceeding the proposed PRG for PCBs in surface water."

Response

Some coordination between CERCLA and the Clean Water Act is mandated in both laws by Congress. In is important to note that neither CERCLA nor this ROD sets forth any requirements or limitations for federal or state implementation of the Clean Water Act; and the Clean Water Act does not set forth any requirements or limitations for CERCLA implementation. Congress dictated how CERCLA sites should apply Clean Water Act standards in Section 121(d) of CERCLA. The state uses its water quality standards, including designated uses, and numerical and narrative water quality criteria (and the National Toxics Rule (NTR) promulgated by EPA in 1992), in issuing Clean Water Act permits. It should also be

helpful to recognize that the implementation of the Selected Remedy is projected to take many years, and that when discrepancies between federal and state water quality numerical criteria occur, they are typically reconciled over time. There is therefore no basis to assume that there will be any discrepancies when Selected Remedy implementation is completed (for example, the current difference between the NTR PCB value the state uses in permitting as a human health criterion, and the current federally recommended CWA Section 304 PCB value to which the comment refers).

EPA has established a Selected Remedy for the In-waterway Portion of the Site which is geographically defined by the LDW mean higher high water level (see ROD Section 4.3). LDW surface water is within this portion of the Site, within the areal extent of contamination in the LDW, where releases or threats of releases of hazardous substances come to be located. Consequently, LDWG's statement that "EPA is establishing a remedy for sediments" is an over-simplification. There are no surface water cleanup levels in the ROD, but there are surface water ARARs, and a clear process for determing compliance with ARARs or an ARAR waiver if future data and evaluation support such a waiver.

2.4.4 Comment: Comparisons of water quality data to AWQC are inappropriate

LDWG commented that they disagreed with EPA's requirement that they include comparisons of water data (including surface water, porewater, and seep water data) with both marine and freshwater AWQC in the RI. LDWG disagreed with these comparisons and does not believe these comparisons should be made in assessing compliance with water quality criteria for the following reasons. First, the freshwater AWQC are not applicable to the LDW based on seasonal and depth-integrated salinity data. Including such comparisons can only confuse implementation and related source control efforts. Second, human health AWQC should not have been compared with porewater or seep water data because they are only applicable to surface waters. Third, seep water data should not be compared with chronic AWQC because of the ephemeral nature of the seeps within the LDW (i.e., tidal inundation two times a day); compliance with chronic AWQC should be evaluated only over longer periods than most seeps occur.

LDWG commented that results from future water monitoring should only be evaluated as follows: 1) water data should be compared only to marine criteria; 2) porewater and seep data should be compared only to aquatic life criteria; and 3) seep data should be compared only to acute criteria.

Response

In the RI, surface water, seep, and porewater data were compared to state and federal marine and freshwater, and acute and chronic criteria. After completion of the RI, and upon further discussion within EPA Superfund and water programs and with the state, EPA determined that the LDW is considered marine water under the state's water quality standards and regulations because it meets the salinity threshold (vertically averaged maximum daily salinity of 1 part per thousand qualifies as marine) described in WAC 173-201A-260(3)(e). See ROD Section 6.2.

EPA disagrees with LDWG's comment that porewater or seep water should not be compared to human health AWQC because they are only applicable to surface waters. Porewater and seep water measurements are an indicator of COC concentrations in benthic organisms which are consumed by fish and shellfish and may bioaccumulate up the food chain. Thus, remedy components such as caps should be

designed to meet AWQC in porewater at the top of cap. However, in long-term monitoring, a single exceedance of an AWQC will not necessarily trigger action; it may trigger additional monitoring to determine whether the release is large enough to result in any impact to surface water, the food chain, or any other exposure route.

EPA also disagrees with LDWG's comment that seep water data should not be compared with chronic AWQC because of the ephemeral nature of the seeps within the LDW (i.e., tidal inundation two times a day). Under WAC 173-201A-240, chronic WQC are 4-day average concentrations not to be exceeded more than once every 3 years on average, with the exception of pesticide and PCB concentrations, which are 24-hr average concentrations not to be exceeded at any time. Acute WQC are 1-hr average concentrations not to be exceeded more than once every 3 years on average, with the exception of silver and pesticide concentrations, which are instantaneous concentrations not to be exceeded at any time, or the PCB concentration, which is a 24-hr average not to be exceeded at any time. Seeps occur daily and generally for more than an hour, thus chronic criteria would apply. As discussed in the previous paragraph, a single exceedance of an AWQC in a seep will not necessarily trigger action; it may trigger additional monitoring to determine whether the release is large enough to result in any impact to surface water, the food chain, or any other exposure route.

2.4.5 Comment: Support surface water PRGs

DRCC/TAG commented that they appreciate and support the inclusion of a PRG for surface water in addition to sediments, stating that it is essential to ensuring that Remedial Action Objectives (RAOs) are achieved. Another commenter agreed and added that water quality criteria for all contaminants in the LDW, not just PCBs, should be cleanup levels. The Suquamish and Muckleshoot Tribes commented that they appreciate the inclusion of remedial goals for surface water. However, if the recommended AWQC are not based on fish consumption rates consistent with tribal exposures, they cannot be considered protective of human health for the consumption of organisms at this site, and asked that we verify the protectiveness of the surface water PRGs or revise as necessary. As with tissue PRGs, the Tribes asked that remedial goals for surface water be considered real remedial goals and not simply placeholders that will be later dismissed as being technically impracticable.

Response

Although surface water quality criteria are ARARs and not cleanup levels in the ROD, they will still be required performance standards for implementation of the Selected Remedy. Surface water quality criteria must be met (or waived) for all contaminants that exceed a criterion upon or before completion of the Selected Remedy. Some criteria could be waived in a future decision document if EPA determines it is technically impracticable to meet them. At this time, in the state of Washington, neither federal nor state water quality criteria are based on Tribal seafood consumption. However, consistent with CERCLA Section 121(c), EPA will conduct reviews at least every five years after the initiation of the Selected Remedy to ensure that human health and the environment at the Site are being protected. Based upon such review, EPA may determine that additional actions at the Site are appropriate.

2.5 Tissue PRGs

2.5.1 Comment: Tissue concentrations should not be cleanup levels, they should be used only for comparison to monitoring results

LDWG and many other commenters requested that the Proposed Plan PRGs for fish and shellfish tissue not be included as cleanup levels in the ROD. Commenters agreed with the concept of having target tissue concentrations in the ROD as benchmarks to monitor the progress of the cleanup, but thought they should be used for informational purposes only, not as enforceable cleanup levels. They believe that although sediment concentrations can impact tissue concentrations, so can a host of other sources and mechanisms, biological processes unique to specific organisms, life cycles of organisms, and basin-wide non-point source contamination issues. Commenters also noted that in the Duwamish, the available scientific work defining a relationship between sediment concentrations and tissue concentrations found poor correlations.

Commenters stated concerns that the tissue concentrations achieved at the end of the cleanup are out of the control of the performing parties who will not be remediating tissue directly. They stated their belief that protection of surface water and tissue quality for those hazardous substances that are exhibiting unacceptable risk should factor into calculation of sediment PRGs or cleanup levels, but there should not be surface water or tissue cleanup levels.

Commenters also stated that tissue and surface water PRGs are not required by MTCA, CERCLA, their implementing regulations, or agency guidance, and PRGs were not developed consistent with the CERCLA PRG development process. They note that MTCA limits cleanup levels to environmental media such as soil, water, and air, and that many of the tissue PRGs in the Proposed Plan are based on the MTCA cancer risk threshold of 1×10^{-6} or natural background. They argue that because MTCA excludes non-environmental media such as tissue, it should not determine the method for establishing PRGs in tissue. Instead, the CERCLA risk range and non-cancer hazard quotient or the anthropogenic background concentrations should be used to provide consistency with other federal cleanup sites and avoid arbitrary application of regulatory requirements. They state that tissue cleanup levels have not been selected at any Superfund Site.

LDWG states in their comments that they agree it is important to monitor contaminant concentrations in tissue to support risk communication and to assess progress toward target concentrations to protect human health and the environment. However, they do not believe these concentrations should be considered PRGs or cleanup levels for the following reasons:

- All practicable sediment cleanup actions are already being taken. Therefore, tissue cleanup levels are not needed to implement the remedy and they set unrealistic expectations on what tissue concentrations can be achieved.
- The required sediment cleanup measures at this site, along with Ecology-led source control efforts, will reduce contaminant concentrations in tissue, but these concentrations will continue to be affected by factors outside the scope of the CERCLA sediment cleanup, including upstream surface water and lateral inputs.

- Measuring trends against target tissue concentrations is useful for risk communication and LDWG and other commenters support monitoring of tissue, but do not believe it is necessary to establish a PRG to evaluate these trends, and therefore a PRG would not provide additional value to the sediment cleanup.

LDWG suggests that, rather than formally establishing tissue PRGs and cleanup levels in the ROD, target tissue concentrations can be established for risk communication and to track the remedy's progress toward achieving the RAOs. They believe this approach will be just as useful as tissue PRGs and cleanup levels, but will not have the downside of creating cleanup requirements that can never be either met or waived. In addition, tissue PRGs or cleanup levels are not needed to implement any part of the remedy.

Response

EPA has established fish and shellfish tissue target concentrations to measure progress towards achieving RAOs 1 and 4, and to inform fish advisories. As stated in ROD Section 8.2.3, "Target tissue concentrations are not cleanup levels; they will be used for informational purposes to assess ongoing risks to people who may consume resident LDW fish and shellfish. Tissue monitoring data will also inform the content or degree of any potential future fish advisories, other ICs intended to minimize risk to the LDW fishing community, or other response actions that may be identified in a ROD Amendment or ESD."

EPA agrees that cleanup levels for tissue are not needed to implement any part of the Selected Remedy, and that the reduction of risk from the consumption of LDW resident fish and shellfish should not be different in any respect regardless of whether tissue levels are cleanup levels as proposed in the Proposed Plan or are informational targets as has been decided in this ROD.

EPA believes commenters' argument that tissue levels should not be based on MTCA's more-stringent-than-federal excess cancer risk or background standards is flawed. While MTCA defines cleanup levels as concentrations in soil, water, air and sediment determined to be protective of human health and the environment, CERCLA has no similar arguably media-restricting definition. Further, MTCA's newly revised portions of the SMS expressly address the protection of people consuming fish and shellfish at specified more-stringent-than-federal risk levels. Since the point of having either tissue targets or cleanup levels is to more directly and accurately assess and thereby reduce these risks to these consumers to the extent practicable, assessing tissue levels and sediment levels by different risk standards becomes incoherent and undermines the fundamental premise inherent in remediating sediments under CERCLA or MTCA to reduce excess cancer and non-cancer risks in people consuming resident fish and shellfish tissue. EPA has concluded that carefully monitoring, distributing, and assessing tissue data against specified tissue targets based on the same excess cancer and non-cancer risks that sediment cleanup levels were based on is the best course of action for the LDW.

EPA disagrees that tissue cleanup levels have not been selected at any Superfund Site. They were selected in the Old Navy Dump/Manchester Laboratory (EPA 1997) and Puget Sound Naval Shipyard (EPA 2000b) Records of Decision (RODs) and were recently included in the Grasse River ROD (EPA 2013c). Also, see response to comment 2.5.7 with regard to the relationship between sediment and tissue COC concentrations.

As long as the modified remedy remains protective of human health and the environment, changes in cleanup levels can be formally made by EPA whenever EPA may determine that they cannot be achieved, and ARARs may be waived in accordance with Section 121(d)(4) of CERCLA. Where cleanup levels are based on ARARs, the ARARs are typically waived in the same formal decision document that changes the cleanup levels. The only difference presented by targets is that changing them does not require formal amendment.

2.5.2 Comment: Fish Tissue contaminant concentrations should be regulated by the FDA

One commenter stated: "Leave regulation of the food supply to health departments and the Food and Drug Administration (FDA). Focus CERCLA efforts on cleanup of environmental media. We are very concerned by the recent trend of EPA setting tissue PRGs (in contrast to setting target tissue concentrations when setting cleanup levels for environmental media). This is most commonly done for fish and shellfish and is having an effect that is not in the public interest, and which we do not believe was in the Congressional intent behind the toxics laws such as CERCLA and RCRA. When EPA sets a tissue concentration that is "protective" of human health under the various toxics laws, they assume reasonable maximum exposure rates that are intentionally highly conservative. They do not, and are not supposed to, consider any type of cost-benefit analysis as part of this consideration. For example, when we are told that even the salmon in Puget Sound are contaminated by PCBs and dioxins/furans, we are not told that these contaminated fish are still cleaner than almost any other protein source available for consumption, and are "clean" under criteria used by the FDA. This imbalance in how the food supply is viewed results in a serious misrepresentation to the public regarding what is safe and what is unsafe to consume. We believe that EPA should leave the setting of tissue PRGs to the existing agencies, such as the Health Departments and FDA, who are tasked with evaluation of the food supply as a whole and are expected to utilize cost-benefit tools that consider the available food options."

Response

See response to comment 2.5.1 explaining why EPA sees its use of tissue targets consistent with the requirement to develop a remedy that is protective of human health and the environment under CERCLA. At LDW, as at many CERCLA sites, the most stringent cleanup levels are based on risks to people who consume resident fish and shellfish who get their contaminant body burden at least primarily from contamination at the site. Risks to consumers of resident fish and shellfish tissue are most accurately measured and expressed as tissue concentrations, whether they are called informational targets or cleanup levels.

Many agencies at and within all levels of government, federal, state, tribal and local, address human health risks in ways that may be seen as overlapping. However, it is important to understand that the legal mandates given to these different regulators are not the same and therefore it is critical that EPA explain how its role is different and not overlapping of these other regulatory agencies. CERCLA authority, and EPA's corresponding mandate in implementing it, is to protect the public health or welfare or the environment from the release or threat of release of hazardous substances or pollutants or contaminants to the environment. For the LDW, EPA has developed RME assumptions that may be conservative,

consistent with applicable guidance (EPA 1989), but are also specific to the LDW consumers of fish and shellfish, including Tribes.

2.5.3 Comment: Tissue PRGs were not developed in the RI/FS and the fish tissue data are too limited and lacking in uniformity to support tissue cleanup levels

LDWG commented that the tissue PRGs were not established during the RI/FS process, as anticipated by the NCP, and have been subjected to little supporting analysis. The FS does not support selecting tissue PRGs or evaluating and comparing remedial alternatives with regard to tissue contaminant concentrations. Because tissue PRGs were not established, evaluated, or modified during the RI/FS process, there was no opportunity provided to review and comment on the methods and assumptions used to develop these PRGs.

They further state that "the tissue data used to derive the proposed tissue PRGs were deemed by EPA during the FS revision process to be unsuitable for statistical use in a risk context. Specifically, EPA agreed that upper confidence levels (UCLs) should not be calculated with this dataset because it: 1) does not provide a representative and random sampling of non-urban fish and shellfish populations in Puget Sound; 2) is a compilation of data from various studies with differing methods and designs; and 3) has small sample sizes for many of the species/risk-driver contaminants. Therefore, throughout the RI/FS process, EPA viewed these data as suitable only for informational use as general indicators of non-urban background concentrations to which monitoring data could be compared. The calculation of UCLs with this dataset for the derivation of quantitative species-specific tissue PRGs is not defensible."

Response

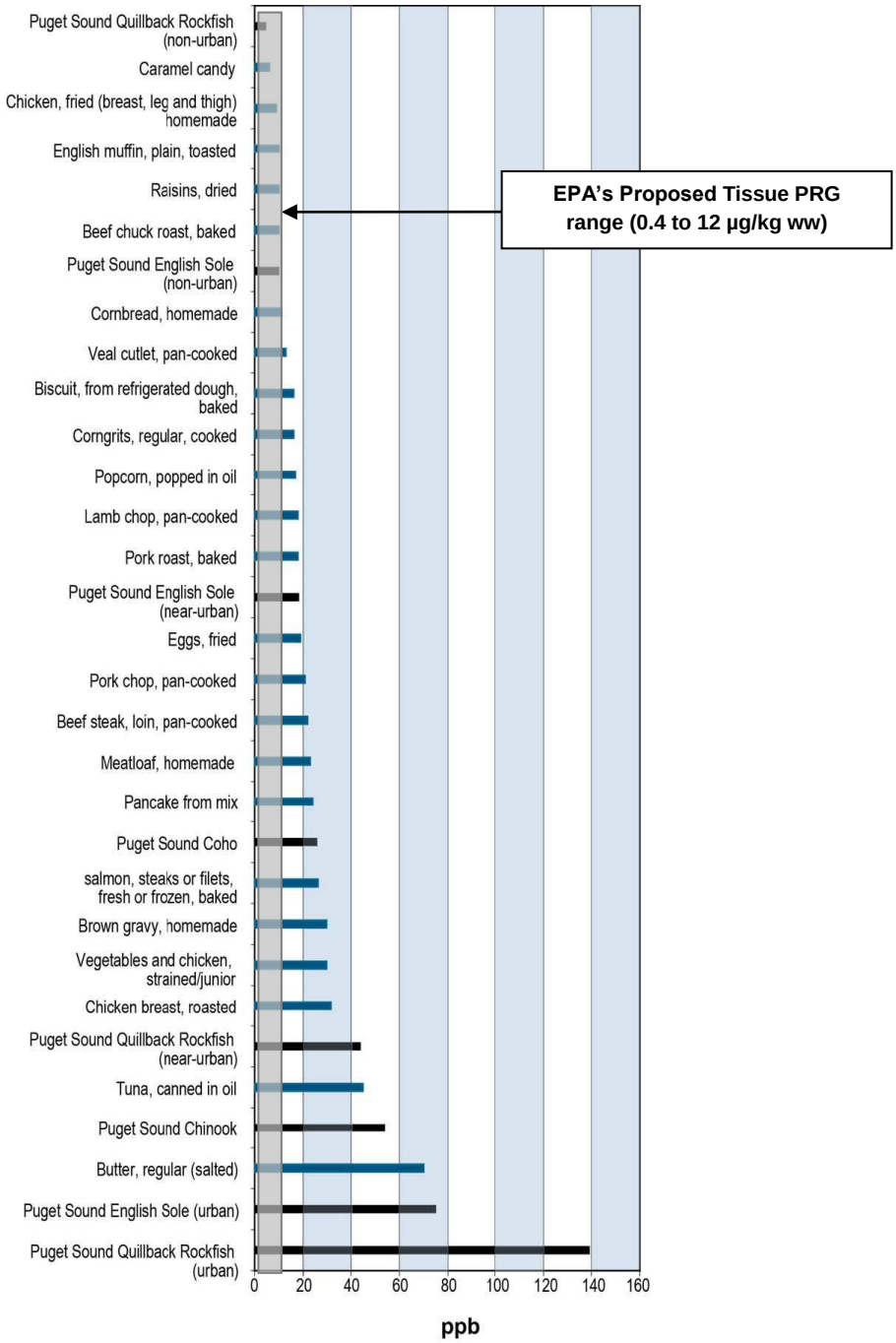
Sufficient data were collected during the RI/FS to set risk based threshold concentrations (RBTCs) for tissue, but EPA agrees that there are limitations associated with the natural background tissue data sets used as PRGs in the Proposed Plan when RBTCs were lower than natural background concentrations. As stated in Section 8.2.3 of the ROD, fish and shellfish target tissue concentrations based on background data are uncertain because they were developed with a limited dataset, as described in the comment. The ROD calls for additional fish and shellfish tissue background data to be collected during the remedial design phase to increase understanding of non-urban tissue concentrations of the human health COCs. See also the response to comment 2.5.5 below that RBTCs should be presented as a range of values.

With respect to tissue PRG development not having occurred during the RI/FS and therefore not having been considered in evaluating and comparing alternatives, tissue concentrations are of critical importance because they more accurately measure and express risks to resident fish and shellfish consumers than sediment concentrations. Further, because tissue is not being directly cleaned by the Selected Remedy, tissue concentrations would not have affected the evaluation and comparison of remedial alternatives in the FS. Lastly, the public had ample opportunity to comment on the tissue PRGs and the information on which they were based during the public comment period on the Proposed Plan and Administrative Record on which the plan was based.

2.5.4 Comment: Proposed tissue PRGs are not achievable and are excessively stringent

LDWG commented that: "As demonstrated in the Feasibility Study, models predict that the sediment actions will not achieve the tissue PRGs that EPA has selected for most resident fish and shellfish species regardless of the assumptions used for future sediment and water column concentrations. To place this in context, many common food sources contain PCB concentrations well above the tissue PRGs for PCBs because PCBs are ubiquitous in the environment. Selecting unachievable PRGs is inconsistent with CERCLA guidance, sets false expectations concerning what the remedy can achieve, and results in an ambiguous compliance standard. Further, because tissue cleanup levels would be established only under CERCLA, and would therefore not be ARARs, they could not be waived by EPA no matter how unachievable they are. This leaves both implementing PRPs and EPA with the task of achieving the impossible. This approach is not required, is misleading to the public, and will only cause confusion and difficulty for both EPA and PRPs, while adding no value to the cleanup itself." LDWG included Figure RS-1 to illustrate their point.

A local business commented: "It is inappropriate to establish preliminary remediation goals (PRGs) for fish tissue. The Proposed Plan states that the in-water remediation will focus on reducing concentrations of contaminants in sediment, not surface water or fish. Fish tissue contamination can often times be related to sediments outside the study area, or to exposure to other media/releases both inside and outside the study area (e.g., surface water, stormwater, air-deposition, and overwater activities). Although long-term monitoring of fish tissue can provide important information regarding the overall health of a river system, it is not a reliable or reasonable gauge for remedy performance. In addition, [Proposed Plan] Section 7.2 states: '*Table 10 lists PRGs for resident fish and shellfish (crab and clam) tissue for RAO 1. Tissue PRGs are based on the higher of: the RBTC at 1 in 1,000,000 excess cancer risk or HQ of 1 for the adult Tribal RME scenario; or the current concentrations in non-urban Puget Sound data. Fish and crab tissue PRGs must be met as a 95% UCL LDW-wide. Clam tissue PRGs must be met as a 95% UCL across all clamming areas.*' This statement is troubling for several reasons: a) it is inappropriate to utilize non-urban Puget Sound data to establish background for the LDR [sic –LDW was meant] since the Puget Sound data set includes numerous locations that are quite different from the LDR (e.g., in terms of the physical, chemical and biological aspects), and b) there is no supporting rationale for requiring the cleanup to meet 95% UCL of the PRGs."



Source: Ecology (2012) citing Puget Sound Action Team 2007

Note: Samples include fish from Puget Sound and results are reported in micrograms per kilogram wet weight (ppb). Commercial foods were sampled as part of the U.S. Food and Drug Administration's total diet study and market-basket survey. In most cases, data are limited by small sample sizes

kg = kilogram; µg = microgram; PCB = polychlorinated biphenyl; ppb = parts per billion; PRG = preliminary remediation goal; ww = wet weight

Figure RS-1. Total PCB Concentrations (µg/kg ww, or ppb) in Fish from Puget Sound Compared to Other Common Food Sources

Response

With respect to the ubiquity of PCBs in the food supply, see the response comment 2.5.2 that recommends EPA leave protective exposure levels to hazardous substances like PCBs from LDW resident fish and shellfish tissue to the FDA. It explains why EPA believes it is required to consider these risks. With respect to the proposed tissue cleanup levels being established under CERCLA to protect human health, and therefore not being ARARs which could be waived, see the last paragraph of the response to comment 2.5.1. Nothing in this ROD establishes perpetual obligations to achieve the impossible, particularly in a remedy that limits active remediation to the achievable sediment RALs.

As stated in several previous responses, the ROD does not include tissue cleanup levels, but does include target tissue levels. EPA will use UCL95 of site tissue and sediment as the means of comparison for sediment cleanup levels and tissue target levels, to be consistent with risk assessment practice, including exposure point concentration calculations used in the RI/FS, and best science based on best professional judgment.

Further, EPA does not agree that long-term monitoring of fish "is not a reliable gauge for remedy performance." EPA believes that it is in fact a reliable gauge for measuring the achievement of RAO 1 as explained in previous comments in this section. EPA similarly does not agree that "it is inappropriate to utilize non-urban Puget Sound data to establish background for the LDW." Doing so is consistent with meeting the substantive requirements of the SMS in achieving RAOs 1 and 4 as explained in prior comments in the section on tissue PRGs. Lastly, note that tissue target concentrations were developed only for resident LDW species.

2.5.5 Comment: Tissue RBTCs should be presented as a range of values

LDWG and other commenters commented that because of the high level of uncertainty associated with species-specific RBTCs, they should be presented as a range of values, which would encompass a credible range of values calculated using various defensible techniques. A range for species-specific RBTCs would acknowledge the high level of uncertainty associated with these values.

Response

EPA agrees that species-specific RBTCs are uncertain. However, presenting a range of values for either the RBTC-based or background-based target tissue concentrations would create unnecessary confusion. Where within the range, especially if the range was not narrow, would the acceptable risk level or goal be? EPA is convinced that the expression of RBTCs as a range is both unnecessary and would ultimately only serve to confuse. It would also be inconsistent with how RBTCs are typically expressed as a single value, with no substantive benefit to justify this deviation.

2.5.6 Comment: Collection of additional background tissue data should be performed by EPA and Ecology

LDWG commented that any additional fish and shellfish background data collected post-ROD should be performed as a Puget-Sound-wide effort paid for by EPA and Ecology to benefit many projects throughout Puget Sound and should not be the sole responsibility of the PRPs performing the LDW remedial design. LDWG further commented that the data collection effort should focus on urban background tissue concentrations rather than natural background.

Response

Comparison of site fish and shellfish tissue concentrations to background data is a measurement endpoint for the LDW and an integral component of the Selected Remedy for the In-waterway Portion of the Site and therefore collection of background data for this purpose is part of the long-term monitoring requirements of this ROD.

2.5.7 Comment: Sediment remediation will not reduce clam tissue COC concentrations

LDWG commented that available data indicate the Preferred Alternative, or any of the alternatives considered in the FS, is unlikely to substantially reduce clam tissue concentrations, because clam tissue concentrations are more related to the water exposure pathway, which they contend is not being addressed by the Selected Remedy and is influenced by sources outside of the LDW. For these reasons, they believe a clam tissue PRG to measure reduction in cPAH and arsenic concentrations in clams should not be used to measure the success of the Selected Remedy. They believe that RI and literature data, and the fact that clams are filter feeders, show that it is unlikely that sediment is the major exposure pathway for clams, and that the predominant exposure pathway is from the water and that upstream inputs would dominate tissue accumulation levels. LDWG asked that EPA clarify the text in the ROD so the public understands that there is little relationship between sediment concentrations and clam tissue concentrations and the Selected Remedy may not change the clam tissue concentrations significantly.

Response

EPA disagrees that available data support the view that the major pathway of arsenic and cPAHs to Duwamish clams is via water, plankton, and suspended sediments. Insufficient information was collected during the RI to develop a relationship between arsenic and cPAH concentrations in clams and sediment, or to discern the factors influencing the concentrations of these contaminants in clam tissue. Arsenic and cPAHs contribute 95% or more of the risk associated with clam consumption for the RME scenarios. Therefore, it is critical that research be conducted prior to implementation of the Selected Remedy to better understand and characterize the relationship between sediment concentrations and clam tissue concentrations of arsenic and cPAH. The results may shape the design of remedial action in clam habitat areas. EPA has initiated this research, and a final report of the first phase (laboratory exposures of eastern softshell clams to LDW bedded and suspended sediments) provides data that supports a view that sediment is a major (possibly predominant) pathway for exposure (Lotufo et al 2014).

2.5.8 Comment: Support fish tissue PRGs

DRCC/TAG commented that they appreciate and support the inclusion of PRGs for fish tissue in addition to sediments, stating that they are essential to ensuring that Remedial Action Objectives (RAOs) (a.k.a., cleanup goals) are achieved. The Suquamish and Muckleshoot Tribes commented that they appreciate the inclusion of remedial goals for tissue; however, due to uncertainty in background concentrations based on existing tissue data, they agreed that these data, and any tissue PRGs derived from these data, should be clearly identified as provisional values. Furthermore, they commented that they understood that a plan for collecting additional relevant background tissue data would be developed during the remedial design and used to set appropriate tissue PRGs. The Proposed Plan states that EPA may adjust the values identified as tissue PRGs, if appropriate, and that such a change would require a ROD amendment or ESD. The

Tribe believes that this is a significant change in approach that unnecessarily complicates the process of establishing relevant tissue PRGs.

Response

EPA agrees that fish and shellfish tissue concentrations are essential for measuring the achievement of RAOs, particularly RAO 1, and fish tissue monitoring is part of the long-term monitoring requirements in this ROD. EPA chose not to include tissue cleanup levels in the ROD for two primary reasons: 1) the uncertainty associated with the data sets on which these values are based—see the responses to comments 2.5.3 and 2.5.5 regarding these data uncertainties and how EPA will resolve them; and 2) their selection as PRGs in the Proposed Plan generated so much confusion and misplaced concern that expeditious implementation of the Selected Remedy seemed potentially diverted for no substantive gain.

EPA emphasizes that calling these values tissue target concentrations rather than cleanup levels does not diminish their importance nor does it diminish EPA's goal to reduce COC concentrations in tissue to as low a level as possible to achieve RAO 1. EPA recognizes how important the goal of lowering fish and shellfish contaminant concentrations is to the community and affected Tribes, and will strive to reduce tissue concentrations as much as possible through implementation of the Selected Remedy and in coordination with Ecology on source control.

2.6 Use of Washington Sediment Management Standards

2.6.1 Comment: Incorporate Sept 1, 2013 revisions to the SMS into the LDW ROD

Many commenters asked that EPA incorporate the revised version of SMS adopted on September 1, 2013 as an ARAR in the ROD, noting that the revised SMS allows sediment cleanup levels to be set at regional background (CSL in the revised SMS). LDWG and other commenters stated that they believe the LDW Feasibility Study (FS) analyses demonstrates that natural background concentrations are unattainable in the urban area that will continue to receive contaminant inputs from these ubiquitous lateral and upstream sources and defines the regional background concentrations relative to the Green River and lateral inputs. They suggest that sediment cleanup levels in the ROD could be based on regional background under the SMS, obviating the need for the technical impracticability waiver process.

Response

EPA has incorporated the substantive requirements of the September 1, 2013 revisions to the SMS into the ROD. *The 2013 SMS allows the use of standards up to the CSL (including regional background) when it is technically impossible to achieve the SCO, or when meeting SCO levels (which include natural background) will have a net adverse impact on the aquatic environment.* See the response to comment 2.3.1. It has not yet been established that it is not technically possible to meet the SCO levels notwithstanding RI/FS modeling predictions that natural background levels cannot be achieved for at least some COCs. In addition, regional background values have not been established for LDW. *If EPA makes this determination based on future monitoring data and analysis, EPA can consider adjusting cleanup levels up to the CSL in a ROD Amendment or ESD.*

2.6.2 Comment: Provide flexibility for benthic SCO compliance

Several commenters stated concerns about a statement in the Proposed Plan that "RAO 3 must be met at every sampling location," stating that compliance with the SQS at every location is not required by the SMS rule. They are particularly concerned about seven SMS contaminants that they believe are expected to have periodic or localized exceedances of the SQS because of ubiquitous urban contributions, analytical issues, transient exceedances, or naturally-occurring contributions (see comment 2.6.3). They believe that the Proposed Plan's compliance standard is unrealistic based on data from the LDW and data from other sites in Puget Sound, and that this compliance standard was not used in the Feasibility Study (where 98% achievement was used as a benchmark for compliance with RAO 3). They are concerned that this compliance requirement could result in increased scope uncertainty, but would not significantly improve the environment because isolated or low-level SQS exceedances would not impair the overall ecological function of the benthic community in the LDW, because not all SQS exceedances equate to adverse effects to the benthic community due to the nature of how apparent effects thresholds (AET) values are derived (see comment 2.6.5). They ask that the ROD provide flexibility for compliance with the SMS, consistent with SMS provisions that permit the use of standards up to SMS cleanup screening levels (CSLs) based on provisions outlined in the rule and that can appropriately address intermittent exceedances and persistent contaminants in the immediate vicinity of outfalls.

Response

The ROD does provide flexibility in meeting the benthic SCO (SQS in the Proposed Plan). For stations where no human health-based RALs are exceeded, the ROD provides flexibility in three ways: 1) biological testing can be used to override chemical benthic SCO exceedances; 2) in areas where natural recovery to the SCO is predicted, remedial action is required only if COC concentrations exceed 2 times the benthic SCO; and 3) although the ROD states that RAO 3 cleanup levels must be met at each sample location, EPA will use its discretion in determining whether a minor exceedance of an RAO 3 cleanup level requires remedial action. A single isolated exceedance of a benthic SCO will not trigger additional remedial action. Instead, it will trigger additional monitoring to determine the nature and extent of the contamination in that area. Additional remedial action may be warranted if, for example, monitoring indicates a cluster of three or more points with COC concentrations exceeding the benthic SCO.

Although the FS (LDWG 2012) used 98% achievement of SMS standards as a benchmark for RAO 3, it clearly states (see notes to Table 9-2b) that it is used for estimation purposes only and does not represent a standard to be applied to compliance monitoring. See response to comments 2.6.1 and 2.3.1 regarding the request that EPA adjust cleanup levels to the CSL.

2.6.3 Comment: Reduce the number of contaminants for which there is an SMS-based RAL

LDWG and other commenters commented that further flexibility in implementing the cleanup can be provided, without compromising the effectiveness of the remedial action, by reducing the number of SMS contaminants for which there is a RAL. They believe this is reasonable based on the distribution of contaminants in the LDW and practices at other sites. They suggested that addressing the human health risk drivers and SMS contaminants that exceed the SQS (the benthic SCO in the 2013 SMS) in greater than 3 to 5% of the samples will address most exceedances of the SMS. For some of the remaining SMS

contaminants, there are isolated or minor SQS exceedances and random exceedances that cannot be tied to a particular source. Because exceedances of the SQS values do not necessarily demonstrate adverse effects to benthic organisms, and because the SMS does not require every SQS exceedance to be remediated, EPA should not view every SQS point exceedance as a problem that must be addressed through active remediation, and should not apply a RAL for certain SMS contaminants.

Response

See response to comment 2.6.2 regarding flexibility in meeting the benthic SCO. A reduction in the number of RAO 3 (protection of benthic invertebrates) COCs (referred to as "SMS contaminants" in the comment) to a smaller set of indicator contaminants would be appropriate if the RI/FS data showed that certain COCs were spatially correlated, and that sampling and remediation of a subset of the contaminants that exceeded the benthic SCO would address a suite of other COCs. However, this was not found to be the case, and EPA does not believe it is appropriate to reduce the number of benthic protection COCs at this time. If it can be shown during remedial design that an indicator contaminant approach would address all benthic COCs, as suggested by WAC 173-340-703, EPA can consider such an approach at that time.

2.6.4 Comment: Provide flexibility for ubiquitous chemicals unassociated with readily controlled sources

LDWG and many local businesses requested that EPA consider providing flexibility in the ROD for contaminants with localized and/or transitory exceedances. They proposed that certain chemicals that show localized exceedances of the SQS due to ubiquitous urban sources, analytical issues, and naturally-occurring contributions not be assigned RALs: bis(2-ethylhexyl)phthalate (BEHP) and butyl benzyl phthalate (BBP), benzyl alcohol, benzoic acid, and phenolic compounds. Others commenters asked that the ROD not require remediation of these ubiquitous chemicals at every location. They commented that, if additional cleanup is performed based on exceedances only for these chemicals, then cleanup will likely not result in reductions in surface sediment concentrations due to recontamination from ongoing inputs from the vast urban area that surrounds the LDW, including natural sources.

The following assertions are made in the comments:

- The SMS requires compliance in 10 years following remediation, but does not require that a cleanup level (or RAL for active remediation) be developed for every chemical.
- The BCM indicated that approximately 14 acres (over 3% of the waterway) could have persistent SQS exceedances of BEHP and BBP as a result of continuing urban inputs from lateral sources, and the Duwamish/Diagonal EAA monitoring dataset supports the recurrence of those chemicals in a remediated area.
- Ecology's Outfall Surface Sediment Sampling Data Report (Ecology 2011) indicated SMS exceedances are occurring near stormwater outfalls. Of 162 samples with detected concentrations, chemicals in decreasing order of SMS (SQS or CSL) exceedances were benzyl alcohol (101), PCBs (11), BBP and BEHP (both with 6), and zinc and benzoic acid (both with 5). Overall, 116 samples had detected exceedances of the CSL, of which 94 were for benzyl alcohol.
- The 1994 revision of the AET values reduced the benzyl alcohol SQS from 650 µg/kg to 57 µg/kg. However, the dataset for this chemical was limited due to analytical uncertainties, and the

> AET value does not reflect the toxicity of benzyl alcohol. A recent investigation showed no benthic toxicity in 17 sediment samples with benzyl alcohol concentrations above the SQS, of which 13 also exceeded the cleanup screening level (CSL) value (Goodrum et al., 2013).

They believe that active remediation triggered only by SQS exceedances for these contaminants would not benefit the benthic community. Control of these contaminants in sediments and outfalls is a difficult regional issue, as they may not be not associated with readily-controlled sources. The commenters stated that it is primarily the role of source control to minimize and address the frequency of such urban contaminants.

Response

The commenters seem to be proposing that exceedances of the SMS criteria be ignored because they are so widespread. EPA disagrees. The ROD allows for a 10-year natural recovery period to meet the SMS SCO criteria at stations where human health-based RALs are not also exceeded; they do not have to be met immediately after completion of the cleanup. As discussed in response to comment 2.6.2, t*he ROD provides flexibility in meeting the benthic SCO*, including allowing for biological testing to override chemical benthic SCO exceedances.

EPA agrees that source control will be an important component of any long-term plan to address the contaminants listed in the comment, and EPA and Ecology will coordinate to find and sufficiently control sources of sediment contamination that may contaminate sediments at levels exceeding the benthic SCO criteria and human health-based RALs prior to the start of remedial action. If the SCO levels cannot be met in the long-term after technically possible source control and sediment remediation measures have been implemented, EPA can consider seeking to increase cleanup levels to the CSL under the provisions of the 2013 SMS. If meeting the CSL is considered technically impracticable, EPA can consider waiving the ARAR. Either of these actions would be done under a ROD Amendment or ESD.

2.6.5 Comment: Benthic SCO (formerly SQS) values are overly conservative

LDWG commented that in many instances, toxicity data are now available demonstrating that SQS values are overly conservative. They commented that both the SQS and the higher CSL of the SMS were based on the application of Apparent Effects Thresholds (AETs) (e.g., Ecology 1996) to the limited, and in some instances questionable, dataset available from testing done primarily in the 1970s and 1980s when toxicity test results were much more variable than they are today. AETs are based on a method that relies on simple correlations, rather than causation. The lowest AET values represent the highest concentrations of a particular contaminant in any sediment sample that did not result in adverse biological effects. Due to the nature of AETs, as more data become available, the AETs are likely to increase for some contaminants, as stations are found where higher concentrations of that contaminant are present, but no adverse biological effects are shown. It was understood at the time the SMS were promulgated that as more data became available, the SQS values would need to be revised, and that they would, in some instances, rise in concentration. In fact, AET values based on the much greater volume of data now available would likely result in significantly higher SQS values. Among the contaminants that would have higher SQS values are some of the SMS contaminants for which problematic and persistent exceedances have been shown in the LDW. They ask that, in determining the need for remedial actions based solely on

exceedances of non-human health SQS values (i.e., excluding PCBs and arsenic), EPA consult the toxicological literature to verify that the SQS value, which is based on a simple correlation analysis, is indeed representative of a toxicity threshold for the protection of benthic communities.

Response

The SMS marine benthic chemical criteria were not developed to provide absolute proof of observed field effects as the result of any single chemical. There are no existing methods that can provide this type of proof. The marine benthic chemical criteria are based on a preponderance of evidence of the association between chemical contamination and adverse biological effects. In addition, the SMS allows the use of biological tests to confirm adverse effects from chemical contamination and the biological test results can override the chemical test results. The reliability of the AET method, and resulting marine benthic chemical criteria, was evaluated using a comprehensive database of samples from thirteen Puget Sound embayments. In at least 85% of the samples, the AET method correctly classified adverse and no adverse effects to biota. The AET method has undergone interagency review and public comments and formal technical review and approval by the EPA Science Advisory Board in 1988. Refer to EPA's SAB report for further detail on the technical review "Evaluation of the Apparent Effects Threshold (AET) Approach for Assessing Sediment Quality" July 1989. Further detail on the scientific validity of the AET method and resulting marine benthic chemical criteria, can be found in the "Responsiveness Summary for Adoption of Chapter 173-204 WAC Sediment Management Standards" (Section B), December 1990, Publication No. 90-001.

2.7 Remedial Action Levels

2.7.1 Comment: Disagree with intertidal depth of compliance

LDWG and other commenters commented that they disagree that a 45 cm depth of compliance for beach play and clamming is needed for human health direct contact risk drivers in the intertidal area. They believe, based on the burrowing depth of Eastern softshell clams and anticipated digging depths by children, it is not reasonable to anticipate a major release by these activities or that intertidal physical disturbances would affect the site-wide spatially weighted average concentration (SWAC) for PCBs. They request that the intertidal RALs only apply to the top 30 cm, averaged over this interval, stating that clam and other high value intertidal habitat should not be preemptively removed in an attempt to avoid a potential risk that can be effectively managed if and when it occurs.

A local business commented that the Proposed Plan is inconsistent in the remedial approach to be employed at clamming areas because it states that PRGs in clamming areas must be met in the upper 45 cm, but later says that caps in clamming areas must be no less than four feet in depth or 122 cm. These standards appear to conflict. If the PRGs apply only to the upper 45 cm, then why would a cap need to be nearly three times as deep?

Response

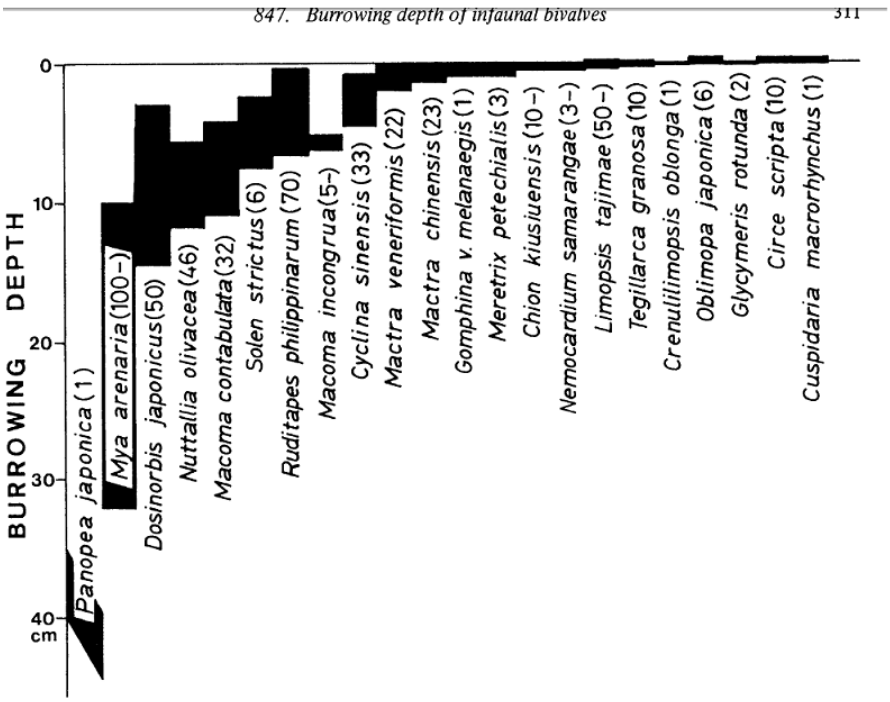


Figure 3. Depth distribution of infaunal bivalves observed in this study. Number of individuals observed is shown in parentheses.

Figure RS-2. Depth distribution of infaunal bivalves (Kondo 1987)

The eastern softshell clam (*Mya arenaria*) has burrowing depths in the range of 25 to 35 cm (Figure RS-2). However, a clammer would not stop at the upper end of the shell, but would rather need to dig around the clam to extract it. The Oregon Department of Fish and Wildlife recommendations for excavating soft shell clams (ODFW no date) emphasize the fragility of soft shell clam shells and siphons and suggest excavating around the margins of a location where a clam might be expected to be. The size of a mature eastern softshell clam ranges from 5 cm up to 15 cm. Thus, consideration of the size of the clam to be excavated and depth would result in an excavation depth of 40 to 50 cm. Providing for a best professional judgment excavation margin of approximately 5 inches to avoid damaging clams would also be appropriate. Given the considerations of clam depth, clam size, and the need to excavate around clams, a depth of 45 cm is readily justified.

With regard to children's play activities, EPA believes that 45 cm (approximately 18 inches) is a reasonably anticipated depth to which a child could dig.

With regard to cap depth, EPA has clarified in the ROD that any cap in a clamming area must be of sufficient depth to allow for a clean clam habitat layer of 45 cm, with an isolation layer below the habitat layer. EPA anticipates this will generally require an overall cap thickness of 4 feet (122 cm).

2.7.2 Comment: No subsurface RALs outside of Recovery Category 1

LDWG commented that they believe subsurface RALs are not necessary in areas not expected to be subject to scour (Recovery Categories 2 and 3). They objected to EPA's adding subsurface RALs in

Recovery Category 2 and 3 areas following FS completion. For example, the FS included only a vertical compliance zone of 10 cm in Recovery Category 2 and 3 areas, and the PCB RAL was 12 mg/kg OC. In the Preferred Alternative, the intertidal RAL is 65 mg/kg OC for PCBs applied across the upper 45 cm (1.5 ft) of sediment as an average, and a subtidal subsurface RAL of 195 mg/kg OC for PCBs applied as an average in the upper 60 cm (2 ft) of sediment in Recovery Categories 2 and 3. LDWG believes that the new RALs and vertical compliance zones in the Proposed Plan mean that EPA is emphasizing mass removal over risk reduction. They believe that removing subsurface contamination in areas where the top 10 cm of sediment meets RALs will not reduce risk, but only add construction-related impacts and costs.

They stated that application of SQS for non-human health COCs should be limited to the biologically active zone of 10 cm typically used under the Washington SMS.

Response

The commenter is correct that the RALs listed in the comment were added after the FS; however, EPA disagrees that this addition was unnecessary or that it signals an emphasis on mass removal over risk reduction. Risk reduction and long-term effectiveness and permanence, not a desire for mass removal, were the primary factors in EPA's selection of subsurface RALs in general, including the additions made after the completion of the FS. See response to comment 2.16.2.

Specifically, the RALs listed in the comment were added due to a concern that the FS alternatives did not adequately address the potential for high concentrations of PCBs, the most prevalent COC in the LDW, to become exposed through human activities such as digging in the beach in intertidal areas or emergency ship maneuvering in subtidal areas. The amount of the waterway potentially subject to mixing or other disturbance to below 10 cm is uncertain but not inconsequential. The FS assigned 77 acres of the LDW (or 17.5% of the total waterway including EAAs) to Recovery Category 1 due in part to likely scour. The FS stated that routine vessel operations in shallow areas and berthing areas (assigned to Recovery Category 1) may cause localized scour in these area to depths of 22 cm; and, in unusual cases, up to 60 cm. The FS considered the need for remediation of contamination at sediment depths up to 60 cm below the surface, rather than the biologically active zone of 10 cm, only in Recovery Category 1. However, this approach does not consider the potential for disturbance in Recovery Category 2 and 3 areas due to vessels traveling outside of frequent lanes of operation, vessels operating with excessive propeller power in berthing areas or elsewhere, barge groundings, emergency maneuverings, changes in the patterns of site use, or maintenance of overwater structures, which occur sporadically in all areas of the waterway. The FS documented evidence from subsurface contaminant profiles and geochronology data to suggest deeper sediment-disturbing events may cause scour and hinder natural recovery in some Recovery Category 2 and 3 locations. The addition of subsurface RALs in Recovery Category 2 and 3 areas provides better protection for releases of contamination that may occur due to such events. All of these factors provide greater permanence in comparison to other alternatives of similar cost and construction duration. See response to comments 2.16.2 and 2.16.3 and for additional information about the analysis of the effects of disturbance of subsurface sediments.

2.7.3 Comment: Do not require active remediation above the CSL

LDWG asked that EPA allow areas of the LDW in Recovery Categories 2 and 3 where the surface sediment concentration is less than 2 times the SQS but above the CSL to naturally recover. For contaminants that have the same SQS and CSL values, natural recovery is not allowed according to the Proposed Plan. They assert that these areas have been shown to demonstrate adequate sedimentation for natural recovery based on empirical trends or model predictions showing recovery and lack of scour, and would achieve SQS within 10 years after remediation, even when concentrations are currently above the CSL. LDWG comments that requiring destruction of a functional benthic community by digging it up when it may only suffer a few years of potentially minor adverse effects is not the best remediation decision for the environment.

Response

EPA agrees. As described in Sections 12 and 13, the ROD allows for natural recovery where surface sediment COC concentrations are less than 2 times the benthic SCO (benthic SCO is equivalent to SQS in the revised SMS) and has removed the requirement that COC concentrations not exceed the CSL. A consequence of this is that numerous compounds which have CSLs close to or equal to the SCO would be less likely to require action.

2.7.4 Comment: Recovery Category 1 subsurface RALs should be for HH COCs only

LDWG commented that the subsurface RALs in Recovery Category 1 areas (evaluated over the top 60 cm) should focus only on the human health-based RALs. They believe that applying the deeper RAL evaluation depth to non-human health SMS contaminants is overly conservative, and that applying a RAL evaluation depth of 60 cm only for human health risk drivers would result in a more efficient cleanup and be equally as protective, for the following reasons:

- Applying the SMS RALs only to the upper 10 cm is protective of the benthic community. A hypothetical disturbance event may not necessarily result in surface sediment SQS exceedances. A hypothetical disturbance event may, at a minimum, physically disrupt the benthic community, which is unrelated to the contaminant concentrations of the subsurface. Therefore, a deeper RAL evaluation depth is ineffective at protecting the benthic community from effects of disturbance.
- The subsurface RAL in Recovery Category 1 areas is reasonable for human-health risk drivers because these contaminants bioaccumulate and have longer-term impacts on receptors in the LDW from the seafood consumption pathway.

Response

EPA disagrees that the 60-cm RAL compliance depth in Recovery Category 1 would be ineffective at protecting the benthic community from effects of disturbance. First, EPA considered evidence presented in the FS (summarized in ROD Table 23), that Recovery Category 1 areas should be established due to the presence of one or more of several factors (evidence of scour, predicted flood scour, low sedimentation, and empirical trends of PCBs and RAO 3 COCs) indicating that natural recovery is limited. The FS presented information indicating that mixing to depths greater than 30 cm depth could be expected from vessel maneuvering; this became the basis for the proposal in the FS of a 60-cm application depth for the RALs for both benthic and human health-based COCs. Mixing of subsurface sediments with surface sediments could result in exceedances of the SCO in the top 10 cm in the

biologically-active zone (top 10 cm) which, after the 10 year natural recovery period, and could require additional remediation.

Regarding the negative effects of physical disturbance, there is ample evidence to indicate that benthic communities should readily and rapidly recover and re-establish themselves following remediation. Studies of benthic communities present in the LDW (Ecology 2007) indicate that most LDW benthic communities show late-succession-stage communities and do not show long-term effects of physical disturbance.

2.7.5 Comment: Simplify dioxin/furan and cPAH RALs

LDWG recommended that EPA simplify the dioxin/furan and cPAH RALs in the ROD to improve consistency of implementation and to combine the LDW-wide and the intertidal values into single values because they are very close to each other. LDWG recommends 28 ng TEQ/kg dw for dioxin/furans and 900 µg TEQ/kg dw for cPAHs (consistent with the direct contact RBTC for beach play areas).

Response

EPA disagrees. These values (25 and 28 ng TEQ/kg dw for dioxins/furans and 900 and 1000 µg TEQ/kg dw for cPAHs) were proposed in the FS. While they are similar, there is no basis for selecting the higher of the values. If the parties implementing the remedy wish to simplify compliance monitoring by remediating to the lower of the two values, this would be acceptable to EPA.

2.8 Remedial Action Objectives

2.8.1 Comment: Remedial Action Objectives should be modified

LDWG commented that the RAOs should be modified so that: 1) the numerical goals associated with the RAOs are achievable; 2) it is clear that only sediment is being remediated and that although some reductions of contaminant concentrations in surface water and tissue will occur as a result of sediment remediation, further reductions are outside the scope of the CERCLA cleanup; and 3) risk terminology (related to exposure potential) is consistent with CERCLA.

They state that the RAOs should reflect goals related to the cleanup—risk reduction related to reducing surface sediment contaminant concentrations. While it is understood that reducing sediment contaminant concentrations is anticipated to decrease surface water contaminant concentrations, sediments are not the only contributing source to surface water. Therefore, it is misleading to imply that the cleanup will fully remediate the water column. LDWG commented that EPA should revise the RAO 1 language in the ROD to read: "*RAO 1: Reduce human health risks associated with the consumption of resident LDW fish and shellfish by reducing sediment concentrations of COCs to protective levels*," (omitting "surface water"). In addition, it is unclear what is meant by "*highest potential for exposure*" (in RAO 1) in the Proposed Plan. CERCLA cleanups are not based on protecting a theoretical maximum exposure potential for any individual within a population, but rather the "*reasonable maximum exposure*" level; the public could easily confuse the "*highest potential for exposure*" with "*reasonable maximum exposure*." Term should be consistent with CERCLA and the meaning defined to eliminate confusion with regard to interpretation in the future.

Response

EPA disagrees that RAOs should be changed as requested in the comment. "Highest potential for exposure" refers to the populations at risk. With this remedial action, EPA seeks to protect populations with the highest potential for exposure such as Native Americans and Asian Pacific Islanders. Surface water is included because CERCLA requires that all affected media presenting unacceptable risks to human health and the environment be addressed, and specifically that selected remedial action achieve a level or standard of control which at least attains water quality criteria established under 304 or 303 of the Clean Water Act where they are relevant and appropriate, see Sections 121(d)(2)(A)(ii) (last sentence) and (B)(i). Further, EPA has not represented that the Selected Remedy alone will fully remediate the water column, though it will significantly reduce the partitioning of hazardous substances from contaminated sediments to the water column. The ROD recites in numerous places, as the Proposed Plan did, that the Selected Remedy is one of many coordinated actions designed to achieve this goal. The other actions are referred to as source control to be undertaken largely by the state under its cleanup and regulatory authorities. EPA has also consistently recognized the challenges source control represents and is committed to assisting the state to the best of its ability within its resource constraints and authority.

2.9 Miscellaneous Regulatory Comments

2.9.1 Comment: Cleanup should meet the goals of the Clean Water Act

One commenter stated that the CWA laid out as its main goals: (1) zero discharge of pollutants into waters of the United States by 1985 and (2) fishable and swimmable waters by 1983. These target dates have not been met. The commenter requested that EPA provide a plan and schedule in the Record of Decision [ROD] that shows how these goals can be addressed within the LDW.

Response

The aspirational goals of the Clean Water Act cited in the comment are not and have never been substantive requirements to be met (or waived) as ARARs by CERCLA remedial action. ARARs are the full extent to which the implementation of CERCLA interfaces with or may be seen to implement portions of other environmental laws. See Section 121(d) of CERCLA. Consequently, the implementation of CERCLA is not and has never been a substitute means for the implementation of the Clean Water Act which has its own detailed and carefully prescribed provisions and implementing regulations for this purpose.

2.9.2 Comment: Water Quality ARARs should be action-specific

LDWG commented that at most sediment cleanup sites, water quality ARARs are typically for action-specific activities (such as discharges of wastewater to surface water during construction, or for source control purposes) and that they should be applied in this way in the LDW ROD.

Response

To assist in the broad identification of ARARs, the NCP developed categories of ARARs known as chemical-specific, action-specific and location-specific. EPA has used these categories in RODs when they have seemed helpful. An action-specific ARAR is a requirement that remedial activity itself cannot cause an exceedance of rather than a requirement the cleanup has to meet. EPA firmly believes that the plain language of Sections 121(d)(2)(A) and (B)(i) of CERCLA establishes water quality criteria under

Sections 304 or 303 of the Clean Water Act as more broadly relevant for surface water than merely action-specific requirements (like Noise Control Act limitations during remedial action implementation) since these exceedances are part of the reason the site poses a risk to human health and the environment. These risks must be addressed in a final cleanup decision and go beyond a requirement to only monitor compliance during implementation of the Remedial Action.

2.9.3 Comment: ROD should be for an interim remedy

The Suquamish Tribe commented that implementation of the proposed remedy is dependent upon completion of Early Action Area (EAA) cleanups and achievement of sufficient source control. In addition, EPA indicates that achievement of PRGs is not considered feasible and has already set the stage for a technical impracticability waiver for sediment and water quality compliance criteria. Given the high degree of uncertainty that the remedy will be successful in achieving all of the remedial action objectives, they do not believe the Proposed Plan provides justification for why this alternative is considered the final remedy.

DRCC/TAG commented that if the cleanup does not achieve natural background, it must be considered an interim action under state law, and must remain on the Washington State Contaminated Sites List. DRCC/TAG notes that natural background in Puget Sound is not pristine, and carries some health risks to people who consume unlimited amounts of local seafood, either because some chemicals are naturally occurring (arsenic) or because of widespread contamination deposited from a variety of non-localized sources, such as long-distance air deposition (PCBs).

Ecology commented that, under MTCA, a cleanup action that only partially addresses the cleanup of a site is considered an interim action. A remedial action which cleans up hazardous substances from all or a part of the site but does not achieve cleanup standards is considered an interim action. The interim action may be considered the final cleanup action for the site if the interim action is subsequently shown to comply with WAC 173-340-350 through 173-340-390. They believe the Proposed Plan does not provide enough detail about the process to get to a final cleanup determination without TI waivers. The state may agree with EPA that the ROD can be considered a final cleanup under CERCLA when the remedy has been performed to the maximum extent practicable and a TI waiver is fully justified.

Response

The Selected Remedy for the In-waterway Portion of the Site is a combination of active remedial measures employing a range of technologies in particular areas depending on sediment quality to achieve the selected RALs, followed by MNR to achieve cleanup levels and meet ARARs. While the ROD requires an assessment of whether further practicable active remedial measures may be warranted at the completion of Selected Remedy and selected in a subsequent decision document if cleanup levels and ARARs are not achieved, the ROD is a final rather than interim ROD because no further active remediation in the In-waterway Portion of the Site is anticipated by EPA. EPA expects that the steady state achieved following completion of the Selected Remedy will either be at cleanup levels for sediment and ARARs for water quality, or will represent practicable limitations in source control implementation. Data collection and analysis during long-term monitoring is intended to test this expectation.

The MTCA rules regarding MTCA status as final or interim are administrative classifications or requirements and as such are not ARARs for CERCLA response actions.

2.9.4 Comment: Definition of Site is too broad

LDWG and some waterway businesses commented that the proposed plan definition of the "Site" provides no clarity concerning what will actually be considered part of the Site following ROD issuance. They are concerned that a site definition that encompasses unbounded "upland sources of contamination" is so open ended as to potentially include all upland areas in the upriver watershed. Commenters noted that the FS alternatives address only sediment remedial actions, and that defining the site to include more than sediment raises issues concerning scope and costs, because no costs or specific remedial actions for upland source cleanups are included in either EPA's Preferred Alternative or in Ecology's Source Control Strategy. They note that it is extremely difficult to comment on a site definition that has no specifics and amounts to a declaration that the "site" will include whatever upland property EPA subsequently decides to include (because all properties in the watershed appear to contribute to at least some degree to surface water contaminant concentrations, even if attributable only to atmospheric deposition and runoff). They note that the contaminants associated with many sources to the LDW have local, regional, and global contributions.

Some commenters suggested that to avoid these problems, the site should be defined as the LDW from River Mile 0.0 (southern end of Harbor Island) to 5.0 (just upstream of the Upper Turning Basin and the Norfolk EAA area) and from the mean higher high water (MHHW) level from one side of the bank to the other.

Response

By definition a CERCLA site or facility, the terms are interchangeable, encompasses all areas where hazardous substances have come to be located. The very broad definition of facility in Section 101(9) states in especially pertinent part: "The term facility means…any site or area where a hazardous substance has…come to be located." The NCP at 40 CFR 300.5 in especially pertinent part, consistent with the statutory definition of facility, defines "on-site" in terms of the "areal extent of contamination." An RI is designed to determine the nature and extent of contamination at a site or a portion or operable unit thereof which is then formally established or fixed in a CERCLA ROD. Neither the river-wide RI/FS performed by LDWG pursuant to an Administrative Order on Consent issued in 2000 by EPA and Ecology under CERCLA and MTCA, nor the ROD for the In-waterway Portion of the LDW Site, evaluated or addressed the upland portion of the Site. Early in the RI/FS process EPA and Ecology agreed that EPA would generally be the lead agency for the In-waterway Portion of the Site and Ecology would generally be the lead agency for the upland (source control) portion(s), though the agencies could freely exchange roles to any degree, and support one another in their cooperative relationship. Ecology has been addressing source control by separately working with individual sources. EPA has been the source control lead at a few facilities (Boeing Plant 2, Rhone-Poulenc, and Terminal 117). No RI or other comprehensive study has been undertaken to date to establish the LDW Site areal extent of contamination or boundaries.

2.9.5 Comment: It is not necessary to include source control areas in the definition of the Site

LDWG and some waterway businesses commented that existing regulatory programs outside of CERCLA already address major sources, as delineated in the Source Control Strategy, and it is therefore confusing and unnecessary to include source control areas in the definition of the Site. They state that a clear and successful regulatory structure already exists to address source control, and that defining the Site to include source control areas creates confusion about the scope of EPA's jurisdiction and will complicate efforts to resolve liabilities with affected parties. In their view, EPA will still have the ability to apply CERCLA authority to any intransigent sources of contaminants to the actual Site, as needed, even if the ROD does not define the Site in an unbounded way. They are concerned that the potential for an inconsistent approach to controlling these sources in the context of CERCLA creates broad and significant economic ramifications.

Response

The upland portion of the Site has not been defined with any specificity in the ROD for the In-waterway Portion of the Site because such a definition is beyond the scope of this ROD, and no study as the basis for an Administrative Record to support such a decision exists, as noted in the response to comment 2.9.4. EPA disagrees that including source areas as part of the Site creates the potential for an inconsistent approach to controlling sources. Ecology has been leading a major source control effort to address many ongoing sources using MTCA cleanup orders as a primary mechanism, along with primarily Clean Water Act permitting authority for point source discharges subject to such authority since the Site was listed on the NPL in 2001. The ROD (Section 4.2) and Ecology's Source Control Strategy describe these complementary efforts.

2.9.6 Comment: Support for EPA's Decision to Address the Whole Waterway

DRCC/TAG commented that they appreciate the inclusion of the entire waterway in the cleanup plan "footprint," and support EPA's decision to require long-term monitoring throughout the waterway.

Response

EPA appreciates the comment and notes that the decision to address the In-waterway Portion of the Site as a whole is supported by sediment transport modeling which estimates large-scale movements of sediment in the waterway that could result in migration of contamination both up- and down-stream given that this is a tidally-influenced water body.

2.10 Cleanup Technologies - Capping and Dredging

2.10.1 Comment: Selection of dredging versus capping

Capping and dredging were seen in very different ways by different commenters. Advocates of more dredging (chiefly DRCC/TAG and other non-business community commenters) indicated strong disagreement with capping as a technology. An argument advanced was that the LDW is in a seismically active area, and that subsurface sediment could undergo liquefaction and transport to surface sediment, resulting in the loss of cap integrity. Some commenters argued that caps are incompatible with the use of the waterway for navigation. They termed this a "short term solution." Some commenters challenged the

FS conclusions regarding construction duration, and proposed longer dredging periods (24 hours a day) during the dredging window, or that more dredges be used concurrently in order to shorten construction times. Some commented on application of dredging or capping in specific areas; these comments are addressed in Section 2.22.

Advocates for use of technologies other than dredging disagree with the Preferred Alternative because they believe it over-emphasized dredging and capping and under-emphasized MNR. These commenters (chiefly LDWG members and businesses) stated that more dredging does not improve the effectiveness or certainty of remediation, results in potentially significant health-related risks due to construction-related impacts, and causes unnecessary additional costs. They argued that the Proposed Plan Preferred Alternative overemphasized dredging and overstated the risk associated with the potential disturbance and exposure of subsurface contaminated sediment by seismic events, ship traffic, or vessel scour. They called the Preferred Alternative "mass removal," and stated that mass-removal emphasis would be inconsistent with the following: CERCLA and National Contingency Plan (NCP) requirements that remedies be cost-effective; recommendations by the National Research Council (NRC 2001, 2007); EPA's guidance for remediation of contaminated sediment sites (EPA 2005); and a USACE technical publication on environmental dredging (USACE 2008). They stated that the cited guidance favors flexible, risk-based approaches over mass-removal approaches.

Response

EPA disagrees that the Selected Remedy is not cost effective or is inconsistent with any of the publications referenced in the comment. EPA carefully evaluated all available technologies including MNR, ENR, capping, and dredging in evaluating alternatives and developing the Selected Remedy. As noted in responses to comments 2.16.2 and 2.16.3., EPA considered the environmental effects of dredging in its analysis of alternatives. EPA's consideration of short-term releases and residuals generated during dredging is discussed in response to comments 2.17.2 and 2.17.3. EPA's emphasis for this active, working waterway is not mass removal, but assurance of reliable protection of benthic invertebrates at the bottom of the food chain, reliable reduction of risks to resident fish and shellfish consumers, and reasonable reduction of the possibility of subsurface contamination that could come to the surface as a result of propeller wash (vessel scour) or other factors including marine construction and maintenance (see also response to comment 2.7.1).

Much of the dredging required in the Selected Remedy stems from a need to maintain sufficient water depth for present and reasonably anticipated future human uses of the waterway, maintain habitat function, and to address potential recontamination. These considerations were considered important by many who commented on the Proposed Plan.

EPA carefully reviewed the assumptions made in FS about the number of dredges operating simultaneously and the work cycles and determined that they were reasonable and consistent with other environmental dredging projects in the region. Multiple dredges could increase water quality impacts during joint operations, and transloading limitations also affect how many dredges may operate. However, during remedial design, equipment availability and environmental considerations such as work schedules will be reviewed by EPA to determine if the overall timeline for dredging can be shortened.

Rather than being a short-term solution, capping has been demonstrated in numerous regional and national projects to achieve long-term effectiveness. The following examples in the Puget Sound area (including areas considered seismically active) extend back nearly 30 years:

- West Waterway PCB Contained Aquatic Disposal - 28 years (USACE 2013a)
- St. Paul Waterway (Simpson) Cap - 25 years (Simpson Tacoma Kraft Company 1999)
- Wyckoff/Eagle Harbor Superfund Site - 24 years (EPA 2012)
- Commencement Bay/Nearshore Tideflats (EPA 2009a)
- Puget Sound Naval Shipyard, Bremerton Naval Complex, Operating Unit B (Department of the Navy 2012)
- Pacific Sound Resources (EPA 2009b)

Caps require periodic monitoring to demonstrate that they are retaining their integrity, and (as assumed in the FS cost analyses) there may be periodic repairs identified as necessary.

EPA considered the potential effects of seismicity on areas proposed for capping in the FS (Section 8.1.3.2) and in the Proposed Plan; and concluded that the risk associated with capping is low, and that risks associated with capping some areas in the LDW is not significantly different from other structural alternatives used at Superfund sites, e.g., bank stabilization, barrier walls, and upland caps. For any structural alternatives that confine contaminated materials, it is necessary to include monitoring and maintenance requirements, and development of an Operation, Maintenance and Monitoring (OM&M) plan has been included in the Selected Remedy. Lateral displacement of caps could occur, but for seismic events up to and including a 475-year recurrence event, the risk of release of significant amounts of subsurface contamination is low, would likely occur in small, manageable areas, and would be amenable to repairs in order to manage resulting sediment contamination. The need for repairs would be determined based upon above- or below-waterline inspection, bathymetry, and evidence of recontamination. As earthquake severities increase, the risks due to inundation of the LDW with new sources of contamination from chemical releases, embankment materials, and debris flows originating from upstream, lateral, and downstream sources would likely be much higher than risks from releases of subsurface contamination.

2.10.2 Comment: Partial dredge and cap should not require 4 feet of dredging

A commenter noted that the Proposed Plan Preferred Alternative statement that "If sediment contamination is 4 feet thick or less in an area selected for dredging, all contaminated sediments will be dredged" is inconsistent with the FS evaluations, which assumed that if > 1 ft of contaminated sediment would remain, then full dredging was assumed. The cited text from the Proposed Plan would require very deep dredging to accommodate caps, especially in the navigation channel.

Response

The FS assumed that if less than 1 foot of contaminated sediment remained after dredging a sufficient depth to place a cap, then all contaminated sediments would be dredged; however, if more than 1 foot of contaminated sediment remained after dredging a sufficient depth for a cap, then the area would be partially dredged and capped. Therefore, because caps are generally 3 ft thick, sediments would be partially dredged and capped in areas where the thickness of contamination is greater than 4 feet. The ROD Section 13.2.1.1 states: "Engineered sediment caps will be placed in areas where sediments are

more highly contaminated (COC concentrations are higher than ENR upper limits; see Section 13.2.1.2 and Table 28), and where is sufficient water depth for a cap. Caps in intertidal clamming areas must include a minimum 45 cm clam habitat layer. EPA estimates that caps in intertidal clam habitat areas will be generally be 4 feet thick. In other areas, cap thickness will generally be 3 ft. Cap thickness will be evaluated during remedial design in accordance with EPA and USACE (1998)."

2.11 Cleanup Technologies - ENR

2.11.1 Comment: Tribal concerns about ENR

Tribal representatives stated their concern that ENR with in-situ treatment (amendment with activated carbon or other sequestering agents) may conflict with treaty fishing rights or tribal treaty natural resources. They recommend a pilot project to evaluate the potential impacts to habitat and associated biota prior to extensive use at the site.

Response

It is EPA's intent to avoid conflicts with tribal fishing and natural resources. EPA is currently in the process of scoping a pilot study for activated carbon amendment for ENR, and is consulting with the Tribes on the details of the pilot project.

2.11.2 Comment: Community concerns about ENR

DRCC/TAG and some community members stated their concern that ENR being proposed for areas with "more highly contaminated sediments and correspondingly higher risks" would not be a permanent solution. They recommended that areas proposed for ENR in the Proposed Plan be dredged instead.

Response

ENR (with or without activated carbon or other amendments) is proposed only for areas of moderate to low contamination (up to 1.5 times the RAL in intertidal areas and up to 3 times the RAL in subtidal areas) and in areas unlikely to be eroded (although EPA has allowed for minor expansions of these areas in remedial design, see response to comment 2.11.3). Most of the areas that meet the ROD requirements for ENR are where incoming sediments should eventually cover the ENR layer (net depositional). Consequently, the principal advantage of ENR is to advance this natural recovery process. Because it is less disturbing to the benthic community, and because there are fewer short term effects (see response to comment 2.16.1), EPA believes that ENR is an important feature of the remedy and that it should be retained.

2.11.3 Comment: EPA should consider allowing ENR or ENR/in-situ technologies in areas subject to scour

LDWG commented that, in the final FS, applications of ENR and in situ treatment were limited to Recovery Category 2 and 3 areas. Because scour is an important remedial design consideration when contaminated sediments are left in place, they believe a discussion of scour mitigation technologies should have been included in the FS and Proposed Plan to support the potential for ENR to be used in some potential scour areas. They believe the methods used to delineate potential scour areas in the FS were conservative, and maximum bottom velocities vary locally. LDWG requested that potential scour

mitigation technologies be considered during remedial design based on location-specific conditions in order to avoid increased costs not associated with additional benefits. Specific scour mitigation technologies mentioned include geo-grids, geo-cells, concrete mattresses, fronded mats, and selective particle size selection.

Response

As noted In ROD Section 13.2.1.2, ENR will not be applied to Recovery Category 1 areas unless results of pilot testing indicate potential for success there. EPA will use the results of the pilot test to determine if ENR would be suitable (i.e., ENR placement would remain stable and effective over time) in some portions of Recovery Category 1 areas. Suitable conditions include limited vessel- and flood-related scour and COC concentrations that do not exceed the CSL.

2.12 Innovative Technologies

2.12.1 Comment: Consideration of innovative technologies

EPA should consider mycoremediation (use of mushrooms) that have been shown to be effective in addressing pollutants in water and soil.

Response

Fungal remediation of sediments is an emergent and innovative ex-situ method (one that requires sediment to be removed from the waterway) requiring aerobic (oxygenated) conditions to break down contaminants or sequester them. In Section 5.5.1 of the FS, in-situ microbial methods (chiefly bacterial methods) used for PCBs were considered but screened out because rates of contaminant breakdown were low. Pilot scale demonstrations of fungal remediation have been conducted, but application at larger scales are unlikely at this time due to the need for offsite reaction facilities. However, fungal remediation might be most useful (as suggested by the commenter) for source remediation; that is, at small scales. A review on the Radical Mycology website (http://radicalmycology.wordpress.com/tag/remediation-2/) states, "In a case in which there is continuous, year-round dredging of a harbor such as New York/New Jersey, with an endless supply of this sediment, this strategy can be useful. Mycoremediation in this case [a separate case being considered in the review, not the New York/New Jersey example] would be too slow, and the space required for treatment or storage of materials could be prohibitive."

2.13 Monitored Natural Recovery

2.13.1 Comment: Disagree With MNR Below Benthic SCO (formerly MNR Below SQS)

LDWG and businesses commented that they believe “MNR below SQS” is inconsistent with EPA and other guidance on natural recovery (EPA 2005, Magar et al. 2009), which state that MNR should be used in areas where natural processes are relied upon to achieve specific target concentrations over a specific time frame with contingent actions to be implemented should the target concentrations not be met. MNR below SQS [called MNR Below SCO in the ROD] implies that areas with contaminant concentrations below the SQS could be triggered for additional cleanup and institutional controls. Commenters expressed concern that if ICs such as environmental covenants prohibiting surface penetration were

applied to the broad areas of the waterway designated as "MNR below SQS", they might negatively impact normal water-dependent uses, such as spudding and anchoring barges and vessels.

LDWG stated that the Proposed Plan assumes MNR is possible in all areas where contaminant levels are between the SQS and the PRGs, but because the long-term model-predicted concentrations trend toward the contaminant concentrations that are in sediments entering the LDW from upstream (approximately 35 µg/kg dw in the case of PCBs), some areas are already at steady-state and are not expected to change significantly. Commenters stated that existing analyses in the FS do not support that natural recovery beyond this level should be expected, especially for lower concentration areas. Therefore, they requested that EPA state in the ROD that MNR Below SQS is not being used as a performance standard or management decision point.

Response

The expectation in the ROD is that following active remediation to meet RALs, MNR will further reduce contaminant concentrations to the cleanup levels or as close as practicable to those levels. The ROD (Section 13.4) states:

> EPA will review long-term monitoring data to assess the success of the remedy, including measuring contaminant concentrations in sediment, surface water, and fish and shellfish tissue. If long-term monitoring data show that RAO 3 cleanup levels (benthic SCO criteria) and human health-based RALs (see Table 27 and Table 28) are exceeded, additional actions will be taken to reduce COC concentrations to these levels. If monitoring shows that contaminant concentrations have reached a steady state at levels below the benthic SCO criteria or human health-based RALs but above the human health risk reduction or background-based cleanup levels, EPA will review the data and consider whether additional technically practicable cleanup actions would further reduce contaminant concentrations in sediments, tissue, or surface water.
>
> EPA expects that, once the active components of the Selected Remedy (dredging, capping, ENR, and any additional actions needed to meet the benthic SCO criteria and human health-based RALs) have been completed and long-term monitoring shows COC concentrations have reached a steady state, COC concentrations will either be at cleanup levels for sediment and ARARs for water quality, or will represent practicable limitations in implementation of source control and active remediation. Data collection and analysis during long-term monitoring is intended to test this expectation.
>
> However, if EPA determines that additional remedial action is appropriate for the In-waterway Portion of the Site, EPA will select such action in a ROD Amendment or ESD. If EPA or the State determines that further source control is appropriate, EPA or the State will address such sources with source control response action decisions separate from this ROD. If EPA determines that no additional practicable actions can be implemented under CERCLA to meet ARARs, EPA may issue a ROD Amendment or ESD providing the basis for a technical impracticability waiver for specified sediment and/or surface water quality based ARARs under Section 121(d)(4)(C) of CERCLA.

Note that an ARAR waiver will not be required if EPA determines, in coordination with the state and consultation with the Tribes, that cleanup levels should be adjusted upward to any of the CSL-based levels, including regional background, provided for in the 2013 SMS.

As discussed in the ROD, EPA carefully considered the potential for subsurface contamination to be brought to the surface by high flows, vessel scour, anchor drag, or other disruptions when selecting technologies to be applied to particular areas, including MNR. MNR was selected only for areas where contaminant concentrations and the potential for scour were low, with the expectation that any disruption of subsurface contaminated materials would be infrequent and insufficient to cause exceedances of the cleanup levels. EPA will reevaluate these assumptions in remedial design, but it is EPA's expectation that ICs other than seafood consumption advisories will not be necessary in most MNR areas.

2.13.2 Comment: MNR pros and cons

Commenters differed on their perception of effectiveness and practicality of MNR. Favorable comments indicated that MNR has been shown to successfully reduce contaminant concentrations in a number of case studies and that it is less disturbing to habitat than active remediation. On the other hand, DRCC/TAG stated that MNR is too uncertain in effectiveness to be relied upon in the LDW, and recommends use of ENR in all areas proposed for MNR. To support their disagreement with MNR selection, DRCC/TAG cited Magar et al. (2009) statements regarding lack of sediment stability as a counter-indication for MNR, and describing earthquakes and storm events in addition to active industrial vessel use as events that could cause subsurface contamination to recontaminate the surface. They also cite statements that several of the COCs (dioxins/furans, PCB, and arsenic) naturally break down very slowly if at all (Magar et al. 2009).

DRCC/TAG included case studies in which MNR half-times for attenuation of contaminants in sediment ranged from 3.2 to 12 years, implying that MNR to SQS would not occur within the 10-year time frame. DRCC/TAG also stated that it will be necessary for EPA to restrict future uses of the waterway to reduce disturbance in areas where subsurface contamination remains. DRCC/TAG stated that failure of MNR to reach goals will lead to unaccounted costs, which could be high.

Response

The FS, in Section 7 and Appendix F, provided a detailed evaluation of site-specific evidence that natural recovery is an ongoing process in the LDW, due in large part to burial by accumulated sediment and surficial mixing, not breakdown. EPA reviewed the evidence provided in the FS and concluded that natural recovery will reduce surface sediment COC concentrations across much of the site. MNR to Benthic SCO includes more intensive monitoring and additional actions in any areas where the benthic SCO is not achieved within 10 years after remedial action. As discussed in response to comment 2.13.1, this prediction will be subject to an adaptive management framework to assure that it is performing as expected.

Thus, EPA retained MNR as a component of the Selected Remedy in the areas that are comparatively less contaminated and where several lines of evidence presented in the FS indicated MNR would effectively reduce COC concentrations, and selected dredging, capping or ENR for other areas. The Selected

Remedy includes many safeguards to ensure that MNR would be viable in the long-term, including requiring remediation of areas of significant subsurface contamination that could be disturbed by emergency vessel operations or other disturbances. EPA believes that this strategy provides a balance of options for areas of moderate contamination.

2.14 Monitoring/Contingency Actions

2.14.1 Comment: Support extensive monitoring program

DRCC/TAG commented that they support an extensive monitoring and adaptive management program that should begin now and continue throughout construction and long-term monitoring. Their comments included the following recommendations:

- Construction monitoring data should be posted on-line so that they can be reviewed by the community;
- Construction monitoring parameters should include contaminant concentrations in water, turbidity, sedimentation rates in areas proposed for ENR, air quality, with public sound/noise/odor reporting capacity via hotline to EPA or Ecology, and reporting on boat traffic in the waterway;
- Construction and long-term monitoring parameters should include contaminant concentrations in water, fish/shellfish tissue (comments included specific recommendations for species to be monitored), and sediments.

King County commented that they are committed to rigorous monitoring and future course corrections to ensure we meet the objectives of the cleanup, but encouraged EPA to build in flexibility for adaptive management.

Response

The ROD does not contain details of the monitoring program. EPA will develop a monitoring program during the remedial design phase and will consider public input as the plan is being developed. The baseline and long-term monitoring programs will include measuring contaminant concentrations in sediment, tissue, and surface water among other parameters. Although parties will continue to collect sampling data in the LDW as part of the ongoing Early Actions, EPA anticipates that a comprehensive monitoring program to develop a new baseline will be done at the beginning of remedial design. Concerns about noise, odor, and other potential community impacts will be considered and addressed in the extent possible, in remedial design. EPA will provide contact information for community members to raise complaints or concerns during the course of construction.

2.14.2 Comment: Insufficient data to support a Proposed Plan

Commenters stated that more data are necessary to devise an effective remedy, and that therefore EPA should suspend the public process and re-issue a revised Proposed Plan after generating sufficient data.

Response

EPA disagrees that the data collected during the RI/FS were insufficient to select a remedy. The RI utilized an existing dataset of approximately 1,200 surface sediment samples, 340 subsurface sediment cores, and 90 fish and shellfish tissue samples, and collected additional data from 2004 to 2006, including

approximately 900 samples of the following media: fish, clam, crab, and benthic invertebrate tissue; seep water (water seeping from banks along the river); surface sediment (the top 10 cm); subsurface sediment (below the top 10 cm); and porewater. Data from an additional 174 surface sediment locations and 509 subsurface sediment samples were added to the RI baseline data for the FS.

In spite of the extensive RI/FS data collection effort, the cleanup footprint is likely to have changed between the time of RI/FS sampling and implementation of the remedy, and the Selected Remedy therefore calls for a baseline sampling program to be performed as part of remedial design and for the remedy footprint to be modified as described in Section 13.2.3 of the ROD. Contingencies were included in FS cost estimates to account for increased costs due to changes in the cleanup footprint (see response to comment 2.18.1).

2.14.3 Comment: Increased sampling density in Supplemental Scenarios not warranted

LDWG commented that EPA requirements for the Supplemental Scenarios Memorandum (LDWG 2012b), which increased the sediment monitoring density and frequency in areas where contaminant concentrations are below the SQS, were unwarranted. Sampling density was increased from the 1 sample/4 acres proposed in the FS to 1 sample/acre in the Supplemental Scenarios Memo; and the post-construction sampling frequency increased from 5 events in 30 years in the FS to 9 in the Supplemental Scenarios Memo. LDWG believes the sampling density and frequency described in the FS is adequate to determine if the Site is reaching the long-term model-predicted concentrations.

Response

Subsequent to completion of the FS, EPA directed LDWG to develop the Supplemental Scenarios memorandum (LDWG 2013a) to provide additional information and consider additional remediation scenarios to allow EPA to develop its Preferred Alternative in the Proposed Plan. This included scenarios with increased sampling intensity in the conceptual long-term monitoring plan, to allow for collection of sufficient information to control decision errors and permit adaptive decision-making. The estimate of 1 sample per acre represents EPA's estimate of the sampling density that may be needed to assure that data are usable for determining trends. Sampling intensity and data quality objectives will be revisited during the remedial design.

FS Appendix K described a stratified random design assuming 100 LDW-wide surface sediment samples per sampling event, but it also noted that the actual sample size for any given event may be much larger.(The FS added 25 clamming-area and 8 beach-area samples for a total of 133 samples per event.) FS Appendix K acknowledged that the data will be used to determine a UCL95 on the LDW-wide mean for the sake of determining compliance. EPA’s analysis of the sampling design proposed in the FS indicates that it would likely be inadequate to discern increases in surface sediment contaminant concentrations above cleanup levels. EPA believes that the sampling density in the Supplemental Scenarios Memorandum is closer to what will be needed and intends to use tools such as Visual Sample Plan (PNNL no date) during remedial design to assure adequate sampling density to control statistical errors.

In comments on the draft FS, EPA and Ecology (and other commenters) stated that they believed the proposed FS sampling approach was adequate for the purpose of developing cost estimates comparison of remedial alternatives in an FS, but would have to be augmented in remedial design. EPA believes there is no reason to assume that future data distributions and sample variance will resemble those assumed in the FS. EPA will seek to control decision errors with regard to compliance with sediment cleanup levels. In addition, EPA notes that the FS sampling approach for beach areas (one multi-increment sample per beach) cannot support a determination of UCL95 unless the samples are replicated.

2.15 Comparative Analysis of Alternatives– Overall Protection of Human Health and the Environment

2.15.1 Comment: The cleanup will not result in unrestricted use for seafood consumers.

DRCC/TAG, Tribes, and community members, students, and other individuals expressed concern about potential health effects from contamination in the waterway and asked that the Duwamish be cleaned up sufficiently to allow for safe consumption of fish and shellfish caught from the river. Several commenters stated that they are aware of people who fish and eat what they catch despite the danger. Commenters also asked that the cleanup be sufficient to allow for people to safely walk and play on the beaches. One commenter noted that "restoring the river to a safe and healthy condition as quickly as possible must be our highest priority."

Commenters noted that no alternative, including EPA's Preferred Alternative, adequately protects unrestricted consumption of resident LDW seafood in accordance with MTCA levels of carcinogenic and noncarcinogenic risks at the RME tribal consumption rate. They do not believe that the proposed remedy, which results in risks above 1×10^{-4} and hazard quotients for PCBs of 4-8 is sufficiently protective. They expressed concern for permanence of the remedy, and concern for PCB-related developmental and neural effects to infants in sensitive local populations.

Response

As described in the ROD and in response to comment 2.1.1, among others, EPA's strategy is to utilize a mix of technologies (including dredging, capping, ENR, and MNR) to address contamination in the waterway to the maximum extent practicable using engineering controls, and minimizing the use of institutional controls (including fish advisories) to further reduce risks. Together, these will protect human health and assure overall protectiveness of the remedy. EPA estimates that seafood consumption risks will be reduced by at least 90% after implementation of the Selected Remedy. EPA agrees with commenters that although risks from consuming seafood will be substantially reduced, the Selected Remedy will not result in achieving 1×10^{-6} lifetime excess cancer risk and HQ of 1 as required under MTCA by active remediation alone for those consuming large quantities of seafood, and that institutional controls such as fish advisories, education and outreach programs will be required to maintain protectiveness. As noted by commenters, this outcome is true for all FS alternatives, including Alternative 6R, which would have dredged 274 acres, or 3.9 million cubic yards of contaminated sediments from the LDW. This is because after contaminated sediments in the LDW are remediated, incoming sediments from the Green River will

become a dominant factor in determining long-term sediment and fish tissue concentrations, as discussed in response to comment 2.15.2.

Most of the public beaches on the Duwamish, including at Duwamish Waterway Park do not now contain contamination at levels of concern. The beaches that do have contaminant concentrations above the Remedial Action Levels in the ROD will be cleaned up and will be safe for recreational use after the cleanup. Washington Department of Health generally advises that people wash their hands and any other exposed areas after walking or playing on the beach and especially before eating (WDOH 2008).

2.15.2 Comment: The Selected Alternative will not reduce concentrations sufficiently to meet the tissue goals for unrestricted Tribal or recreational seafood consumption, and all alternatives have risk-equivalent outcomes above PRGs

Some commenters, including LDWG members, businesses, and consultants asked that the ROD clarify the cleanup results within the context of local, regional, and international exposures to contaminants from various sources, including seafood consumption. For instance, they note that both adjacent Elliott Bay and Lake Washington have fish consumption advisories in place and remain above the MTCA levels of acceptability. FS evaluations using the Bed Composition Model (BCM) showed that none of the action alternatives were projected to result in levels suitable for unrestricted use of the LDW for resident fish consumption, that the desired results (PRGs) are not achievable in the waterway, and that predictive modeling in the FS indicates that the long-term reduction in carcinogenic and non-carcinogenic risks will be similar for all Alternatives, 2 through 6, at variable times between 10 and 45 years following beginning of construction. All of the alternatives would be expected to reach a long-term model-predicted concentration within 17 to 25 years of beginning construction, with the exception of Alternative 6R, which would take 42 years. They stated that the Preferred Alternative (which has a construction time of 7 years and relies more on dredging, capping, and ENR) is predicted to achieve cleanup objectives in 17 years, whereas Alternative 3C (which is constructed in 3 years, and relies more on MNR) is predicted to achieve cleanup objectives in 18 years. One comment requested that Figure ES-11 of the FS be included in the ROD to illustrate this (the figure is reproduced below as Figure RS-3).

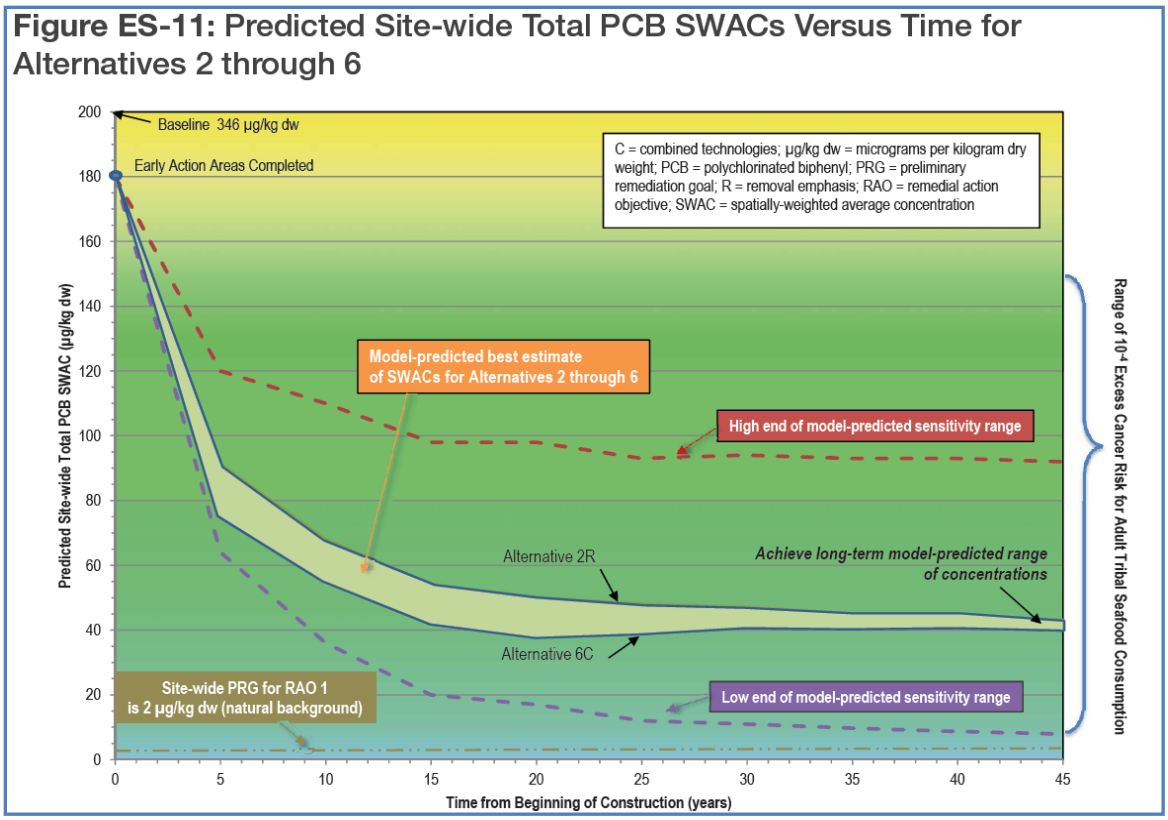


Figure RS-3. Feasibility Study Figure ES-11

Commenters stated that over time in the LDW, incoming sediment concentrations will dominate the biologically active zone (BAZ) and become the primary determinant of site risks. As noted in the Proposed Plan, the BCM predicts that, at the "best guess inputs," the long-term surface spatially-weighted average concentrations (SWAC) for all remedial alternatives converge to a similar value, or steady state. The other bounds (high end and low end) are applications of the BCM to determine how sensitive the outcomes are to a set of higher and lower bound upstream and lateral load inputs.

Response

As stated in response to comment 2.3.6, EPA has retained the risk-based and natural background-based sediment PRGs presented in the Proposed Plan as cleanup levels in the ROD. The information about the long-term outcomes of all alternatives provided in this comment was considered by EPA in making its decision and much of it was presented in the Proposed Plan. For example, on page 82, the Proposed Plan states that "all alternatives are predicted by RI/FS models to result in the same long-term risks after cleanup." The best-guess modeled outcome of approximately 40 µ/kg dw PCBs in sediment is defined in the Proposed Plan for the purpose of comparing alternatives as the "cleanup objective" for PCBs, as it was in the FS. This is 20 times above the RAO 1 sediment PRG for PCBs. Using the lowest input PCB concentrations for lateral and upstream inputs identified in the FS, all the action alternatives resulted in a PCB concentration of 7.6-10 µg/kg dw (depending upon alternative), which is still four to five times the PRG, but is actually quite close relative to the level of uncertainty inherent in risk assessment. The BCM predictions, with their associated uncertainty, have been a valuable tool in assisting EPA in understanding

relative probabilities of future outcomes for the waterway following remediation, and there are additional lines of evidence including recovery rates and consequences of the physical setting of the active waterway that have also been considered. It is important to acknowledge that models are only as good as their inputs and our capacity to account for the multitude of variables in highly complex systems.

In evaluating cleanup alternatives, EPA considered time-to-predicted-equilibrium in the LDW as one element in the Short Term Effectiveness criterion, and balanced it against other factors such as the effects of dredge releases/residuals, as well as cost. It is important to note that the ranges of outcomes shown in the figure above represent how the model operates with different initial conditions and assumptions; these include extreme conditions, but do not indicate level of confidence in an individual outcome.

The outcomes largely reflect the assumed sediment load concentrations from the limited FS upstream data. For this reason, EPA believes that the BCM should be refined with new data during remedial design, and the output should be used to assist EPA in evaluating the progress of natural recovery and the need for adaptive management to address contaminated areas that are not responding as predicted.

As stated in ROD Section 13.4, "If monitoring shows that contaminant concentrations have reached a steady state at levels below the benthic SCO criteria or human health-based RALs but above the human health risk reduction or background-based cleanup levels, EPA will review the data and consider whether additional technically practicable cleanup actions would further reduce contaminant concentrations in sediments, tissue, or surface water.

EPA expects that, once the active components of the Selected Remedy (dredging, capping, ENR, and any additional actions needed to meet the benthic SCO criteria and human health-based RALs) have been completed and long-term monitoring shows COC concentrations have reached a steady state, COC concentrations will either be at cleanup levels for sediment and ARARs for water quality, or will represent practicable limitations in implementation of source control and active remediation. Data collection and analysis during long-term monitoring is intended to test this expectation."

2.16 Comparative Analysis of Alternatives– Long-term Effectiveness and Permanence

2.16.1 Comment: Maximum dredging with ENR elsewhere is more permanent than the Selected Remedy and may be comparable in cost

DRCC/TAG and many individual commenters stated strong support for dredging all areas where the Preferred Remedy proposed capping and ENR, and ENR in all areas where the Proposed Plan proposed MNR, to provide better long-term effectiveness. They state that EPA's Preferred Alternative does not provide sufficient assurance of permanence, potentially exposing the public to longer periods of excess risk and the regulated community to additional liabilities and greater costs than just completing an efficient remedy the first time. One commenter requested that the ROD disclose how long it will take to reach Risk-based Threshold Concentrations (RBTCs) instead of a projected waterway equilibrium. Another requested information on how the LDW FS and Selected Alternative benefitted from experiences

in other Superfund projects that involve contaminated sediments. (See comment 2.28.1 for a description of DRCC's recommended modifications to the Preferred Alternative.)

Response

In developing the Selected Remedy, EPA drew on its decades of experience of cleaning up contaminated sediments in the Puget Sound region and elsewhere in the United States. All of the technologies utilized in the Selected Remedy have been implemented successfully elsewhere. The only relatively new technology proposed is the use of activated carbon with ENR, which is why pilot testing will be conducted before determining where and how to implement this technology. The Selected Remedy uses dredging and capping (with armoring to withstand scour if necessary) of the most contaminated areas and the areas with the highest potential for scour, ENR to address areas with moderate levels of contamination, and MNR to reduce COC concentrations in areas with lower levels of contamination, and provides the best balance of minimizing short-term risks due to construction in a 7-year construction period while maximizing long-term effectiveness by dredging or capping the most contaminated sediments. EPA agrees that dredging provides the greatest long-term effectiveness and permanence, because it removes the contamination from the waterway, but this must be balanced against the short-term increases in risk due to releases and residuals during dredging, as well as the longer construction times and higher cost associated with dredging. FS Alternative 5R calls for dredging approximately the same area that is addressed through dredging, capping, and ENR in the Selected Remedy. Alternative 5R would require 17 years of dredging as opposed to 7 for the Selected Remedy at a cost of $470 million, about 1.3 times the cost of the Selected Remedy. EPA's analysis indicates that the increased cost and additional period of increase in short-term risks is not offset by an appreciable increase in long-term effectiveness and permanence.

See Responsiveness Summary Sections 2.10 and 2.11 for more discussion of the strengths and weaknesses of various cleanup technologies. EPA's Selected Remedy balances these to assure permanence, including considering the strengths of MNR and the influence of subsurface contamination.

EPA will not require meeting RBTCs that are more stringent than natural background, such as those for PCBs or dioxins/furans for RAO 1. Nor is EPA able to confidently predict time to reach RBTCs in the In-water Portion of the Waterway; this is partly due to uncertainties (described in the FS) regarding the BCM predictions related to incoming sediment contaminant loads as well as the uncertainties associated with the Food Web Model.

2.16.2 Comment: EPA's Preferred Alternative is not significantly different than less expensive alternatives in the time to reduce surface sediment contaminant concentrations and potential for disturbance of subsurface sediments to increase surface sediment concentrations

Commenters (chiefly LDWG members) stated that greater emphasis on active technologies such as dredging in the Preferred Alternative is not warranted based upon anticipated risk reduction, and that EPA placed undue emphasis on time-to-steady state and the potential for scour or other disturbances to bring subsurface contamination to the surface outside of Recovery Category 1 areas. They stated that Alternative 3C (which relies more on natural recovery) is projected to achieve cleanup objectives in 18

years, whereas EPA's Preferred Alternative (which relies less on natural recovery) is projected to achieve cleanup objectives in 17 years, and that this 1-year difference is not significant.

These commenters also disagree with the Proposed Plan statements that alternatives that rely more on natural recovery have greater uncertainty in their projected outcomes, and asked that EPA reduce the weight of active versus passive remedies in its comparative analysis of alternatives. They discussed the BCM and their analysis of potential subsurface disturbance in support of this position. They noted that the BCM projected similar long-term, steady-state concentrations across alternatives.

Commenters also noted that sensitivity analyses that evaluated the propeller-wash (vessel scour) and potential seismic disturbance in FS Appendix M, Part 5 indicates that there are no dramatic differences in spatially-weighted average concentrations (SWACs) across the range of areas assumed to be intermittently disturbed. In the analysis provided in the LDWG comments, the average surface sediment PCB concentrations appeared to be more sensitive to incoming PCB concentrations than to the size of potential future sediment disturbances. They also stated that changes in surface sediment PCB concentrations resulting from unanticipated disturbances (i.e., in areas not included in the assignment of Recovery Category 1) do not substantially change the predicted residual risk, except in the case of a very large disturbance area for Alternative 1 (the no further action alternative). See Figure RS-4, which is from the LDWG comments and is provided within the response, below. They asserted that disturbances associated with potential future seismic events and vessel scour are overstated by EPA; and they cite a low percentage of cores that showed anomalies including displacement or loss of isotope markers at depth, which suggests low occurrences of vertical mixing. They stated that the estimated SWACs after disturbance do not really change the conclusion that additional dredging provides little or no risk reduction benefit. They concluded that EPA is really relying upon mass removal instead of anticipated risk reduction in determining the Selected Alternative. [1.2.2]

Response

More or less reliance upon MNR for substantial areas of the waterway is the key difference between Alternative 3C, (which is similar to LDWG's Key Elements proposal, see comment 2.27.1), and the Selected Remedy. While Alternative 3C (and the Key Elements proposal) would cost less than the Selected Remedy, it would provide less assurance in achieving cleanup objectives because it relies heavily on MNR and its associated model projections of contaminant reduction over time, rather than application of engineering controls such as dredging, capping, or ENR. Model projections, especially when based on limited data, are inherently more uncertain than application of engineering controls.

The FS used information such as cores and comparison of re-sampled stations as lines of evidence for establishing potential for scour and recovery categories. Many of the cores and other field data collected during the RI/FS did not show clear or consistent trends, making it difficult to make reliable predictions about time to recovery and the effects of potential scour or seismic events. FS Appendix F, Section 7, noted that only a few cores of those sampled (7 of 85) had sufficient resolution to discern physical, chemical, and isotopic horizons with confidence; and many cores had to be adjusted for in-situ depths due to compaction during the coring process (recovery correction). Sample heterogeneity and differences

between methods applied at different times reduce the comparability between samples and sampling events and thus the ability for the data to reliably suggest temporal or spatial trends.

In the FS, model sensitivity is used at times as a surrogate for uncertainty of outcome and at other times a means to stress-test the model to ascertain the relative influence of factors or assumptions upon results. FS Section 12.3 states, "While uncertainty assessments using bounding-level assumptions did not have significant effect on residual risks, two of the largest effects are associated with: 1) the quality of incoming sediment from the Green/Duwamish River and 2) the potential to expose subsurface contamination left in place following remediation."

Commenters suggest that model sensitivity runs varying assumptions other than those for Green/Duwamish inputs (model run E in Figure RS-4) showed a narrow range of outputs. However, not all sensitivity runs were testing independent events; for example, both low natural recovery (in model runs B and C) and subsurface-to-surface recontamination (in model run D) could jointly increase steady-state concentrations in the waterway, leading to higher uncertainty than shown in the FS analysis. In addition, the analysis conducted in the FS and illustrated in Figure RS-4 fails to account for releases of contamination to the water column which may occur as a result of a disturbance of subsurface contaminated sediments and consequent impacts to COC concentrations in benthic invertebrates, fish, and wildlife. This sediment-only view potentially understates impacts of a release of subsurface contamination due to ship scour or other disturbance events on future fish and shellfish tissue concentrations.

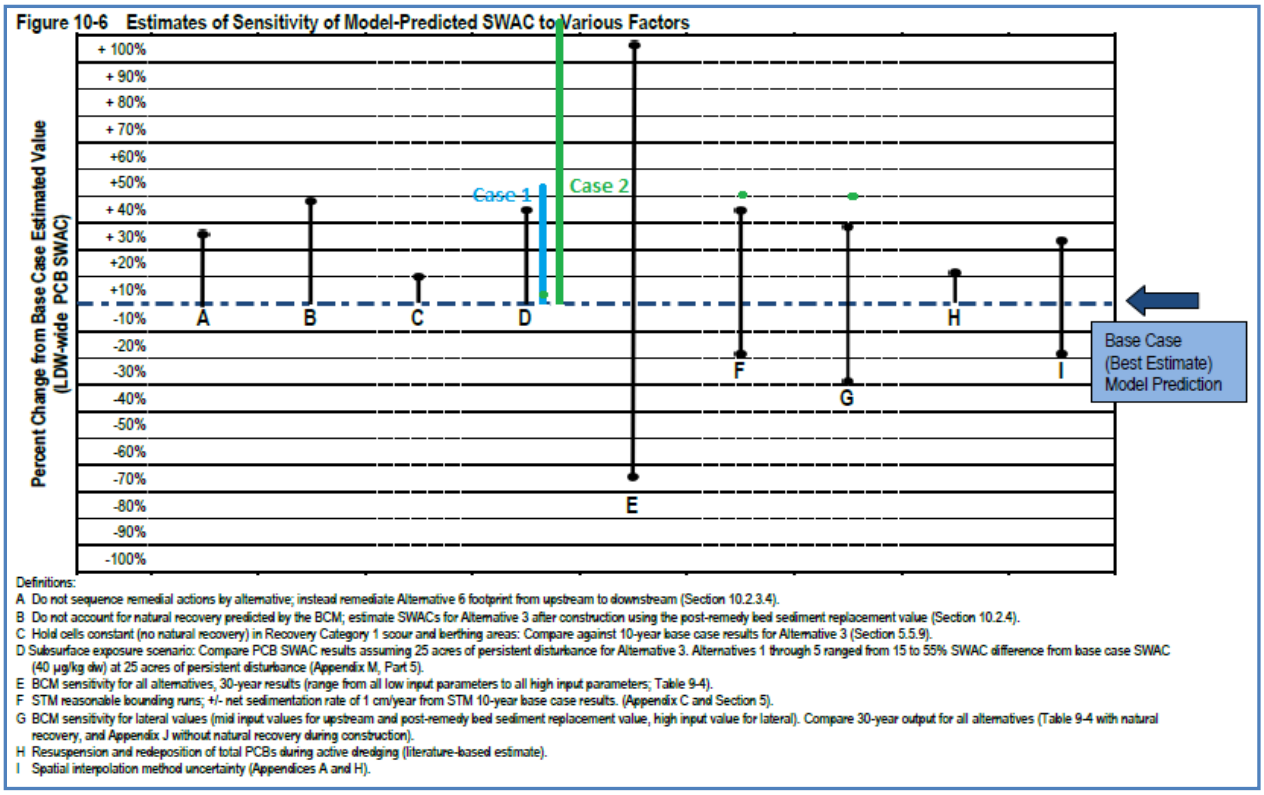


Figure RS-4. Figure 10-6 from the FS with the results of the UCL95 cases shown in Table RS-1

Many commenters on the Proposed Plan emphasized the importance and widespread nature of navigation and commercial activities in the waterway, and EPA views these activities as another way subsurface contamination can be disturbed, which may result in increased contaminant concentrations in surface sediment. Some subsurface contaminant profiles and geochronology data suggest deeper sediment-disturbing events that may hinder natural recovery in areas within Recovery Categories 2 and 3. Disturbance of subsurface sediments due to vessel traffic or other activities could occur throughout the waterway, including vessels traveling outside of usual lanes of operation, vessels operating with excessive propeller power, barge groundings, emergency maneuverings, changes in the patterns of site use, maintenance of overwater structures, emergency vessel maneuvering, vessel groundings, and spudding and anchoring.

LDWG's interpretation of the analysis in Appendix M, Part 5 of the FS (model run D in Figure RS-4) did not fully address potential for releases of subsurface contamination. EPA evaluated the LDWG analysis in light of the Selected Remedy's compliance framework (see ROD Section 8), using the UCL95 as a compliance statistic instead of the SWAC used in FS Appendix M. EPA used a simple simulation (applying reasonable values that represent excursions above the steady state) to estimate how the UCL95, which is the compliance requirement in the ROD, would be affected. ProUCL version 4.1 software was used for the calculations. This analysis is described below and summarized in Table RS-1.

- The base case considered a symmetrical distribution composed of 100 observations with equal numbers of values created to represent the river at steady-state under the midrange estimate of the BCM. This distribution had a mean representing the modeled steady-state composition of the waterway 10 years following construction of the remedy. The SWAC and UCL95 in this case are very close.
- Cases 1 and 2 assumed that 5% of the waterway (22 acres) is recontaminated at the levels described below. The selected area of disturbance is in midrange of that considered in the FS Appendix 5 Part M analysis.
    - In Case 1, 2 values of 100 from the base case were changed to the PCB SCO (240 µg/kg dw at 2% OC) and 3 values of 100 were changed to one-half the SCO (120 µg/kg dw PCB).
    - In Case 2, 5% from the base case data were changed to the average PCB concentration estimated for the top 2 ft, 343 µg/kg dw (see FS Appendix M, Part 5, Table 1) for Alternative 5C.

Table RS-1.

	Description	SWAC, µg/kg	UCL95, µg/kg	% Increase, UCL95 over SWAC
Base Case	Equal parts 20, 30, 40, 50, 60 µg/kg dw PCB	39.8	42.2	6%
Case 1	As Base Case, but 2 instances of 240 and 3 of 120 µg/kg dw PCB	39.9	61.2	53%
Case 2	As Base Case, but 5 instances of 343 µg/kg dw PCB	41.5	85.0	105%

Results are shown in Figure RS-4; blue and green lines represent the results shown in Table RS-1. All other lines shown in the figure are SWAC estimates from the FS; the "0" line represents a mid-range steady-state estimated SWAC of 40 µg/kg PCB. Case 1 (blue line representing 5% of waterway) exceeds the SWAC range for 10% of the waterway subject to recontamination according to the cited Appendix. Case 2 (green line) exceeds the full range of the high-end sensitivity run. Thus, the use of SWACs in the FS tends to compress differences in subsurface-to-surface predictions for PCBs, and areas that are not performing as intended (i.e., recontaminating or incompletely recovered under MNR) could be more influential than indicated in the FS. Subsurface recontamination may thus represent a significant factor to hinder the success of waterway cleanup. In summary, the UCL95, which is used for determining compliance with cleanup levels, is more sensitive to subsurface-to-surface recontamination than the SWAC, so the analysis in the FS likely underestimates the significance of these events on long-term COC concentrations.

EPA concludes that uncertainty associated with potential recontamination from subsurface sediments in Recovery Category 2 and 3 areas should remain a significant factor in assuring long-term effectiveness. EPA also believes that, for PCBs (and other contaminants), MNR in any Recovery Category is not functionally equivalent to active technologies which would remove or isolate subsurface contamination. EPA's emphasis is not on mass removal but instead on minimizing the need for future remediation due to potential future releases of contamination from subsurface sediments.

2.16.3 Comment: EPA is elevating "mass removal" above "risk management" principles in selecting an alternative; other alternatives perform similarly but are less sediment-disturbing.

The similarity of predicted risk outcomes over the long term was taken by some commenters as evidence that EPA emphasized "mass removal" of contaminants over risk reduction in selecting its Preferred Alternative. They state that risk reduction is the stated goal of the National Contingency Plan and EPA's 2005 Contaminated Sediment Management guidance, and therefore, the Preferred Alternative is not cost-proportionate to benefits gained, and inconsistent with guidance. They noted that more dredging generates more dredged material residuals and releases, and that a less aggressive alternative would reduce short-term risks associated with dredging. Some commenters argued for a less rigorous alternative (the LDWG "Key Elements" proposal), which leaves more contamination in place in both the surface (subject to MNR) and subsurface (some of which may be available for recontaminating the surface). They stated that they doubt the EPA approach to considering subsurface recontamination translates to real changes in risk.

Commenters also emphasized the similarity of risk outcomes using the orders-of-magnitude ranges of extra lifetime cancer risks, e.g., $1x10^{-4}$ to $9x10^{-4}$, as seen in Figure ES-11, reproduced as Figure RS-3 in comment 2.15.2.

Response

"Mass removal" was not considered in EPA's selection of a remedy for the In-waterway Portion of the Site. As has been stressed in responses to many comments, reliance on the monitored natural recovery and its model-predicted outcomes (rather than active cleanup) increases uncertainty in achieving cleanup

goals. EPA has selected a remedy with a moderate amount of dredging targeted at areas with the highest contaminant concentrations and where it is otherwise needed as an alternative to capping to maintain elevations for habitat and human use of the waterway. EPA believes that the Selected Remedy will provide the best balance among certainty of outcome, minimizing the remedy implementation time, and minimizing risks of future releases of subsurface contamination, and therefore be protective of public health and the environment.

In response to comment 2.16.2 above, EPA disagreed with the FS conclusion that the role of subsurface disturbance was similar to or less than other conditions modeled in gauging the sensitivity of the BCM.

Lastly, the argument that risk is not significantly different within an order of magnitude fails to consider non-cancer risks, for which increased exposure affects the PCB HQs as follows. From LDWG 2013a (Modified Scenario 5a Memorandum), in year 27 following initiation of construction when the waterway is at steady-state, the child tribal RME PCB HQ is predicted to be 10 and the adult tribal RME PCB HQ is predicted to be 5. With reference to Table RS-1 (in response to comment 2.16.2 above), the Case 1 HQs would be about 50% higher, or 15 and 7.5, respectively; Case 2 HQs would be about 100% higher, or 20 and 10, respectively. Given concerns for developmental and neural effects for infants, EPA believes that these differences are of concern.

2.16.4 Comment: Update FS with latest data and exclude natural recovery during construction

Some commenters asked for modifications to the model used for projections of the rate and long-term concentrations achieved by natural recovery (called the BCM in the FS). One commenter requested that EPA update the FS projections of future waterway conditions at steady-state with loading estimates derived from new data which the commenter believes signals lower concentrations. Another requested that the BCM runs not consider natural recovery during construction, because the commenter believes this would lead to an overestimation of how quickly the PRGs can be achieved for removal-focused alternatives. The commenter asked that the ROD acknowledge that achievement of PRGs could be delayed several years, at least until cessation of construction activities.

Response

EPA has evaluated new data collected since the completion of the FS and has concluded that, while incorporation of these data may have made a small change in FS model projections, these changes would be well within the range of model predictions, and would not affect EPA's remedy selection decision. EPA intends to continue to evaluate new data and refine projections of contaminant concentrations in incoming sediments during remedial design, remedial action, and long-term monitoring.

EPA disagrees that the BCM runs should assume no natural recovery during construction. Even considering extent of construction footprints and sequencing to reduce releases, FS Section 9 noted that natural recovery would occur during the construction. This is consistent with remediation experiences at other sites and best management practices. During each construction season, dredging or other construction activities would occur in a small portion of the LDW. Even if natural recovery processes are disrupted in and near the area where these activities occur, natural recovery in the rest of the LDW is not

likely to be affected. Sensitivity analysis conducted during the FS and documented in FS Appendix C Parts 4-6 tested model output as to whether natural recovery was not occurring in portions of the LDW, and concluded that resuspended sediment that resettles in the LDW is a small component of the sediment mass balance. These analyses concluded that even if natural recovery were not occurring in 25% of the LDW, it would have a minor effect on overall natural recovery rate predictions.

2.17 Comparative Analysis of Alternatives– Short-term Effectiveness

2.17.1 Comment: EPA should put more emphasis on short-term risks associated with dredging in its analysis of alternatives

LDWG and other commenters stated that EPA should give more weight to alternatives that have shorter construction periods than EPA's Preferred Alternative, because shorter construction times reduce exposure to humans from seafood consumption and air emissions. They stated that risks to the community are increased in the Preferred Alternative due to the additional years of construction impacts, which result in impacts due to traffic and air quality, and that these are not fully manageable by Best Management Practices (BMPs), based on experiences at other Superfund sites. They also stated that EPA failed to fully take into account releases from the LDW to downstream water bodies. They stated that community risks and residuals/releases generated during construction should weigh more heavily in short term effectiveness, especially since projected long-term risks from the BCM and Food Web Model appear comparable across all alternatives.

Response

Potential construction impacts due to dredging, including increased noise, traffic, air emissions and elevated fish and shellfish tissue concentrations are discussed in the FS and considered in EPA's analysis of alternatives. In fact, EPA received comments from others (see comment 2.17.2) that the FS analysis of construction impacts overstated these impacts and does not take into account data from recent dredging projects that have greatly minimized impacts using best management practices, including the recent dredging at Boeing Plant 2 in the LDW.

Potential impacts due to dredging have been discussed with DRCC, affected Tribes, and the surrounding community and they have responded to EPA that they prefer a more permanent remedy notwithstanding short term impacts, or whether they have been overstated in the FS, as discussed in comment 2.17.2.

See response to comment 2.17.4 regarding releases to downstream water bodies.

2.17.2 Comment: EPA should select a remedy with more dredging than called for in the Preferred Alternative, using best management practices to mitigate releases and resuspension

DRCC/TAG commented that safety and health effects related to dredging are overemphasized in the FS, and cite other Superfund sites as examples of improved methods to manage dredge releases and residuals, including Pacific Northwest projects which have shown considerable success. They recommend using BMPs successfully employed for short-term dredging effects, including use of debris detection and dredging/excavation methods to reduce dredge releases. They noted that fish tissue levels, initially higher than pre-remedial levels following dredging in other Superfund sites declined significantly over a 5-year

period. DRCC/TAG states in their comments: " . . . the communities most likely to be affected have weighed the potential impacts and benefits and overwhelmingly support removal of the river's most highly contaminated sediments, even at the risk of some short-term construction-related impacts."

Response

Although detailed metrics on impacts of construction were provided in the FS, EPA, in its analysis, considered the following factors to be most important in assessing the short-term effectiveness of alternatives:

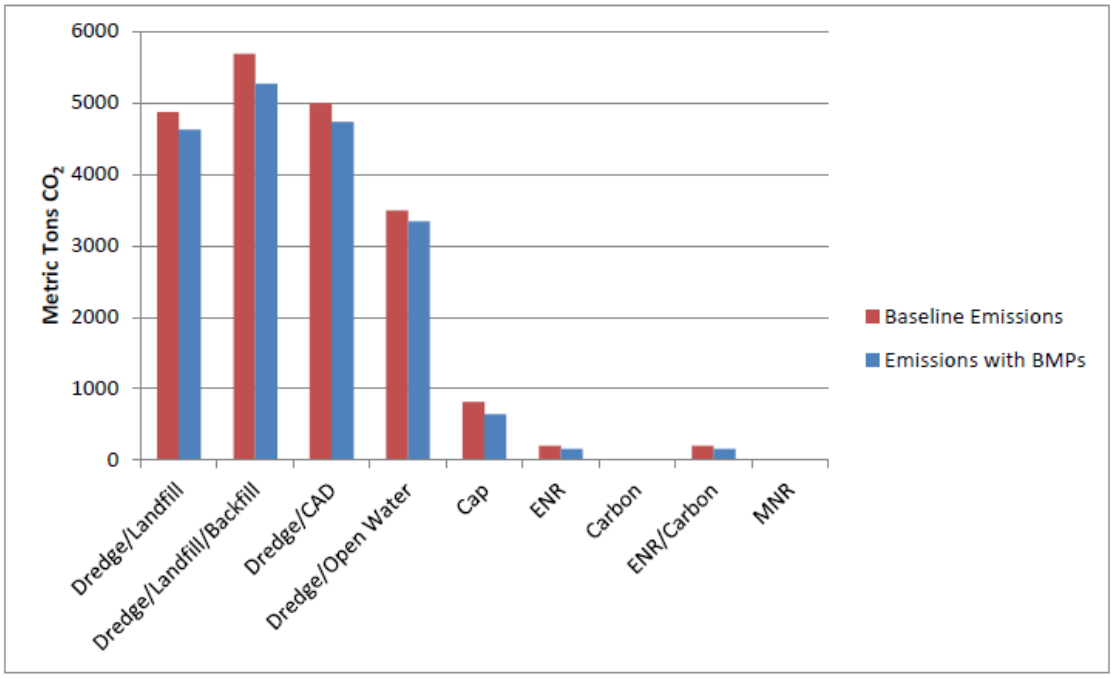
- Construction period,
- Amount of dredging,
- Amount of intertidal and shallow subtidal habitat affected by the remedial action, and
- Time to reach lowest model-projected COC concentrations

EPA agrees that BMPs can be used to minimize some of the effects of dredging, but some releases and residuals are unavoidable. EPA also agrees that the effects of dredging on increasing fish tissue concentrations will diminish rapidly after completion of active cleanup. However, many of the remedial alternatives have very long construction times during which EPA is concerned about impacts of increased fish tissue COC concentrations on people who fish in the LDW despite fish advisories. EPA therefore assumed when evaluating alternatives that short-term impacts would increase with increasing construction times and with increased dredging. EPA's Selected Remedy emphasizes a combined-technology approach, to provide greater permanence in comparison to other alternatives of similar cost and construction duration, by providing the best balance of minimizing short-term risks due to construction in a 7-year construction period, while maximizing long-term effectiveness by dredging or capping the most contaminated sediments and using ENR and MNR for less contaminated sediments.

2.17.3 Comment: EPA should re-evaluate selection considering Green and Sustainable Remediation metrics

Some commenters noted that Green and Sustainable Remediation metrics are worse for longer construction periods and for alternatives with more emphasis on dredging and disposal over containment, ENR and MNR (Figure RS-5 below), and that this fact was not given adequate weight by EPA in identifying the Preferred Alternative. They stated that the Preferred Alternative's additional dredging would result in 11 metric tons of additional PM_{10} air pollutants released into the atmosphere over Alternative 3C, an increase of 73%, and that this is in a community that has higher asthma hospitalization rates than other neighborhoods in Seattle and King County.

Figure A3-1 CO_2 Emissions by Technology and the Estimated Reduction in CO_2 (metric tons) from Using BMPs



Notes:

1. Carbon dioxide (CO_2) emission values are expressed in metric tons based on technology/activity scaled to a 10-acre area, using FS assumptions. Values are approximate.
2. The total height of the red bar is the total estimated emissions for each technology. The height of the blue bar is how much the emissions would be reduced if BMPs were utilized for that technology.
3. Carbon technology refers to *in situ* carbon amendments.

BMPs = best management practices and green practices; CAD = contained aquatic disposal; CO_2 = carbon dioxide emissions; ENR = enhanced natural recovery; MNR = monitored natural recovery

Figure RS-5. Green and Sustainable Remediation Metrics for Technologies

As set forth in the preceding comment, regarding potential atmospheric releases from heavy equipment and transportation, DRCC/TAG commented that the affected community strongly supports dredging in order to assure long term effectiveness and permanence, notwithstanding short term adverse impacts. Some commenters were also concerned about noise during construction. DRCC/TAG cites findings of the Health Impacts Assessment that air impacts are likely to be minor compared to other non-site related sources, particularly given cleaner fuels and "green remediation" policies and initiatives that will further reduce air impacts. They also note that most of the upland traffic will be train traffic conveying sediments to offsite disposal, and this would add an additional 1 to 3 trains per month on average, which is relatively small compared to 65 to 85 trains per day currently moving through the area.

Some commenters requested that EPA evaluate how much additional risk to consumers will occur from the anticipated elevated short-term fish and shellfish concentrations during and for a period following construction, and some suggested that EPA and Ecology used the Disproportionate Cost Analysis (DCA) to bias selection of the Preferred Alternative.

Response

Green and sustainable remediation is a strong policy consideration for CERCLA remedy selection within the context of the nine remedy selection criteria at 40 CFR 300.430(e)(9)(iii) of the NCP. EPA considered the difference in air emissions and transportation impacts as part of its short term effectiveness analysis, as well as potential mitigative measures; notwithstanding that the overall annual contribution of PM_{10} from site operations for LDW cleanup alternatives during construction is a relatively small contributor (5.3 metric tons per year) in comparison to background emissions, estimated at 347 metric tons per year for King County maritime operations and 776 metric tons per year estimated by the Puget Sound Clean Air Agency (PSCAA) for all Puget Sound maritime operations. EPA agrees that more can be done during remedial design to consider mitigation of impacts through green and sustainable remediation practices. Section 13.2.5 of the ROD states that green and sustainable remediation practices will be used to the extent practicable in carrying out the LDW cleanup, including consideration of use of renewable energy and energy conservation and efficiency approaches, conversion to biodiesel or low-sulfur fuel (with fewer emissions),and/or minimizing transportation of materials and use rail rather than truck transport to the extent practicable. EPA will also work with the parties carrying out the remedial action to reduce noise to the extent practicable, especially when conducting actions near residential areas. However, it is difficult to completely eliminate air emissions and noise. DRCC/TAG's comments emphasize that the community supports green remediation and supports longer dredging periods despite additional emissions and traffic.

Recently, after the close of the public comment period on the Proposed Plan, King County (2014) revisited fuel assumptions in the FS and also looked at transportation related impacts, including both fuel usage and means of transporting sediment offsite. It provides information which EPA believes supports it decision making on other sufficient bases, and is provided for informational purposes only. The tables below shows reduced impacts (metric tons emitted over the entire construction period) from adoption of ultra-low sulfur diesel fuel and emission filters in light of phased requirements to use such fuel. "EPA Proposed" is the Preferred Alternative from the Proposed Plan. CO2 emissions would be reduced by 1/8 from the FS estimates, while PM_{10} emissions would decline by nearly 60%. The table also shows the estimates from the Key Elements proposal, which is discussed further below.

Table RS-2

Emission	Key Elements			EPA Proposed		
	FS	Up-dated	Percent Reduction	FS	Up-dated	Percent Reduction
CO_2	24,400	23,200	5%	31,500	27,300	13%
CO	66	61	6%	85	72	15%
NO_x	496	278	44%	641	327	49%
SO_x	12	3	75%	15	3	80%
PM_{10}	21	9	57%	26	11	58%

The report also compared three offsite transport options for sediments removed during remediation: use of trucks for 100% (as assumed in the FS), 60%, and 22% of the trips, with the balance being accomplished

by rail transport. This table compares emissions by option for the entire length of the remediation, and by annual emissions.

Table RS-3

Emission Results in Metric Tons

		Alternative:	LDWG Key Elements			EPA Preferred Alternative			Option 3 Difference
		Truck Transportation Option:	Option 1	Option 2	Option 3	Option 1	Option 2	Option 3	
Total Emissions	CO_2	metric tons	23,200	23,000	22,800	27,300	27,100	26,900	4,100
	CO	metric tons	61	61	61	72	72	72	9
	NO_x	metric tons	279	279	279	327	327	327	48
	SO_x	metric tons	2	2	2	3	3	3	1
	PM_{10}	metric tons	9	9	9	11	11	11	2
Annual Emissions	CO_2	metric tons	4,630	4,600	4,570	3,890	3,870	3,840	-730
	CO	metric tons	12.3	12.3	12.3	10.3	10.3	10.3	-2
	NO_x	metric tons	55.8	55.8	55.8	46.7	46.7	46.6	-9.2
	SO_x	metric tons	0.48	0.47	0.47	0.40	0.40	0.39	-0.08
	PM_{10}	metric tons	1.89	1.89	1.88	1.55	1.55	1.55	-0.34

Notes:

Modified from King County (2014) by addition of right-hand column

1. Option 1 assumes 100% of dredged sediment is trucked from the LDW to a Seattle based BNSF Transfer Station. (assumes no direct-to-rail facilities are available)
2. Option 2 assumes 60% of dredged sediment is trucked from the LDW to a Seattle based BNSF Transfer Station. (assumes 1 direct-to-rail facilities are available)
3. Option 3 assumes 22% of dredged sediment is trucked from the LDW to a Seattle based BNSF Transfer Station. (assumes 2 direct-to-rail facilities are available)
4. Annual emission calculations are based on construction periods of 5, 7, and 17 years for the LDWG Key Elements, EPA Preferred Alternative

The right-hand column above shows the difference between the two alternatives for the highest rail usage, although the differences for the other options are the same. Overall, the Selected Remedy (Preferred Alternative in the tables) has somewhat more total emissions depending upon the balance between trucking and train transportation, but slightly less annual emissions as the construction period is 2 years longer, and hence has less impact during the construction period.

For context, the expected total increase of $C0_2$ emissions due to the Selected Remedy should be compared to all Port of Seattle heavy equipment release of 340,000 metric tons per year. Also PM_{10} would be substantially reduced compared with FS estimates (first table above), but would still be about 11% higher in the Preferred Alternative than in LDWG's Key Elements proposal. Again, due to the shorter construction period associated with Key Elements, annual PM_{10} would be higher than the Preferred Remedy during construction.

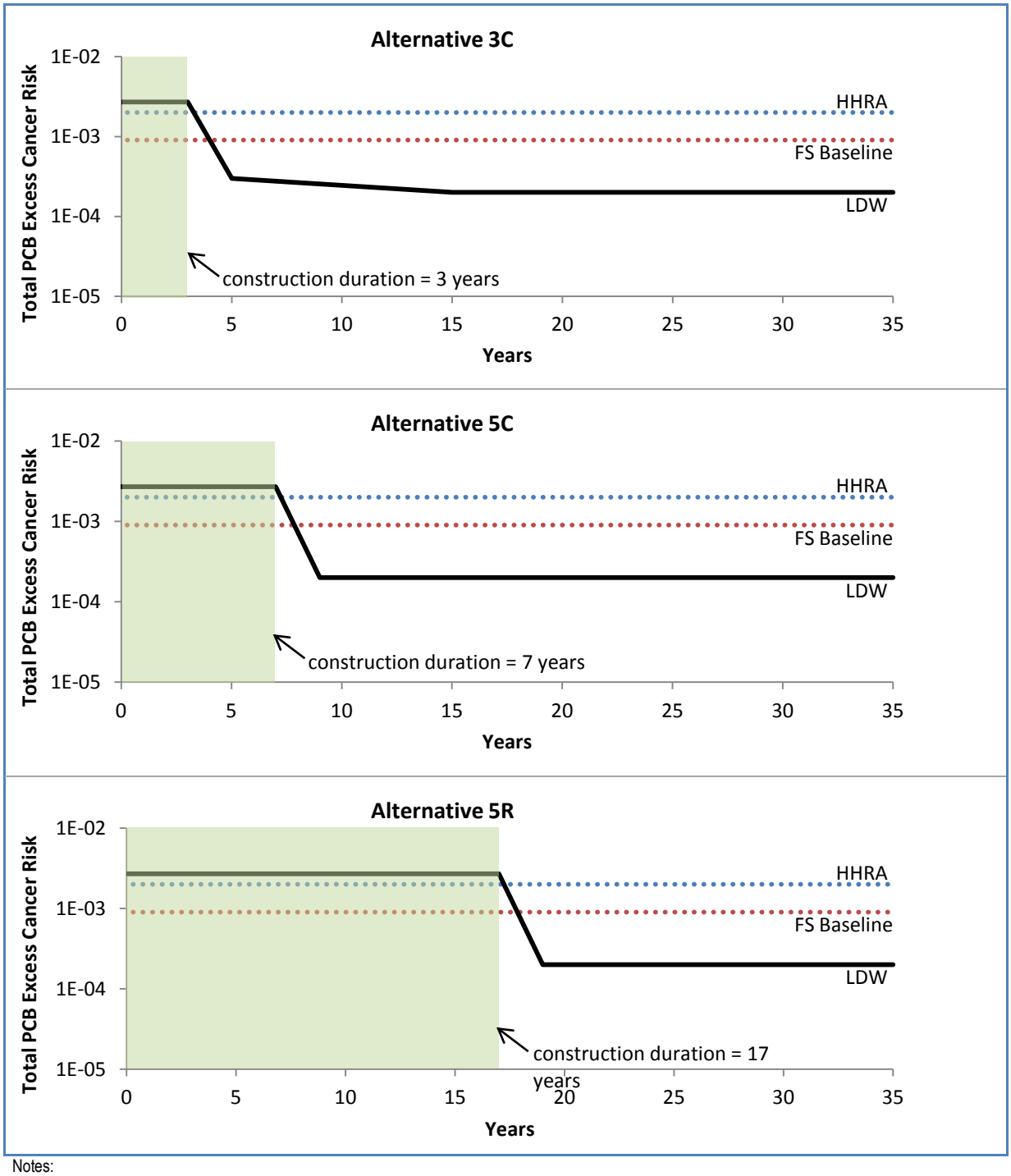
EPA considered evaluating risks to seafood consumers during construction, but rejected the idea because results of such an analysis would be highly uncertain, and it would not appreciably change the analysis of alternatives, which assumed increasing impacts with increasing construction times (see response to comment 1.3.2).

With respect to the comment that EPA and Ecology used the Disproportionate Cost Analysis (DCA) to bias selection of the Preferred Alternative, note that the DCA is presented in the FS because it is required for FSs conducted under MTCA and because the RI/FS order was issued under both CERLA and MTCA. EPA did not use the DCA to analyze alternatives or choose the Preferred Alternative or Selected Remedy.

2.17.4 Comment: EPA should consider risks associated with PCB releases and transport during dredging activities as these affect alternative selection

LDWG commented that EPA should have more closely evaluated the PCB releases and downstream transport during dredging activities as a metric for alternative comparison to consider changes in risks from the remedial action, rather than concluding that PCB exports generated by dredging would be insignificant compared to exports from loading upstream of the Site. Other commenters stated that this loading is the same for all alternatives, does not represent a Site release, and thus obscures the importance of minimizing releases caused by the cleanup action.

LDWG stated that as more dredging occurs, more PCBs would be released and exported into the down-current areas. The FS assumed what they believed to be a reasonable site-wide estimate based on documented projects with best management practices (BMPs) in place: 2 to 3% of dredged sediment lost downstream, regardless of the BMPs employed (FS Appendix M, Part 2). Commenters stated that although EPA considered the estimates to have a high degree of uncertainty, downstream dredging releases of PCBs during construction may increase risks for consumers of resident seafood, and this would be especially important for children. (LDWG's Attachment 1 Figure A1-2 is reproduced below as Figure RS-6; it shows Adult Tribal RME risks.)



Notes:

HHRA: Risks calculated as part of the LDW HHRA, based on fish/shellfish tissue collected from the LDW (Windward 2007, 2010).

FS baseline: Risks calculated using the FWM based on the LDW SWAC of 346 µg/kg dw and a water concentration of 1.2 ng/L.

LDW: Risks were estimated based on the construction timeline for the various alternatives, as presented in the LDW FS (AECOM 2010), and assuming a 3-fold increase in the concentration of PCBs in tissue during dredging. The actual increase in tissue concentrations (and therefore risks) during dredging cannot be predicted with certainty, but this magnitude of increase is consistent with what has been observed in other dredging projects. Future tissue concentrations (and the associated risks) were predicted using the FWM based on the long-term, model-predicted, post-construction SWAC of 40 µg/kg dw total PCBs and an assumed water concentration of 0.6 ng/L. The accuracy of these future predictions is also uncertain but consistent with the assumptions used for the FS.

FS = feasibility study; FWM = food web model; HHRA = human health risk assessment; LDW = Lower Duwamish Waterway; PCB = polychlorinated biphenyl; RME = reasonable maximum exposure; SWAC = spatially weighted average concentration

Figure RS-6. Comparison of Adult Tribal RME Risks for LDW Remedial Alternatives

Response

EPA agrees that unavoidable PCB losses will occur during dredging, and plans to use BMPs to reduce releases and resuspension to the extent practicable. The Selected Remedy is similar to Alternative 5C in terms of short-term protectiveness, so the estimate of exports for Alternative 5C in the FS (Appendix M Part 2) can be used to compare exports associated with the Selected Remedy to those associated with other alternatives. EPA estimates that Alternative 5C would result in 2.4 kg PCB exported compared to 1.2 kg of PCB exported with Alternative 3C (similar to LDWG's Key Elements proposal, see comment 2.27.1). The additional annual export associated with Alternative 5C is estimated to be about 21% higher than Alternative 3C, as shown in Figure RS-7.

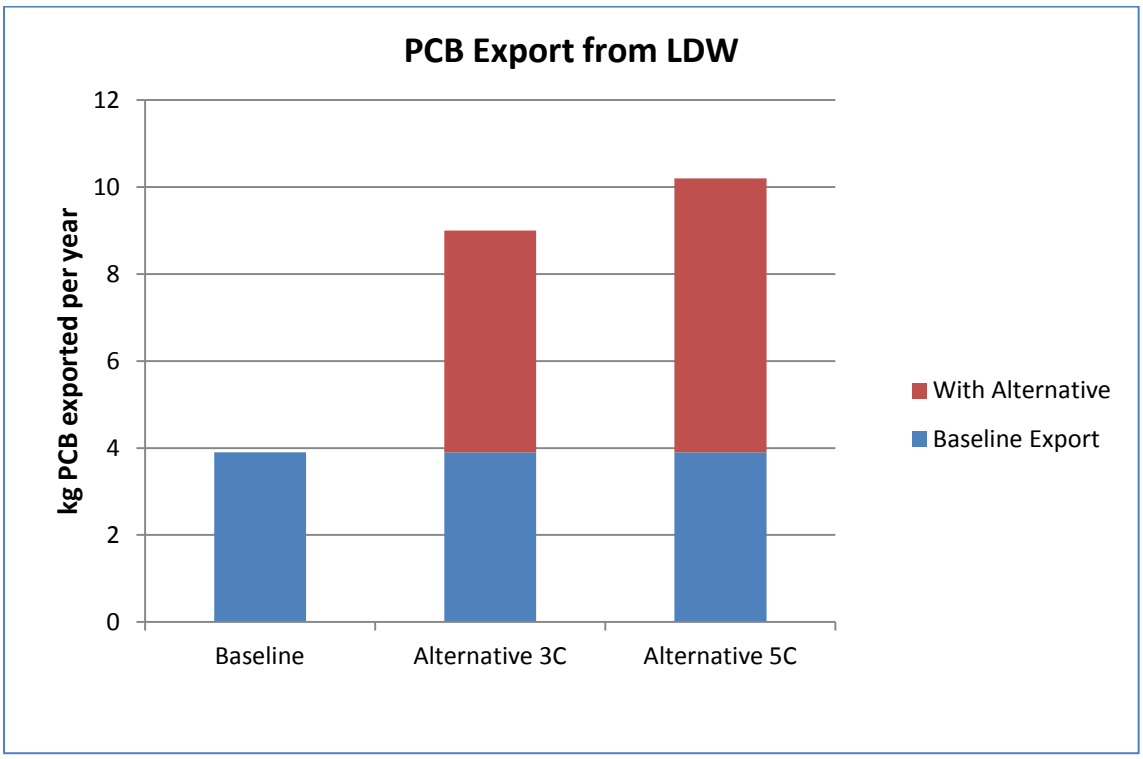


Figure RS-7. Projections of PCB Exported from LDW

EPA agrees that fish and shellfish COC concentrations will likely be elevated for up to 2 years following completion of construction; however, the associated risks shown in Figure RS-6 are uncertain estimates, as they are based upon BCM runs involving 5-year intervals and reflect rounding. Moreover, the risks are theoretical, since they do not reflect reduced consumption due to fish advisories and outreach and education programs EPA plans to conduct during the remedial action, or BMPs to reduce releases during dredging.

Such differences in short-term effectiveness must be weighed against the differences between the Selected Remedy in long-term effectiveness and permanence. There is greater certainty of outcomes

associated with the Selected Remedy due to greater reduction of future recontamination from the subsurface than alternatives such as 3C.

2.17.5 Comment: Dredging and capping are disruptive to benthic communities

Some commenters stated that physical disturbance from dredging or capping would damage invertebrate communities and/or habitat, especially in intertidal area, whereas MNR would permit continued functioning of the community.

Response

EPA agrees that short-term habitat impacts are unavoidable for areas that are designated to require capping, dredging, or in some instances ENR. Past experience has shown that community recovery occurs fairly rapidly (within a year or so; NRC 2007). These impacts were considered in EPA's evaluation of alternatives.

2.18 Comparative Analysis of Alternatives– Cost

2.18.1 Comment: Cost-effectiveness

Comments were received from DRCC/TAG and many community members and that cost should not be a barrier to cleaning up the waterway. Many proposed a more expensive remedy, involving much more extensive dredging and ENR than the Preferred Alternative. Many community members commented that EPA's cleanup plan is not sufficient to achieve cleanup levels, which will inevitably lead to more cleanup being required in the future. They commented that it is more cost-effective to do more dredging now to provide more assurance that cleanup levels would be met, to lessen the possibility that more cleanup will have to be done in the future.

Numerous comments were received (from LDWG and business interests) that stated concern that the Preferred Alternative requires too much dredging and hence is not cost-effective in accordance with the National Contingency Plan (40 CFR 300.430(f)(1)(ii)(D). These commenters supported other alternatives with less dredging, notably 1 (No-action), 3C, 4C, or "Key Elements" as (these commenters concluded) there is disproportionate cost associated with minor additional benefits (risk reduction) achieved by the Preferred Alternative. They stated the Preferred Alternative has a substantially greater community disruption and environmental footprint, and a greater volume of material requiring off-site disposal. An analysis of the uncertainties associated with the cost estimate for the Preferred Alternative was requested.

Response

Cost effectiveness is not merely a function of net-present-value estimates, but also of improved certainty due to less reliance on more uncertain technologies such as MNR. EPA agrees that MNR often works well, but in a complex and dynamic estuarine system such as the LDW, it has considerable uncertainty and thus is only applied to areas with a high probability of success and lower concentrations of contaminants in the Selected Remedy. The stated alternatives also differ significantly in long and short term effectiveness as set forth in Section 10 of the ROD, as well as in their potential for subsurface recontamination and their time to achieve risk benchmarks (see response to comment 2.16.2) These differences are explained both in the ROD and in many parts of this Responsiveness Summary.

With regard to the counter-argument that EPA's Preferred Alternative is insufficiently aggressive and leaves too much contamination in place, EPA disagrees that potential increased costs due to the need for future remediation were not accounted for. The FS assumed a 50% increase in dredging footprint over the boxcut estimate, (a boxcut estimate excludes sideslopes), which is a conservatively high value. Cost estimates for all FS alternatives, including the Selected Remedy, include a 15% contingency for increases in the cleanup footprint due to sampling in remedial design and portions of MNR areas requiring additional remediation if the benthic SCO is not met within 10 years. EPA has evaluated new data collected since the completion of the FS and has concluded that, while incorporation of these data may change FS costs, these changes are within the range of FS cost tolerance (-30% - +50%), and thus would not affect EPA's remedy selection decision. EPA has updated the cost estimate for the Selected Remedy using data collected since the completion of the FS, as discussed in response to comment 2.18.3 and in Sections 12 and 13 of the ROD. EPA will continue to evaluate new data and refine projections of contaminant concentrations in incoming sediments during remedial design, remedial action, and long-term monitoring.

2.18.2 Comment: Presentation of a 2.3% discount rate for net present value (NPV) alone is unrealistic and incomplete

Commenters (primarily LDWG members) stated that the NPV and the discount rate should be explained to the public, along with disclosure of a non-discounted rate or current time of the FS (2012) dollars; and that costs should be presented as a range. A discount rate of 2.3% indicates that, in the future, investments would yield an average of 2.3% above the rate of inflation. At a 2.3% discount rate, the estimated NPV cost for the Preferred Alternative as presented in the Proposed Plan is $305M (million), but commenters stated that non-discounted costs could amount to $348M, $43M over the discounted costs. This is because (they said) the parties contributing funds to clean up the LDW may not be transferring sufficient funds into investments prior to doing the work; thus, the basis of 2012 dollars would be unrealistic. The performing parties would incur additional costs of bonding or borrowing, and would likely be employing low-yield investments which might not account for much greater return than parity with inflation. Finally, public entities (the City, County, and Port) would likely not rely upon such investments. In short, they believe the NPV calculation of 2.3% above inflation is unrealistic.

They stated that other items not accounted for in the estimate could add $75M-$100M to the EPA estimate, so that the non-discounted costs could be $422M to $450M (see comment 2.18.3 for the details on these additional items).

Response

All three rates (nondiscounted, net present value at 2.3% discount, and NPV at 7% discount) were included in the FS and supplemental memoranda and were included in the ROD. EPA's policy for use of discount rates in net present value calculations is documented in its Guide to Developing and Documenting Cost Estimates during the Feasibility Study (EPA 2000). It recommends that a discount rate of 7% be used for estimating the net present value of cleanups conducted by non-federal parties, based on recommendations in the Office of Management and Budget (OMB) Circular A-94 for benefit-cost analyses of proposed federal programs, policies, and regulations. The FS used a discount rate of 2.3% based on the 30-year real (i.e., inflation-adjusted) discount rate published in the 2011 revision of

Appendix C to OMB Circular A-94 for federal projects and also presented costs using the 7% discount rate. (The 30-yr OMB 2013 Real Interest Treasury Rate was updated to 1.1% in 2013, after the FS was completed. If the 1.1% discount rate was used, the total NPV cost for Alternative 5C Plus would be $325 million.) Non-discounted costs for FS alternatives were included in FS Appendix I (Table I-51), and are presented in ROD Table 25. EPA considered all of this information when evaluating alternatives.

2.18.3 Comment: Additional, unaccounted costs significantly increase the cost of the Preferred Alternative, and biases its selection

EPA received many comments from LDWG and other parties about the potential underestimation of remedy costs, due to several factors which some commenters believe may have biased the evaluation of alternatives. Commenters indicated that the following items were underestimated (values shown below are discounted at 2.3% NPV/undiscounted):

- The cleanup footprint may be larger than estimated in the FS, based upon recent Ecology and USACE sampling data: $25/$31M;
- More stringent interpretation of SMS [benthic SCO] compliance than described in FS (i.e., from 98% to ~100% compliance of stations): $5M/$6M;
- More long-term monitoring of surface water and tissue and additional site characterization relative to FS cost estimates: ~$100M (not stated in comment, but apparently undiscounted);
- In-situ amendment pilot study (stated to not be included in the cost estimate): $3M (apparently undiscounted);
- Additional costs for institutional controls (stated as $3M in total for ICs in the Proposed Plan): $72M; and
- Items not separately stated but likely included: dock removal and replacement, return-water management costs, rigid cofferdams or curtains (based upon some recent Early Action requirements), and loss of revenues to businesses during construction.

Response

LDWG was responsible for generating many of the cost estimates they questioned in their comments. EPA reviewed the cost estimates provided by LDWG in the FS (LDWG 2012a) and Supplemental Scenarios Memorandum (2012b), and believes that cost estimates meet the criteria in EPA guidance that they be within +50/-30% of the likely true cost as required by EPA guidance (EPA 1988). The FS included a 15% contingency to address a larger footprint if new data indicate greater extents of contamination, or if natural recovery does not occur as predicted, or if unanticipated recontamination occurs, which should be sufficient to address many of the concerns raised in the comments.

However, EPA recognizes that there are many uncertainties associated with estimating costs for this or any other Superfund cleanup. The following discussion addresses specific concerns expressed by commenters about potential cost increases.

Larger footprints. Sediment characterization data from two waterway-wide studies, USACE (2013b) and Ecology (2011), were available too late to be included in the FS data set. Reviewing the studies, EPA determined that the USACE (2013b) survey of the navigation channel was most likely to affect remediation area, volume, and cost estimates used in the FS; the Ecology (2011) data were limited to the near vicinity of outfalls, and were intended to support source control decisions, not to characterize areas

for remediation. Other data collection efforts in the LDW since the completion of the FS have focused on specific areas (for example the Early Action Areas) and inclusion of these data sets would not greatly affect FS area, volume and cost estimates.

Therefore, EPA focused its examination on the USACE (2013b) data, which were collected to characterize subsurface sediment COC concentrations in shoaled areas in the waterway above the depth of navigation (i.e., the Congressionally-authorized depth plus 2 ft deeper to assure complete dredging) from RM 0 to RM 4. Evaluation of the data required some assumptions about the core interval, as sediment data were collected for analysis from longer core intervals than the 2 ft intervals used in the RI/FS. Additionally, only a few surface-interval samples had associated bioassays, so chemistry was used to ascertain benthic SCO status. EPA estimates that inclusion of these data may result in additional 9 acres and 56,000 cy of dredging compared to the area and volume estimates used in the Proposed Plan Preferred Alternative (USACE 2104). These revised estimates were added to other modifications to the Selected Remedy to provide an updated cost estimate in the ROD (see ROD Sections 12 and 13). All data collected after the completion of the RI/FS, plus baseline sampling and remedial design sampling will ultimately be considered to refine the cleanup footprint and revise cost estimates during remedial design.

More stringent SMS benthic SCO compliance requirements were used in the Proposed Plan than in the FS. The commentors did not provide sufficient information for EPA to evaluate this additional cost claim. LDWG requested, and EPA and Ecology allowed, the use of the 98% compliance statistic in the FS. This was based on the assumption that it was overly conservative to require 100% compliance because some stations are likely to pass biological test criteria. However, the FS (Section 9) states that "the convention of 98% of stations or LDW surface area below the SMS criteria is used in the FS for point count and area estimation purposes only. It does not represent a standard to be applied to compliance monitoring." See response to comment 2.6.2 regarding flexibility in determining compliance with the benthic SCO requirements.

Additional long-term monitoring of surface water and tissue plus additional site characterization. EPA agrees that long-term monitoring costs may be underestimated in the FS because, for example, water sampling and analyses were not included. However, the $100 million claimed in the comment is not supported by any level of detail that EPA could review, and appears to be excessive. Even if long-term monitoring costs are underestimated to some degree, they are minor compared to overall remedy costs, and more significantly would be similar for all alternatives. As a result any underestimation of these costs could not have biased EPA's alternatives evaluation or its selection of either the Preferred Alternative or the Selected Remedy.

In-situ amendment pilot study. EPA agrees that pilot testing is not included in the FS or Supplemental FS Scenarios cost estimate. This is partly because this study is in the process of being scoped; but again the basis for the amount of alleged increased costs are not provided at a sufficient level of detail to permit EPA to understand them; and, in any case, these costs apply to all combined technology alternatives, and are not unique to the Preferred Alternative or Selected Remedy.

Costs for Institutional Controls (ICs). The example given in the comment, the Palos Verdes Superfund Site in Los Angeles, is much larger than the LDW, and the affected population is much larger and far more widely dispersed. Similarly, the fish species of concern at Palos Verdes is distributed in many public markets. Comparison between the two sites for costs estimating purposes is not appropriate.

Miscellaneous costs were considered to the extent that they are known, and once again EPA does not believe that this introduces any bias in the selection of the Preferred Alternative or Selected Remedy.

- *Dock removal and replacement*. It is correct that this is not considered, as it is an unknown quantity and would require decisions on behalf of the owners/operators that are not available to EPA. The cost estimates did consider the consequences of working around docks: FS Table I-2 notes that dock related work is included in dredge production estimates; capping and ENR under-dock work is considered in FS Table I-6.
- *Return-water management costs, rigid cofferdams or curtains*. This appears to be a concern related to requirements for cleanup of some Early Action Areas with very high levels of contamination, greater than many of the other areas in LDW. Dredging, capping, and water management practices are improving with regard to potential for releases/residuals, and EPA will consider conditions on a location-specific basis and discuss requirements with parties performing the work during remedial design. Also, future costs will be influenced both by better technologies (decreasing cost per unit of production) and by increases in the cost of consumables such as fuels. It is not possible at this time to better predict these costs.
- *Loss of revenues to businesses during construction*. EPA agrees that this was not factored into the costs; however, this is not something EPA typically considers in an FS cost estimate.

Cost is the fifth of five balancing criteria in the nine criteria for remedy selection in the NCP. EPA carefully balanced it along with the other balancing criteria, while considering the modifying criteria, to determine the best overall balance for minimizing risks to the maximum extent practicable in meeting the threshold criteria of protecting of human health and the environment and meeting ARARs.

2.18.4 Comment: Costs of cleanup are justified

Many commenters noted that doing a thorough cleanup, even if costly, is better than a partial cleanup which is ineffective at achieving the protection that the community seeks; some commented that the costs will be amortized over a considerable period.

Response

EPA agrees the proposed cleanup is as complete as practicable, and the costs are sufficiently moderate as well as focused upon removing critical contamination and not imposing high future costs.

2.19 Paying for Cleanup

2.19.1 Comment: Paying for cleanup

EPA received many comments about paying for the cleanup. Many commenters asked that parties responsible for the pollution pay for the cleanup. Other commenters thought the cleanup should be paid for by state and federal funds and asked that EPA and Ecology seek adequate funds from Congress and the state Legislature to pay for the cleanup. One commenter noted that the toxics fund created as part of

the 1989 Model Toxics Control Act (MTCA) raises a considerable amount of money through taxes on petroleum products, pesticides, and chemicals, and that public parties who pay for the cleanup are eligible for a 50 percent cost share from the MTCA fund, and that this fund should be used to reduce the cost burden of the cleanup on the parties who pay for it. An additional commenter stated that Federal Harbor Maintenance Funds could be used to accomplish remediation in the federal navigation channel.

Some commenters noted that regardless of who pays for the cleanup, ordinary citizens will bear the burden of cleanup costs through increased taxes, utility rates, and the cost of products manufactured by parties contributing to the cleanup costs.

Response

Consistent with CERCLA, EPA seeks to have Superfund cleanup work performed by potentially responsible parties. Liability for cleanup is based on Section 107 of CERCLA, consistent with EPA's long-standing "polluter pays" policy. Limited appropriated funds for cleanups are typically used for sites where there are no viable responsible parties. MTCA funding eligibility for local governmental entities is beyond EPA's authority or responsibility; Ecology administers MTCA funds. EPA understands that USACE harbor maintenance funds are not typically appropriated for Superfund cleanups.

2.20 Flexibility in Implementing the Cleanup

2.20.1 Comment: Flexibility

Comments received on the Proposed Plan request a flexible cleanup process for individual river segments to account for site-specific information developed during the remedial process, to protect ongoing use of the waterway by businesses, and to provide incentives for businesses to complete cleanup actions. In particular, concerns were expressed for continuing ability of businesses to maintain and operate berthing and mooring areas, and for assignment of caps in areas where spudding occurs. One comment requested reversion to Sediment Management Areas (SMAs) proposed in the Draft FS, as the GIS-based overlays are complex and unrealistic.

Response

EPA acknowledges that all technology assignments must be reassessed based on new data and observations collected during remedial design. Section 13 of the ROD describes the criteria EPA will use to evaluate remedial design data to determine whether cleanup technology designations should change. See also response to comment 2.17.5 and 2.22.1, which describe criteria for reevaluation of recovery category areas.

EPA agrees that the use of the waterway by waterfront businesses and others will be an important consideration in designing the remedy, and that the cleanup technology assigned to a particular area should be compatible with use of the waterway by local businesses to the extent possible. During remedial design, EPA will communicate with owners/operators of LDW industries and marinas to confirm current and planned waterfront uses, and use this information in designing the remedy.

EPA, USACE, and LDWG did make inquiries to businesses, the community, and maritime pilots about waterway uses during the RI/FS and used this information in assigning cleanup technologies in the FS and Proposed Plan. For example, maintenance of navigable depths in the navigation channel and in berthing areas was an important consideration in assigning cleanup technologies. However, EPA acknowledges that more detailed information is needed during remedial design to get a better understanding of activities conducted at each waterfront business, as well as by members of the public and maritime pilots, and this information may change technology assignments. See response to comment 2.2.7 regarding assignment of technologies that require intuitional controls in areas where institutional controls for caps may not be appropriate.

Among other reasons, SMAs were not used in the final FS, Proposed Plan, or ROD because they do not provide a clear approach for reevaluating and modifying cleanup technology assignments when new data are collected in the design phase.

2.20.2 Comment: Provide flexible cleanup process for individual businesses

Some businesses stressed the importance of enabling a flexible cleanup process for individual properties, and that the Record of Decision (ROD) must provide a flexible decision-making framework to provide incentives and legal protection for businesses to complete cleanup actions at their properties.

Response

See the response to comment 2.20.1 regarding a flexible decision-making process. Legal protections for cleanups and whatever incentives the comment is referring to would be the subject of potential consent decree settlements which are beyond the scope of what would be included in a CERCLA decision document.

2.20.3 Comment: Role of location-specific information in remedial design

Comments (from LDWG and its members) state that there is a need for flexibility in the development of cleanup processes and decisions. They cite the following concerns:

- Desire for opportunities to select from a range of technologies, not from single technologies as suggested in the Proposed Plan and FS. For example, commenters requested that EPA suspend judgment until remedial design on which technology, dredging or capping, should be used in suspected scour areas in light of location-specific conditions.
- Desire for opportunities to consider or modify assignments based upon waterfront/waterway uses, such as anchoring and spudding.
- Desire for opportunities to develop “sediment management areas” or SMAs.

Response

See response to comments 2.20.1 and 2.22.2. Although EPA understands the desire for flexibility in designing the remedy, the purpose of the ROD is to provide clear guidelines on what technologies are acceptable for what areas, to allow for an efficient and implementable remedial design process.

2.21 Coordination with Early Action Areas

2.21.1 Comment: NRD Early Action Area remedies in relation to preferred alternative

One Tribe questioned whether the EAA cleanups, especially those conducted under the 1991 Natural Resource Damages Consent Decree, are consistent with or at least as stringent as the Preferred Alternative. Since the EAAs are not part of the Preferred Alternative, they wondered if EPA can require additional work if the original work is not consistent with the Selected Remedy.

Response

As noted in ROD Section 4.1, EPA has reviewed the cleanup plans for the early actions conducted under EPA's RCRA and CERCLA programs and has determined that these actions are consistent with the Selected Remedy in the ROD. As discussed in the ROD "…all the EAAs will be subject to performance review to assure that human health and the environment are being protected. In conducting performance reviews, EPA will review the Institutional Controls Plans and long-term monitoring plans for all EAAs and will require that the EAAs be incorporated into plans for the rest of the LDW as necessary to make them consistent with the Selected Remedy in the ROD. For the cleanups conducted under the 1991 Natural Resource Damages Consent Decree (Duwamish/Diagonal CSO/SD and Norfolk CSO), EPA will conduct a review during the remedial design phase to determine whether any additional work is needed to make these cleanup actions consistent with the Selected Remedy in this ROD… " Further, EPA has authority under CERCLA to require any response action it deems necessary to protect human health and the environment at the Duwamish/Diagonal CSO/SD and Norfolk CSO EAAs irrespective of whether these areas are part of the Selected Remedy.

2.21.2 Comment: Clarify authority under which King County-led Early Actions were conducted

King County asked EPA to clarify in the ROD that the two King County-led early cleanups [at the Duwamish Diagonal CSO/SD and the Norfolk CSO/SD] were conducted as interim cleanup actions under Ecology Cleanup Action Plans pursuant to MTCA among other authorities, and that the Natural Resource Damage Assessment (NRDA) Consent Decree only defined the settlement and how it was to be implemented and was not the authority used to identify, assess, define, and conduct the cleanups.

Response

EPA does not see the need for any clarification in the ROD. EPA is aware that Ecology played a role in reviewing and approving cleanup plans for the 1999 Norfolk CSO/SD cleanup and the 2004-2005 Duwamish/Diagonal CSO/SD cleanup, including preparation of SMS Cleanup Action Decision documents (Ecology 1996b, 2002, and 2004).

The 1999 cleanup of the Norfolk CSO/SD occurred prior to listing of the LDW on the National Priorities List (NPL) in 2001. While King County, the Natural Resource Trustees, and Ecology coordinated with EPA on post-cleanup long-term monitoring after the LDW was listed on the NPL, EPA had no involvement with the Norfolk cleanup and no formal oversight role in long-term monitoring. For the 2004 – 2004 Duwamish/Diagonal CSO/SD cleanup, King County, the Natural Resource Trustees, and Ecology

coordinated with EPA and considered EPA's comments on project documents, however, the EPA Superfund program did not have a formal oversight role for this project.

2.22 EPA's Cleanup Plan for Specific Areas of the Waterway

2.22.1 Comment: Recovery Categories related to assignment of cleanup technologies

Numerous commenters argued that specific areas should not have been assigned Recovery Category 1 because of the implications for cleanup which would require capping, dredging, or partial dredging and capping of the areas in question. They questioned the physical and interpretive methods used to assign this category, including multibeam bathymetry ("sun-illuminated diagrams") and evidence of active berthing activities. They stated that more recent data (sediment chemistry, bioassays, and pore-water chemistry), as well as other observations suggesting that recovery is occurring in the areas, should be considered in assigning a remedial technology. Commenters in general asked that the ROD include flexibility to allow the use of site-specific evaluations of sediment deposition, scour potential, and contaminant concentration trends for individual river segments to account for site-specific information developed during remedial design and to provide incentives for businesses to complete cleanup actions.

Some commenters stated concern that the technologies assigned would not be compatible with their existing use, while others stated concerns that the FS and Proposed Plan assumed ship traffic and maneuvering in areas where these activities do not occur. Some commenters suggested that the requirement for remediation if RALs are exceeded in the top 60 cm in scour areas (such as Recovery Category 1) is excessively stringent, citing some EAA cleanups that have occurred in the LDW that have been effective using, in their view, less stringent criteria.

Some commenters expressed support for the LDWG "Key Elements" approach, which would permit even areas with potential scour and moderate levels of contamination to be treated by ENR or ENR with in situ treatment, proposing a stabilization technology to hold reactive amendments (activated carbon or organoclays) in place. In essence, this proposal would de-emphasize the use of Recovery Category 1 to delimit the use of ENR.

Approximate areas where commenters noted that Recovery Category designations should be reconsidered, or that waterway uses should be considered in Recovery Category and technology assignments include:

- RM 4.1 E (adjacent to the former Rhone Poulenc facility)
- RM 1.7 – 1.8E (Slip 2)
- RM 2.3 – 2.4 E (Myrtle St. embayment)
- RM 2.3 and 2.5E (adjacent to Seattle Iron and Metals)
- RM 1.0 E (Slip 1 and adjacent waterfront)
- RM 4.1 W (Duwamish Yacht Club marina)
- RM 0.0 – 0.2 E (adjacent to Ash Grove Cement Company)

Response

As noted in Table 23 of the ROD and more fully described in Section 6 of the FS, Recovery Category 1 includes areas with observed or anticipated net scour based upon empirical data demonstrating scour patterns or increasing concentrations over time, and predicted scour using the sediment transport model. The discussion below provides details about how areas were assigned to Recovery Category 1 in the FS and responds to specific points made in the comments.

Reevaluation of Recovery Categories. As noted in ROD Table 23 and Section 6 of the FS, Recovery Category 1 includes areas where natural recovery is presumed to be limited based on the following evidence: net scour has been observed or has been predicted using the sediment transport model, or contaminant concentrations have remained the same or increased over time. As discussed in Section 13.2.3 of the ROD and in numerous earlier responses to comments, EPA agrees that additional information should be collected and considered during remedial design to refine technology assignments and to refine the assignment of areas to recovery categories. In addition, EPA will revisit the FS areas where the criteria in ROD Table 23 were overridden based on best professional judgment (FS Appendix D) to assign recovery categories to determine whether these areas were properly assigned to recovery categories in accordance with the criteria shown in Table 23 of the ROD.

Depth of Contaminant Consideration in Evaluation of Scour. As noted in the Proposed Plan, the LDW is a very active industrial waterway throughout much of its length. In FS Section 6.1.1, a 60-cm interval was used as a conservative upper limit on the depth to which scour induced by propellers or currents occurs, in Recovery Category 1. This was based, in part, on the maximum estimated net erosion depth, during a 100-year high-flow event of 22 cm, and the maximum observed scour pattern (via “sun-illuminated” multibeam bathymetry visualization), that extended to about 30 cm deep. However, such scour features are likely to fill in rapidly, and therefore may not reflect the total depth of disturbance. It is EPA's judgment that the 60-cm interval is an appropriate depth for addressing potential disturbance in the LDW.

Allowing ENR in Recovery Category 1 Areas. This comment proposes to use engineering controls to improve stability, e.g., sediment armoring or gridded fabrics that could reduce depth of scour and thereby permit ENR/in situ amendments to remain in place. Currently, this approach has not been demonstrated in the waterway. As noted in Section 13.2.1.2 of the ROD, "Pilot testing will be performed to determine whether ENR/in situ treatment is effective in reducing toxicity and bioavailability of COCs while avoiding unacceptable impacts to biota. If pilot testing shows that ENR/in situ treatment can meet these objectives, EPA will consider, in coordination with the state and Tribes, the locations where ENR with in situ treatment will be applied. These areas may include some of the Recovery Category 1 areas where it can be demonstrated that ENR with in situ treatment will maintain its stability and effectiveness in these areas over time; for example, areas where vessel- and flood-related scour were shown by the STM and FS scour analysis to be minor. EPA may also consider ENR with in-situ treatment in areas with COC concentrations up to the CSL if it can be demonstrated that it will maintain its effectiveness over time.”

2.22.2 Comment: Technology assignments must be compatible with waterway use

Some commenters stated concerns about any remedy that would restrict their ability to conduct their business on the LDW. They asked that the waterway uses in a specific area, for example, berthing traffic, tugboat activities, spudding, and undertaking maintenance dredging, be a primary consideration in the designation of Recovery Categories and selection of cleanup technologies. They commented that if the institutional controls needed to protect an assigned technology is incompatible with waterway uses, the technology assignment should be changed to one that does not require such institutional controls. For example, there are some areas where proposed caps would be damaged by propeller wash generated by tugboats, the use of spuds [vessel-mounted metal poles that are sunk into sediment for stabilizing vessels] to secure vessels, or maintenance dredging.

Approximate areas mentioned as being of concern are:

- RM 1.0 E (Slip 1 and adjacent waterfront)
- RM 1.2 W (adjacent to Alaska Marine Lines)
- RM 1.6 - 1.7 W (adjacent to Northland Services Marine Transportation)
- RM 0.0 – 0.2 E (adjacent to Ash Grove Cement Company)
- RM 2.3 - 2.5 W (adjacent to Boyer Towing)

Response

As stated above, EPA agrees that waterway use should be an important factor in assigning cleanup technologies and in delineating recovery categories. As discussed in Section 13.2.3 of the ROD, EPA will survey waterway users to gather detailed information about waterway use, including maneuvering and anchoring of ships, barges and tugs, use of spuds, and other activities such as berth and wharf maintenance. Information about such activities may change some areas from Categories 2 or 3 to Category 1. See also response to comment 2.2.7 regarding institutional controls and waterway use.

2.22.3 Comment: Additional areas should be designated as eligible for MNR

Some commenters thought that specific areas should not be designated as Recovery Category 1 because available evidence indicates that the area is recovering. They requested that EPA consider more recent data (sediment chemistry, bioassays, and porewater chemistry), as well as other observations suggesting that recovery is occurring in the areas. They requested EPA consider more direct measures of ecosystem functioning, such as toxicity to sediment dwelling organisms, bioaccumulation of COCs, and benthic community conditions in their determination of Recovery Categories and appropriate cleanup technologies. Some commenters also stated that dredging of a mudflat is unwarranted as it would yield marginal long term improvement to the ecosystem, but would lead to destabilization of shoreline and short-term impairment of the habitat and functioning of the resident sediment dwelling organisms.

Specific areas mentioned include:

- RM 4.1 W (adjacent to the former Rhone Poulenc facility)
- RM 2.75 W (adjacent to ACC Hurlen; the commenter noted that cPAHs are naturally attenuating in the LDW and are the primary COC driving remediation in this area)
- Slip 2 (RM 1.7 – 1.8W)
- Adjacent to Seattle Iron and Metals (RM 2.3 – 2.5E).

Response

See response to comments 2.17.5 and 2.22.1. EPA firmly believes the criteria and assessment to determine where active remediation will occur are appropriate for reasons set forth at length in the Proposed Plan, ROD, and numerous responses to comments. EPA will consider sampling data and other information that was not included in the RI/FS during remedial design to assess whether specific areas exceed the RALs or whether Recovery Category areas should be adjusted. If parties believe sediments at the concentrations of ecologically-based COCs seen in any area are not toxic to benthic invertebrates, where human health-based COCs are not also present at concentrations above the RALs, the ROD allows for bioassay test results to override the results of toxicity testing in determining whether the benthic SCO-based cleanup levels have been met. Biological data may not be used to override human health based RALs.

2.22.4 Comment: ENR is inappropriately proposed in some areas

Many members and slip owners of the Duwamish Yacht Club (DYC) located at RM 4.1W commented that enhanced natural recovery is not the best solution for this area. Vessel scour from the boats at the DYC and by vessels using the haul-out facilities of the Delta Marine boatyard (located in the DYC marina) could cause downstream transport of contaminants. They stated ENR will not halt ongoing contamination in Hamm Creek from contaminating the Marina, and recommended that steps be taken to eliminate the environmental contamination from Hamm Creek which ends up in the DYC Marina and LDW. They asked that the EPA consider requiring dredging and that King County and Ecology should address contamination from Hamm Creek.

They stated that DYC has an urgent need to dredge to prevent further damage due to docks/vessels resting on the bottom at low tides and limiting the member's use of their vessels. ENR would only make the marina shallower and exacerbate difficulties in moving and berthing vessels at low tides. DYC faces permitting issues and special requirements for disposal of dredging materials, which may not go to open-water disposal sites.

Response

The comment incorrectly states that ENR was assigned to this area (this area is designated MNR below Benthic SCO, see ROD Figure 18). This comment implies that Recovery Category 1 should have been assigned based upon berthing and associated activities, presumably as reasonably anticipated future land use. However, this would not have changed the conclusion that the area does not require active cleanup based on contaminant concentrations that do not exceed the RALs which are applied uniformly across the In-waterway Portion of the Site. Hamm Creek is not part of the In-waterway Portion of the Site but EPA will continue to coordinate with Ecology regarding any needed source control at Hamm Creek.

2.23 Source Control and Sediment Recontamination

2.23.1 Comment: Define recontamination and state the methodology for determining the source of recontamination and endpoints for monitoring compliance

LDWG and some businesses commented that EPA has not clearly defined "recontamination," and that this definition is key to defining responsibilities and limits on PRP liabilities. They recommended that numeric criteria be included in the ROD to gauge when recontamination has occurred. In their view, any additional actions to address recontamination should not be within the scope of the Selected Remedy, but rather the subject of a separate action. They stated that, although the Proposed Plan states that "sufficient source control should be conducted to minimize recontamination," EPA did not provide a description of the methodology for determining whether sufficient source control has been achieved. Their concerns were that continued, long-term liabilities and financial impacts would be imposed upon businesses along the LDW should sampling indicate recontamination of their remediated areas, and that ongoing sources of recontamination unrelated to businesses' remedies and beyond their control would remain unidentified but warrant contingent sediment actions such as dredging, placement of more ENR materials, or establishing sediment impact zones. Thus, they believe it is important that "recontamination" be clearly defined in the ROD.

They are concerned that if "recontamination" remains undefined in the ROD, it might be interpreted as any concentration above the PRGs for sediment and surface water, which in their view is not a practicable approach. They asked that EPA define recontamination on a point-by-point basis as exceedance of a RAL; and not the human health and wildlife-related PRGs that are defined on an area-wide basis. Other commenters suggested that EPA define recontamination as exceedance of anthropogenic/regional background levels. Some commenters recommended that the ROD clarify that recontamination of sediments that occur after the remedy is complete would require a new ROD and a new settlement with the potentially responsible parties.

Some commenters thought that EPA should detail the methodology for determining sources of contamination in the ROD.

Response

While the ROD does discuss recontamination and coordination of source control with implementation of the Selected Remedy, as detailed below, EPA has not provided a detailed methodology for determining sources of contamination or implementation in the ROD, as requested by the commenters, because source control is not part of the ROD.

As described in Section 4.2 of the ROD, based on communications with Ecology, EPA anticipates that the process for determining whether source control is sufficient to begin in-water work will be fully described in Ecology's final Source Control Strategy, to be released in 2015. The focus of this work is to control sources sufficiently such that recontamination above the benthic SCO criteria and human health remedial action levels (RALs) (see Section 13.2 for an explanation of SCOs and RALs) is unlikely. Ecology plans to divide the waterway into three sections for the purposes of prioritizing source control activities, sequencing activities from the upstream to downstream sections of the LDW. Baseline and/or remedial

design data will be necessary prior to conducting a sufficiency evaluation. After an evaluation, Ecology will provide EPA a recommendation whether or not to proceed with in-water remedial actions based on the status of source control in the immediate vicinity of the planned action. Upon EPA's concurrence that source control is sufficient, active in-waterway sediment remediation can begin. This will prevent or minimize the likelihood that sediments will be recontaminated at levels that trigger additional active in-waterway sediment remediation (see Section 13).

Ecology sought public comment on its 2012 draft final revision of its 2004 Source Control Strategy concurrently with EPA's public comment period for the Proposed Plan. Ecology is currently in the process of revising the Source Control Strategy to address public comments.

As discussed in responses to previous comments (see responses to comments 2.3.1 and 2.13.1), the ROD does not require active remediation for COC concentrations below the RALs. Section 13.4 of the ROD states that if long-term monitoring data show that RAO 3 cleanup levels (benthic SCO criteria) are exceeded, additional actions will be taken to reduce COC concentrations to the benthic SCO criteria and human health-based RALs. If monitoring shows that contaminant concentrations have reached a steady state at levels below the benthic SCO criteria or human health-based RALs but above the human health risk reduction or background-based cleanup levels, EPA will review the data and consider whether additional technically practicable cleanup actions would further reduce contaminant concentrations in sediments, tissue, or surface water. If EPA determines that additional remedial action is appropriate for the In-waterway Portion of the Site, EPA will select such action in a ROD Amendment or ESD.

2.23.2 Comment: Interagency coordination

Several commenters stated that they would like to see better coordination between EPA and Ecology. Commenters stated that they would like to see EPA fully comply with all Ecology regulations and include of all Ecology's source control work in EPA's plan.

Response

As required by Section 121(d)(2) of CERCLA, the Selected Remedy will comply with or waive the substantive requirements of all applicable or relevant and appropriate state environmental and facility siting laws and promulgated regulations upon or before completion of remedial action. The Selected Remedy is solely for the In-waterway Portion of the Site. It is based on an Administrative Record, as required by law, consisting primarily of the RI/FS which did not cover or include source control or any upland portion of the Lower Duwamish Waterway Superfund Site. Ecology has the lead for source control and with a few exceptions is implementing it under its state authorities. See Sections 2.4, 4.2 and 13.2.7 of the ROD and the rest of the comments in this section of the Responsiveness Summary, along with Ecology's Source Control Strategy for more information on source control and coordination between EPA and Ecology on source control and remedy implementation. EPA will continue to work closely to coordinate efforts with Ecology as the Selected Remedy is implemented.

2.23.3 Comment: Upstream source control

Many commenters stated that LDW source control must include the Green River and areas immediately upstream from the Duwamish, because the Proposed Plan shows that current upriver sources will prevent the LDW from meeting the legally-required cleanup goals.

Response

EPA is supporting Ecology's development of a PLA (EPA and Ecology 2014) to understand the overall health of the Green/Duwamish watershed, including water, fish tissue and sediment, and to reduce ongoing sources of pollution in the watershed.

Ecology and EPA's efforts to restore water quality to the Green/Duwamish watershed are aimed at protecting human health and the environment. The PLA will use a watershed-based model to track the cumulative impacts of pollution, predict short and long-term improvements in water and sediment quality, and predict fish tissue quality over time. It will help identify sources of pollution to the watershed, help assess relative contribution of pollutants from various sources, help identify priority pollutant sources, and inform targets and strategies for reducing those sources of pollution.

The LDW source control effort is part of this larger regional effort. Several Ecology programs are involved with this effort. As examples, the PLA discussed in the previous paragraph is being initiated by Ecology's Water Quality Program to inform this regional effort. Ecology's Waste to Resources Program is developing a comprehensive Chemical Action Plan to identify, characterize and evaluate all uses and releases of a specific Persistent, Bioaccumulative Toxics (PBT), such as PCBs, a group of PBTs or metals of concern. A Chemical Action Plan is a plan, not legislation or a rule. It recommends actions to protect human health and the environment. Some of the recommendations may lead to new legislation or rules. These would go through the normal legislative or rulemaking process.

At this time, it is unclear whether sources and sediments upstream of the LDW should be subject to LDW-specific source control activities to protect post-remediated sediments. Several Ecology and King County studies are being conducted to assess sources to the sediments upstream of the LDW and refine sediment pollutant loading estimates from the upstream portion of the Green-Duwamish River. Decisions about expanding LDW-specific source control efforts to the areas upstream of the LDW study area will be made after the assessments are completed.

2.23.4 Comment: Source control goals are unachievable

Several comments raised concerns about unachievable source control goals, that the Source Control Strategy was too broad and general in defining source control goals, and that more specificity was needed in order to achieve a source control end point in order to begin EPA's proposed remedy or to protect the cleanup after remedy completion. Commenters stated that it is not productive to state that the goal of source control is to "minimize the risk of re-contaminating sediments above the sediment cleanup standards" when the FS shows that those standards cannot be achieved and waterway sediment will exceed that concentration after cleanup. Some commenters also stated that the proposed cleanup goals will affect those with existing National Pollutant Discharge Elimination System (NPDES) permits issued by Ecology.

Response

EPA and Ecology agree that the goals presented in the draft Source Control Strategy (Ecology 2012) were too broad. The goals stated in the Source Control Strategy were intentionally broad, overarching goals that Ecology was willing to strive to achieve.

EPA understands that Ecology has modified the interim goals for source control to sufficiently control sources of sediment contamination before conducting active in-waterway remediation, thereby preventing or minimize the likelihood that sediments will be recontaminated at levels that trigger additional active in-waterway. The final Source Control Strategy (to be published after completion of the ROD) is expected to have a detailed discussion describing how Ecology will determine if source control is adequate enough for EPA to begin cleanup of the sediments without an unreasonable risk of the cleaned sediments becoming recontaminated from sources that can be readily controlled is minimal. The approach was vetted with EPA, LDWG, interested stakeholders. See also response to comment 2.23.3.

The purpose of the draft Source Control Strategy is, in part, is to support the ROD to address sediment cleanup for the in-waterway portion of the site. Ecology plans to accomplish this work using existing regulatory mechanisms. The draft Source Control Strategy describes how Ecology will be following MTCA and the state Water Pollution Control Act as the primary regulatory mechanisms.

With regard to concerns about NPDES permits, commenters appear to assume that surface water and fish and shellfish tissue PRGs proposed by EPA in the proposed plan are the most stringent criteria applicable to NPDES permits. This is not correct. Existing provisions of Chapters 173-220 and 173-226 WAC require the consideration of effluent limitations based on Washington water quality standards. Additionally, surface water bodies that are impaired (e.g., do not meet designated uses per Chapter 173-201A WAC) are listed as Category 5 water bodies on the state's Water Quality Assessment (e.g., the 303(d) list). Impaired water bodies require a Total Maximum Daily Load (TMDL) or other pollution control plan. Such TMDLs or pollution control plans are typically based on pollutant loading assessments. In an approved TMDL, permitted discharges are assigned waste load allocations, which must be reflected in NPDES permits. Permit conditions associated with TMDLs are predicated on the water body meeting applicable water quality criteria and/or attaining the designated uses for that water body. Because the CERCLA remedy for the LDW may not result in the attainment of designated uses, concerns about how NPDES permits will be affected by a CERCLA ROD that contains surface water and/or tissue PRGs appear to be overemphasized. The Clean Water Act and the state WPCA are the primary drivers affecting NPDES permit limits.

2.23.5 Comment: Finish and evaluate source control

Several commenters stated that no remedy, including the Preferred Alternative, should be implemented until the ongoing sources of contaminants to the LDW are controlled and there is no material risk of recontamination. Commenters also stated that source control measures should be evaluated as to their effectiveness before requiring remedial measures in the LDW.

Response

Ecology and EPA are working together to better define when source control is sufficient to begin in-waterway remedial action. Neither EPA nor Ecology believe it would be efficient to evaluate source control sufficiency on the basis of the entire LDW basin. Such an LDW-wide source control evaluation would depend on so many variables that it would likely offer no certainties. Instead, Ecology and EPA propose to adopt a flexible approach where source control sufficiency evaulations are influenced by the size of the source or area being studied. Depending on the geographic size of the source area, evaluations may be conducted on the baisis of individual facilities or discharges, multiple facilities or discharges, or they may be performed for entire source control areas (see Ecology's 2102 draft Source Control Strategy for a map of the 24 source control areas identified by Ecology).

With regard to time frame, many source control activities are routine and ongoing (such as spill response, or storm sytem maintenance) and will continue into the future. Inspections will always need to be conducted, more historical contamination will be discovered, and new sources will likely appear. Depending on the specifics of an evaluation, there are several possible outcomes:

- Ecology may recommend that in-water sediment cleanup for a specific cleanup unit could proceed with reasonable confidence that recontamination potential above remediation action level is minimal.
- Ecology may recommend that in-water sediment cleanup for a specific cleanup unit could proceed as long as certain additional controls or oversight are implemented in the near future.
- Ecology may recommend that in-water sediment cleanup for a specific cleanup unit not proceed until additional controls are in place.

It is anticipated, even with a comprehensive source control effort, that there is likely to be localized recontamination. Such recontamination will likely have different contaminant signatures and likely lower concentrations than the contamination identified during the LDW RI (LDWG 2010), due to the difficulty in identifying and controlling all possible sources and pathways in a highly populated urban environment. Long-term monitoring will continue to occur to provide information about any particular location or overall decreasing or increasing trends.

Once recontamination occurs, EPA and Ecology will determine the appropriate course of action on a case by case basis. Many factors will determine what actions will be needed, including:

- the contaminants causing the recontamination,
- the spatial and temporal extent,
- how much recontamination has occurred (exceedance factors),
- how the recontamination is occurring (such as new sediment deposition),
- the proximity of known sources,
- how well the known sources are controlled,
- sediment bioassay results, and
- Agency enforcement discretion.

2.23.6 Comment: source control should be included in the ROD

Several commenters stated that source control should be included in the ROD in order for it to be effective and enforceable, and it should also be included in any administrative order or consent decree for implementing the cleanup.

Response

The Selected Remedy is solely for the In-waterway Portion of the Site. It is based on an Administrative Record, as required by law, consisting primarily of the RI/FS which did not cover or include source control or any upland portion of the Lower Duwamish Waterway Superfund Site. Source control is, however, acknowledged in the ROD as an integral part of the overall cleanup strategy for the Site.

Ecology has the lead for source control and with a few exceptions is using existing state regulatory authorities to control sources and minimize recontamination. EPA will support Ecology's source control efforts as appropriate under current law and within its resources. EPA's long-term plan to support Ecology's source control program will be detailed in its Implementation Plan, which will be attached to Ecology's Final Source Control Strategy. EPA is also supporting Ecology's broader Green/Duwamish River Watershed Pollutant Loading Assessment (EPA and Ecology 2014), which, along with post-cleanup LDW monitoring data, will be available to help evaluate the effectiveness of the sediment rememdy and source control activities.

See also response to comment 3.5.1. The content of enforcement mechanisms for the implementation of the Selected Remedy in the ROD, such as CERCLA consent decrees or unilateral orders for remedial action, are beyond the scope of comments and responses on a Proposed Plan.

2.23.7 Comment: ROD and Source Control Strategy should recognize that some contaminants are ubiquitous and uncontrollable

Several commenters stated that both the Proposed Plan and Ecology's Source Control Strategy should more explicitly recognize the uncontrollable nature of ubiquitous "problem chemicals" such as benzyl alcohol, benzoic acid, phthalates, and phenolic compounds that periodically exceed SMS chemical criteria in the LDW and other urbanized sediment sites. Many of the sources of these chemicals are natural, and have proven to be even more difficult to control than PCBs.

Response

EPA agrees that some level of recontamination may occur despite our best efforts in controlling sources. The draft Source Control Strategy (2012) states that the long term goal is to *minimize* (emphasis added) recontamination. EPA recognizes that it may be impossible to eliminate all contamination given the wide range of pollutants used today and already present in our environment. Ecology's draft Source Control Strategy does not limit the scope of source control to a list of contaminants of concern for the "LDW site" because there are multiple facilities inside the LDW source area where Model Toxics Control Act (MTCA) cleanup actions are occurring due to identified releases to the LDW sediments or surface water that are not considered "contaminants of concern" for the LDW CERCLA action. The draft Strategy is intended to be flexible enough so that it is applicable to the wide range of cleanup actions in the LDW (including no action) and the wide range of chemicals in the LDW source area that pose risks to human health or the environment, which may be identified during source control investigations.

While the term "ubiquitous contaminants" was used in many Proposed Plan comments, it may be more appropriate to refer to "ubiquitous concentrations" of contaminants or pollutants. Some point-sourced pollutant releases of these ubiquitous contaminants have resulted in concentrations that cannot be ignored or regarded as wide-spread urban contribution. Also, monitoring of these contaminants needs to be conducted because it may help to identify because additional sources that can be addressed.

Over the long term, source control efforts aimed at attaining applicable water and sediment quality standards and designated uses in the LDW will involve a comprehensive Green/Duwamish River watershed approach and identifying and deploying water quality implementation tools as well as other source control programs (e.g., chemical action plans, air quality management, toxics substances controls and product replacement; see response to comment 2.23.3), all of which are outside the current scope of LDW source control. See also response to comment 2.6.4, which responds to comments asking for flexibility in the ROD with respect to "ubiquitous contaminants".

2.24 Institutional Controls

2.24.1 Comment: Against fish advisories

DRCC/TAG and many community members and individuals expressed concerns about the Proposed Plan's reliance on fish advisories. DRCC/TAG stated that they are deeply concerned that the Proposed Plan predicts that the LDW's fishing communities will have to live with the residual contamination burden for the next 40+ years. At the same time, they will be asked to change their behavior (e.g., stop/limit eating seafood or learn new ways to cook seafood, etc.) as a result of pollution that they are not responsible for creating. They state that to place this burden on the impacted communities suggests a troubling lack of understanding, concern, and cultural competence regarding the subsistence and cultural significance of seafood consumption to LDW fishing communities. Relying on behavior change by the affected community should be understood as an unacceptable long-term solution to the threats posed by contaminated fish, as it has potentially serious implications for cultural, community, and family stability and health. The majority of LDW seafood consumers harvest seafood because it is deeply rooted in cultural traditions that are important both to subsistence and to community and family cohesion.

DRCC/TAG agreed that Institutional Controls (ICs) will be critically important in the short term, before and during cleanup activities. However, in their view, it is equally critical that the remedy minimize the need for ICs over the long term. They understand that there are natural (global) levels of some risk-driver hazardous substances in Puget Sound and LDW sediments that do not currently allow for unrestricted risk-free fishing for some seafood species. However, any contaminants remaining in LDW sediments above this background level will disproportionately impact LDW fishing communities, comprised primarily of tribal, low-income, and immigrant subsistence fishing families. Therefore, they believe long term ICs should be limited to those needed to protect fisher's health from natural background levels of contaminants. All contaminants above this level should be cleaned up as part of the remedy.

Response

EPA shares the commenters' desire to reduce the reliance on fish advisories and to achieve protection of human health through reduction of fish and shellfish tissue contaminant concentrations. The objective of the remedy in the ROD is to get sediment contaminant concentrations as close as practicable to natural background. If EPA determines that it is not technically practicable to achieve natural background

concentrations in sediments, EPA may issue another decision document (ROD Amendment or ESD) explaining why the agency believes it is not technically practicable to achieve natural background, or why the standard in the SMS for raising sediment cleanup levels to regional background has been met. DRCC/TAG is correct in stating that there will be some remaining fish advisories no matter how well contaminated sediments in the LDW are remediated due to sources of contamination that are outside of the scope of the Superfund cleanup (e.g., widespread, global sources). It is important to recognize that even if natural background levels are fully achieved in sediments, advisories recommending limiting consumption of resident LDW fish and shellfish will likely be warranted, as they are in most of Puget Sound.

2.24.2 Comment: Ensure programs to discourage fishing are culturally appropriate

DRCC/TAG and other commenters noted that trying to prevent people from fishing by posting signs is ineffective. ICs such as warning signs and educational campaigns to discourage subsistence fishers and Tribes do not convey the message regarding threats to local populations. DRCC/TAG commented that, although they are opposed to long-term fish advisories, in the short-term, ICs must not be limited to fishing advisories and education. While both advisories and education will need to be part of the IC program, an effective program must be designed in consultation with the affected community and be both multilingual and culturally-competent, and much more is needed for an effective, equitable, and enforceable IC program for the LDW. To date, no details of the ICs to be included as part of the remedy have been provided by EPA. It is at this stage simply a plan to develop a plan. However, EPA's Environmental Justice Analysis and Daniell et al's (2013) Health Impact Assessment of the Proposed Plan provide ideas for temporary fishing and seafood consumption substitutes and alternatives, as opposed to simply providing advisories and education. They should be considered as a starting point for consultations and IC development with the affected fishing communities. DRCC/TAG emphasized that it is of paramount importance that ICs do not themselves cause health risks, such as food insecurity, nutritional deficiencies, erosion of health cultural and family practices, etc. ICs that simply substitute one health risk for another are not health protective.

Response

EPA agrees that simply issuing a fish advisory is not sufficient to reduce risks to the affected community, and is aware that people continue to consume LDW resident fish and shellfish despite the existing Washington State Department of Health (WDOH) fish advisory. EPA believes it is important to understand the barriers preventing people from not eating resident fish and shellfish, as well as the opportunities consuming these species provides them in order to design an IC program that includes outreach and education tailored to the affected community. As noted in (EPA 2002c), informational campaigns like fish advisories, focused on restricting or influencing behaviors assume that there are accessible substitute food sources for the fish consumers and that changing behavior is appropriate. This may not be the case in low income and minority communities, including the people who may be consuming fish and shellfish from the LDW. EPA therefore plans to consider their unique needs in developing ICs to ensure that they are effective and appropriate and adequately protect their health.

LDWG, overseen by EPA and Ecology, are currently performing a Fishers Study (LDWG 2014b) as a first step in developing effective ICs as part of the LDW cleanup. Input from community members has been obtained via the Environmental Coalition of South Seattle, and DRCC/TAG, WDOH, and Seattle/King County Public Health have played an active role in developing the study. The goal of the Fishers Study is to gather information from people who either harvest or consume seafood from the LDW or who may assist in understanding aspects of seafood consumption from the LDW. Key questions being investigated in the study are:

1. How is the LDW currently being used for the collection and consumption of seafood, particularly resident seafood?
2. What is currently known by the community about the risk of consuming seafood from the LDW? What are the perceived benefits of consuming seafood from the LDW?

The ROD in Section 13.2.8 calls for "Continuing to engage the community throughout remedial design and implementation of the cleanup, including convening an advisory group as a means for the affected community and local agencies to work together on mitigating the impacts of the cleanup on the affected communitycontinuing to engage the community throughout remedial design and implementation of the cleanup, including convening an advisory group as a means for the affected community and local agencies to work together on mitigating the impacts of the cleanup on the affected community". EPA intends to use the data gathered from the Fishers Study and input from the advisory group envisioned by the ROD to develop appropriate ICs tailored to the people who utilize the LDW.

2.24.3 Comment: Remedy must include fish advisories

One commenter stated that the ROD should necessarily include an emphasis on using ICs to more fully achieve protectiveness given that none of the remedial alternatives achieve the RAO 1 PRGs for PCBs and dioxins/furans. ICs should be used only to address residual risk that is not reduced through other remedial measures.

Response

EPA agrees that ICs should be used only to address residual risks that are not reduced through other remedial measures.

2.24.4 Comment: ICs are reliable

King County commented that they disagree with statements in the Proposed Plan that ICs such as environmental covenants or restricted navigation areas may be unreliable in much of the heavily used waterway, stating that these IC have been shown to be protective in these situations in the past and should be here also. They also believe that any potential exposure of subsurface contamination (whether or not ICs are in place) will not increase risk.

Response

As stated previously, EPA has selected a remedy that most reliably protects benthic communities, reliably reduces the risk to seafood consumers to the extent practicable and protects people from the risk of exposure to contamination in beach areas during clamming and beach use with the right balance between active remediation, ENR, and implementation of institutional controls. This comment suggests that the

remedy should be adjusted to include more reliance on ICs, which EPA determined was not appropriate, notwithstanding the fact that these additional ICs would have direct impacts on future uses of the waterway. As noted in the response to comments in 3.9 and those in Section 2.25 many waterway users objected to the use of ICs to the extent that they interfere with commerce in the waterway.

2.25 Remedy Compatibility With Current and Future Use of the LDW

2.25.1 Comment: Hindrance to authorized navigation channel maintenance

The U.S. Army Corps of Engineers (USACE) commented that the Lower Duwamish Waterway is a federally authorized navigation channel and that, in accordance with USACE policy in exercising its approval authority for modifications to federal projects under the Rivers and Harbors Act of 1899, 33 U.S.C. §408, the cleanup action should not adversely affect its navigation function or usefulness by altering the boundaries or depth of the authorized channel, or by increasing maintenance or repair costs to USACE. USACE asked that the EPA consider existing requirements and future plans for this waterway, citing nascent plans to deepen East and West Waterways. They asked that EPA examine the Selected Remedy to determine whether it will adversely affect or impair the usefulness of the channel if deepened, even though deepening is not currently authorized. The comment requested additional analysis and close coordination with USACE, state or local authorities as necessary to ensure there are no other plans that would impact the Selected Remedy.

USACE concerns included:

- The planned remedy of natural recovery appears to call for portions of the authorized navigation channel to be shoaled to depths shallower than the authorized depth. This is in conflict with USACE responsibility to maintain the channel at authorized depths. Furthermore, USACE maintenance dredging may thwart the intention of the Proposed Plan by eliminating the natural recovery via necessary maintenance dredging.
- Portions of the authorized navigation channel are shoaled greater than 2 feet and sediments in the top 2 feet have contaminant concentrations that are below the remedial action levels (RALs), but sediments at the federally authorized depth have contaminant concentrations that are above the RALs. Failure to remediate the sediments at the authorized depth in all likelihood will increase costs for USACE maintenance dredging and would be contrary to USACE policy that the remediation must not increase operation and maintenance costs of the federally authorized navigation channel.
- In portions of the authorized navigation channel that have significant shoaling and contamination above the authorized depth, maintenance dredging may result in exposed sediments that contain concentrations greater than RALs.

Many businesses operating in the LDW noted that maintaining the federal navigation channel in the LDW is vital to the economy, and that the EPA remedial action must enable the USACE to perform maintenance dredging in the future. Several commenters asked how EPA is coordinating the remedy with USACE in this regard. They stated that the area from Harbor Island to the First Avenue South Bridge is the most critical as this is the area where there is deep draft ship traffic, and that the area south of the First Avenue South Bridge is also important to tug and barge traffic. Some commenters believed that EPA's Proposed Plan should include more dredging for the areas in the federal navigation channel and that any

areas that are dredged or dredged and capped need to be at a depth that is far enough below the project depth to allow future dredging by the USACE.

One commenter requested EPA remove and dispose of all sediments in the federal channel contaminated at levels exceeding the open-water dredged disposal suitability criteria, and noted that the USACE could request funds to maintain the waterway from the Harbor Maintenance Tax Fund.

Response

Consistent with the Rivers and Harbors Act of 1899, 33 U.S.C. §408 requirement that modifications to federal projects not impinge upon federal navigation authority, EPA discussed channel maintenance requirements with USACE during development of the RI/FS and Proposed Plan, and will continue to engage in discussions with USACE during remedial design to ensure that the cleanup will not adversely affect the function or usefulness of the waterway. Efforts will be made to verify that implementation of the remedy does not result in alteration of the boundaries or authorized channel depths. Responses to specific concerns raised in USACE and other comments regarding the federal navigation channel are provided below.

Plans for deepening. EPA considers reasonably anticipated future uses, but not all possible future uses in developing CERCLA remedies. EPA is unaware of any plans to deepen the federal navigation channel in the LDW at this time, and neither USACE nor the Port of Seattle indicated future plans to deepen the channel. Thus, the Selected Remedy only considers compatibility with maintenance of the channel at its currently authorized depth.

MNR in the federal channel. EPA does not expect that all waterway operations will cease in portions of the waterway designated for MNR. RI data indicate that sediments have and will continue to deposit in the navigation channel despite regular maintenance dredging (see ROD Figure 2).

Shoaled areas in the navigation channel. EPA has considered comments from USACE and other commenters and has concluded that the reasonably anticipated future use of the federal channel is that it would be dredged. Accordingly, EPA has revised the remedy to include dredging all contaminated sediments that exceed the human health-based RALs or the benthic SCO in areas where sediment has accumulated above the maintenance depth (2 ft below the authorized depth) in the federal navigation channel. This requirement extends to 2 ft below the authorized depth because EPA understands that USACE typically dredges this extra 2 ft below authorized depth as part of its normal maintenance dredging operations. See ROD Sections 12 and 13.2.1. The ROD (Section 13.2.1.1) states that shoaled areas in the navigation channel must be dredged during the implementation of the remdial action where contaminant concentrations in the top 2 ft exceed RALs. Where contaminant concentrations exceed RALs only at depths below the top 2 ft, cleanup may be deferred if USACE determines it is not currently an impediment to navigation, but must be dredged in the future if USACE determines that the area has become an impediment to navigation.

Capping in the navigation channel. See response to comment 2.25.2.

As shown in Table RS-4, the Selected Remedy adds a total of 170,000 cy and 21 acres of dredging to the Proposed Plan preferred alternative, due to a combination of: 1) revising estimates to include the USACE

2012 sampling data (see response to comment 2.18.3); 2) an additional 1 ft buffer for caps in the navigation channel (see response to comment 2.25.2); and 3) the requirement that all sediments in shoaled areas in the navigation channel with contaminant concentrations above human health-based RALs or the benthic SCO be dredged, as discussed above.

Table RS-4. Estimated Increases in Selected Remedy Volumes and Acreages over Proposed Plan Estimates

Scenario	Additional Volume (CY)[a]	Additional Area (ac)
Additional 1-ft Buffer for Caps in the Navigation Channel, Plus Side Channel Stabilization	14,000	--
Additional Volumes Requiring Remediation Based on New Information from USACE 2012 Sampling Data	56,000	9
Additional Volumes Requiring Remediation Due to Requirement to Dredge All Contaminated Sediments in Shoaled Areas in the Navigation Channel	100,000	12
Total	170,000	21

2.25.2 Comment: Capping in the federal navigation channel

USACE commented that the top surface of any proposed sediment cap in the federal channel should be at least 4 ft (2 ft for allowable dredging over-depth and a 2-ft cap buffer zone) below the authorized dredging depth. USACE also requested a 10-ft cut-back to assure that side slopes are stable and do not slough into the channel. USACE's two expressed concerns were 1) that standard maintenance dredging could expose the United States to liabilities associated with degrading an in-place remedy and 2) that inadequate buffer could result in USACE having to adopt specialized environmental dredging equipment or practices that reduce productivity and significantly raise costs for channel maintenance.

The FS assumed that the top surface of a sediment cap would be a minimum of 3 ft below the authorized dredging depth in the navigation channel, representing 2 ft for dredging over-depth and a 1-ft buffer zone, assuming that this would be sufficient to account for both over-depth and vertical accuracy of modern dredging equipment, and that USACE's 2-ft cap buffer would result in additional sediment removal at additional cost with no additional benefit.

Another commenter stated that even the tolerances in the FS were too large given the vertical and horizontal accuracy capabilities of modern dredges and that the vertical and horizontal buffers should be reduced.

Response

The Selected Remedy addresses USACE's concern. It requires a 4-ft minimum buffer be evaluated when the cap is in the federal channel, and that a minimum 10-ft horizontal cut-back be created to assure that side slopes are stable in areas where dredging or capping occur. EPA will coordinate with USACE and

other parties during remedial design to ensure that adequate clearances in the navigation channel or berthing areas are maintained. Additional engineering approaches, such as thinner cap design, additional dredging before capping, or cap armoring may also be evaluated during remedial design.

The other commenter's reference to vertical and horizontal accuracies of modern dredging may refer to dredging for environmental purposes. The 2010 letter from the USACE to EPA, referenced in USACE's comment on the Proposed Plan, noted, "Based on technical review of prior dredging activities in the Seattle District as well as other USACE Districts and considering research from the USACE's Engineering Research and Development Center facility, final cap elevation should equal authorized depth plus 2-foot over-depth and an additional 2-foot buffer zone for cap protection. This is based on the type of equipment that typically maintains this channel (clamshell mechanical dredging) and considers the typical 2-foot over-depth dredging that is usually performed. As an example, the authorized depth of the navigation channel at Station 240 is -15 feet MLLW. With the 2-foot over-depth and 2-foot of buffer zone, the protective caps should be at -19 feet MLLW or deeper. The buffer zone could be clean material or simply a water buffer."

The USACE letter continues, regarding horizontal buffer, "From a horizontal positioning perspective, we would like to see a 10-foot horizontal buffer zone between the authorized federal channel and the edge of a protective cap to minimize horizontal positioning errors that could cause cap breaching. The 10-feet buffer horizontal buffer is roughly the equivalent of the dredge bucket width used during Duwamish River maintenance dredging." This horizontal buffer was included in FS volume estimates. As noted above, EPA will coordinate with USACE in developing vertical and horizontal buffers in remedial design.

2.25.3 Comment: Cleanup must not interfere with commercial use of waterway

Many waterway users commented that the Preferred Alternative should encourage and support water-dependent use of the LDW consistent with state and local land use regulations, including the state Shoreline Management Act (SMA). EPA should consider the SMA an ARAR that helps shape the remedy. These water dependent uses include waterborne transport and delivery of materials to waterway facilities by ship and barge. Waterway businesses need to have unimpeded access to their docks and piers to maintain their business operations. The movement of deep draft vessels at and near many docks has been an increasingly difficult effort for several years and depending on the remedial approach selected for the LDW, it could become substantially worse.

Response

See response to comment 2.2.7. Note that state ARARs provide substantive requirements for cleanups that are more stringent than federal requirements. The commenters did not make clear what, if any, more stringent requirements in the SMA they may be referring to.

2.25.4 Comment: Preferred Alternative fails to account for access limitations

Some businesses commented that the Preferred Alternative fails to account for access limitations in certain areas of the LDW due to security and safety concerns. They stated that the Preferred Alternative appears to assume there will be unrestricted public access to the entire LDW, regardless of necessary and required security and safety limitations in certain areas. They cited as an example federal regulations that

prohibit access near ships once they are in port at the Glacier Cement Terminal. Glacier must limit access to its facilities, including its docks, to comply with federal security regulations and facility-specific safety rules. These security and safety regulations affect access to intertidal areas near the Cement Terminal and Batch Plant, including Glacier Bay and Slip 2. They asked that the ROD modify the Preferred Alternative to acknowledge public access is limited at many locations for security and safety reasons. These area-specific limitations should be taken into account when assessing exposure to human health and determining the remedial technologies to be employed.

One commenter noted that EPA appears to be unaware of the National Maritime Transportation Security Act of 2002. This law together with the National Maritime Transportation Security Plan of 2005 prohibits public access to any area in, on, or adjacent to any marine businesses on the waterways of the United States including rivers. They stated that in the area from the barrel company all the way to 7th Ave. S. and S. Riverside Drive there are businesses engaged in interstate commerce and marine contracting; thus public access is prohibited. Public access is also prohibited in areas where large quantities of freight are moved by huge trucks by the Freight Mobility Act. The Highway Safety Act would also prohibit the creating of hazardous situations on public roads which would certainly be the case in the industrial area. Finally, public access is prohibited by the Seattle Municipal Code in SMP Volume III, Title 23, pages 23-144 - 23-147 which prohibits recreational uses in industrial areas.

Response

EPA has consistently developed remedies to protect trespassers on private property with restricted access, as well as on otherwise restricted-access upland property. The ROD designates areas accessible to the public from the shoreline as "beach play" areas and includes more restrictive RAO 2 (direct contact) cleanup levels to protect children who might play in those areas. However, the In-waterway Portion of the Site to which this ROD is addressed is largely an open aquatic environment subject to usual and accustomed tribal fish and shellfish harvesting rights derived from treaties of the United States. The entire LDW shoreline is accessible by boat. Tribes have made clear and it has been recognized in many contexts that tribal exercise of their treaty rights has been limited by long-standing LDW contamination. Further, property ownership and associated access restrictions may change in the future. In view of this, RAO 2 cleanup levels for clamming are required for all areas where clam habitat is present and those for netfishing are required throughout the LDW, regardless of shoreline access restrictions. In addition, the ROD requires intertidal remedial action levels (RALs) to be met regardless of access restrictions because EPA determined that a uniform set of requirements for all LDW intertidal areas was EPA's most prudent course.

2.25.5 Comment: Habitat restoration

Some commenters stated that habitat restoration should be conducted as part of the remediation activities, some specifically suggested a focus on salmon habitat. Some asked that EPA ensure that materials used in enhanced natural recovery provide suitable substrate for the growth of native flora and fauna and minimize ongoing natural resource damages. One commenter suggested that cleanup and source control efforts focus on areas with good potential for salmon habitat.

Response

Consistent with Clean Water Section 404(b)(1) guidelines, where the remedial action adversely impacts habitat, the habitat will be restored or mitigation will be undertaken, the parameters of which would be developed during remedial design. CERCLA jurisdiction to address natural resource damages and habitat restoration generally, beyond CERCLA remedial action impacts, was given to federal natural resource management agencies, states, and affected Tribes, and is beyond the scope of any EPA ROD, though such activities may be coordinated with CERCLA remedial action implementation.

2.25.6 Comment: Invasive species

One commenter asked that EPA consider carrying out surveys for the snail *Potamopyrgus antipodarum* (New Zealand mudsnail) before dredging the LDW and transporting the dredged material to a disposal site to avoid the spread of this invasive species.

Response

EPA appreciates the concern with respect to invasive species, particularly the New Zealand mudsnail *Potamopyrgus antipodarum* which can reach very high densities. These mudsnails are small (5 mm or so long when full grown). Although they are most commonly found in freshwater and are considered a freshwater species, they have a "salinity tolerance < 26.4 ‰; populations in saline conditions produce fewer offspring, grow more slowly, and undergo longer gestation periods." (USACE no date). In addition, King County has a website on local introductions of the mudsnail (King County no date). So far, they are only present in a couple of freshwater streams in the Lake Washington watershed.

During the RI investigation, which had an extensive effort to collect benthic organisms, no mudsnails were recorded. EPA does not see the need for an additional survey as requested by the comment.

2.26 Support for EPA's Preferred Alternative

2.26.1 Comment: Support EPA's alternative

EPA received many comments stating general support for EPA's proposed remedy, including many commenters who proposed changes to specific aspects of the remedy but felt that the overall approach proposed by EPA was sound.

Response

EPA agrees.

2.27 Support for LDWG's Preferred Alternative

2.27.1 Comment: LDWG's "Key Elements" cleanup proposal

LDWG submitted a "Key Elements" (also called "Combined Elements") cleanup proposal to EPA and Ecology in August 2011, and resubmitted it again as part of their comments on EPA's Proposed Plan, with a recommendation that EPA consider their proposal as they develop their final remedy in the ROD. EPA received many postcards, letters, and oral comments supporting LDWG's recommended plan for cleaning up the Lower Duwamish Waterway, including many copies of a pre-printed post card.

LDWG's Key Elements proposal calls for:

- 38 acres dredging
- 34 acres capping or partial dredge and cap
- 65 acres ENR
- 20 acres MNR To SQS [SCO in the ROD]
- 23 acres of Verification Monitoring

The Key Elements approach relies less on dredging and capping, and more on ENR, MNR, monitoring, and adaptive management than the Preferred Alternative [Selected Remedy in the ROD] does. LDWG stated that the Key Elements approach would ensure comparable effectiveness and permanence of the cleanup, in comparison to EPA's Preferred Alternative, by:

1. Reducing human health risks and meeting some cleanup objectives sooner than the Preferred Alternative by limiting dredging to the areas with the highest contaminant concentrations.
2. Increasing certainty of success through adaptive management and reduced reliance on natural recovery to achieve human health goals, while retaining design flexibility to ensure the best solution is applied at each location in the waterway.
3. Reducing construction times, which could lower impacts to neighborhoods, local residents, and businesses by reducing air emissions associated with remedy construction, and traffic and water quality impacts, benefiting those with asthma living and working in the LDW corridor (particularly children).
4. Reducing high risks to resident seafood consumers by reducing the dredging period, because higher contaminant concentrations in fish and shellfish tissue are expected to occur during construction and for a few years following construction.
5. Reducing costs. They estimate the cost of their proposal at $290 million (non-discounted costs).
6. Avoiding uncertainties associated with the Preferred Alternative for taxpayers and businesses regarding when the cleanup will be complete, thus protecting the regional economy by setting achievable cleanup goals and controlling costs.

LDWG believes that EPA's Preferred Alternative would increase short-term impacts and add costs without improving the environmental outcomes. They believe both approaches are equally protective in the long term, and the Key Elements proposal is more protective in the short term.

Response

EPA carefully analyzed LDWG's Key Elements proposal and concluded that it would not lead to better outcomes than the Selected Remedy. Responses to specific claims made by LDWG about the advantages of the Key Elements proposal are provided below.

<u>Reducing human health risks and meeting some cleanup objectives sooner than the Preferred Alternative by limiting dredging to the areas with the highest contaminant concentrations.</u> LDWG asserts that intermediate and long-term risk reduction milestones for human health seafood consumption (RAO 1) will occur faster under Key Elements due to the shorter construction duration. The Key Elements proposal assumes that the remedy can be constructed in 5 years, in contrast to EPA's Selected Remedy, which is estimated to take 7 years. The estimated differences in time to reach long-term cleanup goals between

LDWG's proposal and EPA's Selected Remedy are within the predictive uncertainty of the RI/FS model (BCM and FWM) outcomes.

The stated advantage of the shorter construction timeframe in LDWG's proposal does not counter-balance the increases uncertainty associated with greater reliance on natural recovery and probable need for contingent actions. The Key Elements proposal appears to acknowledge the latter by referring to using robust monitoring practices and identifying contingent actions. Moreover, the Key Elements timeline fails to account for the additional time required to implement adaptive management should cleanup goals not be met.

LDWG claims in the Key Elements proposal that remedial goals for clamming and beach play areas will be achieved sooner than in EPA's Preferred Alternative, but they do so by prioritizing these areas to be remediated first. The choice to prioritize these area for remediation is not unique to Key Elements. Any alternative, including EPA's Selected Remedy, could be sequenced so that clamming and beach play areas are remediated first.

Increasing certainty of success through adaptive management and reduced reliance on natural recovery to achieve human health goals, while retaining design flexibility to ensure the best solution is applied at each location in the waterway. This statement is difficult to interpret since there is more reliance upon MNR in Key Elements than in the Preferred Alternative or Selected Remedy, rendering a key premise of the statement fundamentally inaccurate. As noted in many responses to comments in this Responsiveness Summary, EPA believes that active remediation, namely removal, capping, or ENR provides far greater certainty that remediation goals will be achieved.

Another uncertainty associated with LDWG's Key Elements proposal is that it seeks to apply ENR to areas that were deemed unsuitable for ENR in the FS, the Proposed Plan and the ROD. It proposes ENR in Recovery Category 1 areas subject to scour, coupled with scour-mitigation methods that have yet to be proven. (The ROD does allow for consideration of use of ENR in some of the Recovery Category 1 areas where it can be demonstrated in pilot testing that ENR with in situ treatment will maintain its stability and effectiveness in these areas over time, for examples, areas where vessel- and flood-related scour were shown by the STM and FS scour analysis to be minor, see ROD Section 13.2.1.2.)

The Selected Remedy also allows for flexibility and utilizes adaptive management to identify when additional active remediation is needed, but it does so at lower contaminant concentrations than proposed under Key Elements.

Reducing construction times, which lowers impacts to neighborhoods, local residents, and businesses by reducing air emissions associated with remedy construction, and traffic and water quality impacts, benefiting those (particularly children) living and working in the LDW corridor with asthma.

- As noted above (see response to comment 2.17.3), comments from the affected community support greater dredging in order to assure effectiveness and permanence, while acknowledging the short term impacts may exist. DRCC/TAG cites findings of the Health Impacts Assessment that air impacts are likely to be minor compared to other non-remedy related sources and can be further minimized through use of cleaner fuels and the implementation of "green remediation"

policies and initiatives aimed at reducing air impacts. DRCC/TAG also commented that upland traffic will largely be by train conveying sediments to offsite disposal, amounting to up to 3 trains per month on average, compared to 65-85 trains per day at present.

- See also response to comment 2.17.3 regarding differences between emissions produced under the Key Elements and under the Preferred Alternative. EPA finds that these differences are not significant.

Reducing high risks to resident seafood consumers by reducing the dredging period, because higher contaminant concentrations in fish and shellfish tissue are expected to occur during construction and for a few years following construction. The FS and Proposed Plan carefully considered, in their short-term effectiveness analyses, that fish and shellfish tissue concentrations of bioaccumulative contaminants would likely be elevated throughout the duration of construction, plus up to 2 years thereafter, after which they are reasonably expected to decline to much lower levels. Balanced against the greater certainty of approaching cleanup levels sooner with more reliance on active remediation, among other factors set forth at length in the ROD, EPA concluded the Selected Remedy is superior to Key Elements, which relies to a greater degree on natural recovery, as discussed above.

Reducing costs. The estimated cost for the Selected Remedy is greater than the Key Elements proposal. LDWG estimated the cost of the Key Elements proposal at $260 million (at a 2.3% discount rate). The Selected Remedy cost is estimated at $342 million (at a 2.3% discount rate). However, the costs of contingent actions are potentially substantially greater for the Key Elements proposal due to its greater reliance on less certain natural recovery processes. Contingency costs were estimated as a proportion of costs (e.g., 15% of dredging), so a greater reliance upon adaptive management and contingency could significantly alter the actual difference between costs.

2.27.2 Comment: Support for LDWG's cleanup plan

As mentioned above, EPA received many postcards, letters, and oral comments supporting LDWG's recommended plan for cleaning up the LDW, including many copies of a pre-printed post card that stated:

Cleanup of the Lower Duwamish Waterway will have a major impact on our region - not only in how it improves the waterway and its ecosystem but its effect on taxpayers, utility ratepayers and local businesses that invest and create jobs in the area.

The Lower Duwamish industrial area generates more than 100,000 jobs, almost eight percent of King County's total employment. Some of our most richly diverse neighborhoods are also along the river's banks.

I support a cleanup that:
Reduces health risks to people and the environment as quickly as possible by targeting cleanup so it takes two years less to complete than EPA's proposed seven year plan.

Minimizes construction impacts by focusing dredging on the most contaminated areas. More extensive dredging lengthens construction and increases impacts to neighborhoods and businesses and risks associated with fish contamination.

Maximizes the use of other effective and less costly technologies and monitoring for less contaminated areas. The cleanup's long-term effectiveness and permanence should be measured through monitoring and adaptive management.

Protects the regional economy by setting achievable cleanup goals and controlling costs. As written, the plan sets goals that cannot be met and creates uncertainty for taxpayers and businesses on when the cleanup will be complete.

Response

See response to comment 2.27.1.

2.28 Support for DRCC's Preferred Alternative

2.28.1 Comment: DRCC's preferred alternative

DRCC/TAG stated in their comments that the affected communities' and stakeholders' priorities for strengthening the Preferred Alternative can generally be characterized as:

- Maximize certainty that the selected cleanup action will be effective in meeting the cleanup goals;
- Ensure the permanence of the remedy, to prevent recontamination and/or the need for "do-overs";
- Minimize future risk and the potential for ongoing liability for tax- and rate-payers and businesses
- Protect the environment and people's health to the greatest degree possible; and
- Ensure equity by designing a cleanup that protects all river users.

In order to accomplish this, DRCC/TAG proposed the following changes to EPA's proposed plan:

- Eliminate use of MNR
- Use ENR in areas currently proposed for MNR
- Dredge areas currently proposed for ENR and capping

DRCC/TAG believes that implementing these suggestions will be more costly in the short term, but that this investment provides greater certainty of success over the long term, both for residents who rely on the waterway, and also for the agencies and ratepayers who will be financially responsible for the success of the cleanup into the future. DRCC/TAG emphasized its concern that substantial portions of the cleanup might have to be redone, and that the total price of initial and future cleanups may exceed the somewhat higher cost to get it right the first time.

Response

EPA shares DRCC/TAG's desire for a LDW cleanup that is as protective as can be practicably achieved; however, our analysis indicates that DRCC/TAG's proposal is unlikely to provide greater long-term risk reduction than the Selected Remedy. DRCC/TAG's lack of support for natural recovery processes in the LDW fails to acknowledge evidence presented in the FS that recovery is occurring in portions of the LDW and that MNR under the right conditions has been effective at similar sites, typically in combination with active remediation and source control. DRCC/TAG's preferred alternative would significantly increase project costs and construction time, and would greatly increase short term impacts and risks associated with dredging releases. DRCC/TAG's proposal is similar to FS Alternative 5R, which calls for dredging approximately the same area that is addressed through dredging, capping, and ENR in the Selected Remedy. Alternative 5R would require 17 years of dredging as opposed to 7 for the

Selected Remedy at a cost of $470 million, (compared to $342 million for the Selected Remedy). The Selected Remedy uses dredging and capping (with armoring to withstand scour if necessary) of the most contaminated areas and the areas with the highest potential for scour, ENR to address areas with moderate levels of contamination, and MNR to reduce COC concentrations in areas with lower levels of contamination, and provides the best balance of minimizing short-term risks due to construction in a 7-year construction period while maximizing long-term effectiveness by dredging or capping the most contaminated sediments. While EPA agrees with DRCC/TAG that dredging provides the greatest long-term effectiveness and permanence, because it removes the contamination from the waterway, this must be balanced against the short-term increases in risk due to releases and residuals during dredging, as well as the significantly longer construction times (more than double) and higher cost associated with dredging. EPA's analysis indicates that the increased cost and additional period of increase in short-term risks is not offset by an appreciable increase in long-term effectiveness and permanence.

While EPA shares concerns about the ability of the BCM to accurately portray future sediment concentrations, over the long term, conditions in the waterway will likely be strongly influenced by upstream sediments, which provide the vast majority of surficial sediments in the waterway. Therefore, DRCC's proposal to dredge most of the waterway and cover the rest with clean sand would likely result in sediment contaminant concentrations in the waterway eventually resembling upstream sediment contaminant concentrations as incoming sediments deposit over the clean sediments, the same long-term outcome as anticipated for the Selected Remedy.

For these reasons, EPA believes the Selected Remedy provides the appropriate balance among the nine CERCLA remedy selection criteria in the NCP.

2.28.2 Comment: Support DRCC's recommendations

EPA received many comments in the form of post cards e-mails, handwritten comments and testimony in public meetings supporting all or part of DRCC/TAG's recommendations for modifying EPA's proposed cleanup plan. The recommendations summarized in the comment post card are listed below:

1. Fully integrate and enforce control of ongoing sources of pollution in the final cleanup order, in order to achieve the goal of reaching Puget Sound background.

2. Remove, instead of cap or cover, all highly contaminated sediments to ensure a successful, final and permanent cleanup.

3. "Enhance" all remaining "natural recovery" areas, to speed recovery and reduce health risks more quickly.

4. Mitigate impacts on Tribes, fishing families, and residents by establishing a community health and revitalization fund.

5. Create Green Jobs - Hire Local!

The statement: "I believe Alternative #5C+ will not sufficiently meet these goals and urge EPA to strengthen its proposed cleanup plan to ensure success and protect our investment in cleanup."

Response

EPA believes it has "strengthened its proposed cleanup plan to ensure success and protect our investment in cleanup" – please see ROD Section 12 for a summary of changes to Proposed Plan Alternative 5C Plus, although EPA does not select Alternative 5R as preferred by DRCC. See also responses to the following comments:

- DRCC/TAG's preferred alternative - 2.28.1
- Source control – see Responsive Summary Section 2.23,
- Dredging, as opposed to capping or covering sediments - 2.1.1
- Community health and revitalization fund – 2.32.2
- Hire local – 2.2.6

2.29 Proposed Plan Content

2.29.1 Comment: Proposed Plan content

Many comments on the Proposed Plan contained specific recommendations for revising the text of the Proposed Plan for incorporation into EPA's ROD.

Response

EPA considered the suggested language changes made by commenters when drafting the ROD, and significant comments on Proposed Plan content and responses are included in this Responsiveness Summary.

2.30 Human Health Risk

2.30.1 Comment: Seafood consumption rates overestimated

One commenter believes that seafood consumption rates in the Proposed Plan are overestimated, stating that survey information cited in the HHRA and Proposed Plan is not specific to the Site and there is no demonstration of why it is reasonable to conclude that the cited survey information actually reflects tribal seafood consumption habits within the LDW. The commenter stated that despite the lack of site-specific seafood consumption data, HHRA nonetheless makes exposure assessments and concludes it is likely that current seafood consumption rates with the LDW are lower than those used to develop the reasonable maximum exposure (RME) risk. They believe the HHRA does not provide a rational basis from which EPA may draw conclusions regarding tribal consumption of seafood within the LDW, or any resulting risks associated from such activities.

They stated that the Proposed Plan does not consider the fact that institutional controls, such as seafood consumption advisories, present a viable means to limit any present risks that may be associated with such activities. Implementation of these institutional controls will effectively minimize any potential human health risks while EPA and the target communities develop the necessary, site-specific information required to create an appropriate risk profile for consumption of seafood in the LDW.

Response

EPA agrees that current seafood consumption rates in the LDW are likely to be lower than those used in RI/FS risk estimates; this is to be expected because there is a state Department of Health advisory warning people not to consume any resident fish or shellfish from the LDW. However, it is unreasonable and unfair to the affected community as a whole to conclude that because fishing rates are suppressed due to contamination and seafood consumption advisories, people would not eat seafood from the LDW if contamination levels were reduced in the future. Further, it is particularly important to recognize that tribal fishing rights are derived from treaties of the United States and that Tribes regard seafood consumption as being of great nutritional, economic and cultural importance. Therefore, consistent with EPA guidance and policy, EPA estimated reasonable maximum exposure risks that are protective of reasonably anticipated future use of the LDW. As stated in the NCP preamble at 55 Fed. Reg. 8710: "the reasonable maximum exposure estimate for future uses of the site will provide the basis for the development of protective exposure levels."

Further, consistent with EPA policy, in consultation with the affected federally recognized Tribes, EPA used a respected published study of relatively nearby Tulalip Tribe seafood consumption rates as a surrogate for the depressed rates for the LDW. After careful consideration, EPA concluded that the Tulalip Tribe study reflects reasonably anticipated tribal seafood consumption from the LDW if resident seafood consumption were not depressed, and that a "more appropriate risk profile for consumption of seafood in the LDW" is neither necessary nor likely capable of being assembled. The fish and shellfish consumption rates derived from the Tulalip data set are consistent with those determined in other regional fish and shellfish consumption surveys of Native Americans and Asian Pacific Islanders in the Pacific Northwest. EPA also included in the HHRA an "upper bound" seafood consumption scenario using Suquamish Tribe seafood consumption rates, which are much higher than Tulalip Tribe rates. Despite fish consumption advisories, extensive seafood consumption from the LDW has been documented in a creel survey done by King County (King County 1999) to study combined sewer overflows.

EPA further believes that seafood consumption health risks for smaller areas within Puget Sound need to be addressed holistically. The argument that a smaller area within a large body of water cannot support a high fish consumption rate leads to the erroneous conclusion that that larger body of water generally cannot support a high fish consumption rate. Individuals should be able to safely obtain seafood from anywhere within Puget Sound, including the LDW.

2.30.2 Comment: PCBs are the risk driver at the Site

One commenter stated that PCBs are the real driver of risk in the LDW, accounting for approximately 95% of the total area requiring remediation; that a comparison of PCB and arsenic background fish tissue data with Site fish tissue data demonstrates that PCB concentrations are 66 times greater than background, whereas arsenic is only 1.4 times greater than background for sole filets. They believe that, from a risk perspective, the LDW is a PCB site. They believe that the Proposed Plan's failure to recognize PCBs as the primary risk driver for LDW cleanup is an error and it necessitates a fundamental re-working of EPA's risk profile for the LDW. They commented that EPA should focus on PCBs as the main contaminant that drives the hypothetical risk, and eliminate the confusion caused by diverting focus to other detectable, but insignificant risk-driver contaminants.

Response

EPA agrees that PCBs are the most widespread contaminant in the LDW for seafood consumption exposure, but they are not the only contributor of risk. For example, dioxins and furans also likely pose a significant fraction of Tribal seafood consumption risk. Dioxins and furans were not measured in tissues in the RI because it was assumed that these risks would be unacceptable based on other Puget Sound investigations in areas with sediment concentrations lower than those found in the LDW. These studies have consistently detected dioxins and furans at concentrations that would be associated with unacceptable risk at the consumption rates evaluated in this HHRA (LDWG 2010). It was assumed in the FS that dioxins/furans would be remediated to natural background levels in sediments, consistent with MTCA (LDWG 2012a).

The commenter's focus on fish tissue PCB concentrations ignores the differences in contaminant levels between fish and bivalves, and the high arsenic seafood consumption risks associated with shellfish consumption. Bivalves in the LDW have much higher levels of both arsenic and cPAHs than fish. The RME arsenic seafood consumption risk is 2×10^{-3}, which is well above the upper end of the CERCLA risk range. RME cPAH seafood consumption risks are 7×10^{-5}, which is very close to the upper end of EPA's risk range.

Additionally, the commenter ignores direct contact exposure pathways which have lower risks than seafood consumption pathways, but which are still of concern. Direct contact exposure pathways have a contaminant/risk profile that differs significantly from seafood consumption exposures. In particular, cPAHs are the primary risk contributor for children's beach play; they comprise 25% of child tribal seafood consumption exposure risks.

2.30.3 Comment: Beach play risks are overestimated

LDWG and other commenters stated that beach play risks in the HHRA are overestimated because:

1) Many of the areas identified as beach play areas in the HHRA are not likely to be used for such purposes at present because they are adjacent to industrial properties (e.g., Trotsky Inlet) or because they would be difficult for a young child to access and consists of a mix of substrates, some of which are not conducive for beach play activities. They note that the estimated risks, based on young children playing in the sediments in the intertidal area, would greatly overestimate the risks associated with other more likely uses of these areas, such as recreational fishing, launching of kayaks, dog-walking, etc. Some commenters argued that the probability of exposure of the public to beach play and clamming areas is insignificant because: a) the beach play or clamming areas are actually inaccessible to the public, b) the clam resources are absent or non-native in origin, c) the areas are unattractive to the public because they are armored or consist of too-soft soft substrate, or d) the areas should not be utilized because of storm drain and CSO discharges nearby which would introduce pathogens or debris which would be dangerous for play.

2) The exposure frequency of 65 days per year is based on the 95th percentile for children aged 0 to 6 observed playing during surveys at beach parks in King County (located along Lake Union, Lake Washington, and Lake Sammamish). Given the nature of these areas and the fact that exposure can occur only at low tide, this frequency of use likely overestimates the realistic frequency of beach play in most of

these areas, and thereby overestimates the risks and results in public misperceptions about risks along the shoreline.

LDWG believes different rates should be used for different areas, depending on their potential use. Another commenter suggested the exposure rate be 5 days per year in difficult to reach areas.

Response

EPA's intent, consistent with CERCLA policy and guidance (EPA 1995), is to provide for a cleanup that is protective of current and reasonably anticipated future uses of the LDW. There are several public parks and publicly accessible shoreline areas in the LDW; other areas are accessible by boat. EPA surveyed the entire LDW shoreline to determine what areas could be accessed by the public, including children with adults, as part of the HHRA, and included only areas EPA determined could be accessed by shore as beach play areas in the HHRA. A clam habitat survey was also conducted during the RI to verify that areas designated as clamming areas contain clam habitat and are accessible from the shoreline or by boat. The community, Tribes, and natural resource agencies have stated that there are plans to create additional recreational and habitat opportunities in the LDW corridor. Shellfish collection is not limited to native species. While it is correct that the majority of clams are a non-native species (*Mya arenaria)*, they are eaten on the East coast, where they are native, and the Tribes have stated that they would harvest them if they were not contaminated.

Also, the presence of a storm drain or CSO nearby would not likely deter beach play by children and others, including those with limited English proficiency, who may not be aware of or comprehend the dangers of pathogens or other hazardous substances associated with these features. Further, it is inappropriate to use the presence of CSO discharges as an excuse for avoiding removal of chemical contaminants. See response to comment 2.30.4.

2.30.4 Comment: Tribal clamming exposure parameters are overestimated

LDWG and other commenters suggested that the ROD use less conservative tribal clamming exposure parameters. The Final HHRA calculated tribal clamming risks for both a reasonable maximum exposure (RME) scenario (120 days per year for 64 years) and a high-end tribal clamming scenario (183 days per year for 70 years). They contend that the premise that an individual would participate in clamming work for 64 or 70 years at the assumed exposure frequencies is overly conservative and unrealistic.

LDWG further commented that, at present, the Washington Department of Health recommends that people not consume clams from anywhere in King County (not just within the LDW) because of the concern over pathogen exposures resulting in gastrointestinal illnesses, as tracked by fecal coliform bacteria. Given the relatively limited habitat for clams in the LDW and the presence of fecal coliform bacteria (from upstream sources, stormwater, and combined sewer overflows), LDWG believes the clamming frequency in the LDW of every third day for a lifetime was unrealistic, resulting in an overestimate of direct contact risk.

Response

As stated in many responses, see e.g., response to comment 2.30.5 below, RMEs are typically conservative in the interest of ensuring protection of public health. EPA surveyed Puget Sound Tribes to obtain information on the frequency and duration of clam harvest. The clamming exposure duration and frequency selected for the LDW HHRA are based on this information and are consistent with EPA guidance that exposure duration and frequency should be assigned upper bound values in computing RME. Further, the Muckleshoot Tribe has indicated that they are are keenly interested in improving the quality of shellfish habitat and utilizing it for future shellfish harvest and consumption.

Finally, EPA does not make determinations about issues such as suitability of clamming areas based on existing contamination. That these areas are currently under health advisories for both contaminants and pathogens is therefore not a reason to consider them irrevocably lost as clamming areas. Reductions in the discharge of pollutants and pathogens is an ongoing objective of Clean Water Act regulation and source control work conducted by Ecology. Because of this, the substandard existing conditions are not presumed to persist into an indefinite future.

2.30.5 Comment: Compliance depths for beach play and clamming scenarios are overestimated

LDWG commented that EPA should use a 30-cm point of compliance for both clamming and beach play direct contact exposure scenarios, rather than the 45 cm required by EPA. This depth would be protective for people harvesting Eastern softshell clams, which have a burrowing depth between 10 and 20 cm in the Pacific Northwest (Harbo 2001; Kozloff 1973). With respect to beach play, although LDWG agrees that it is possible for a child less than 6 years old to occasionally dig a hole to a depth of 45 cm in some locations along the LDW, combining this conservative assumption with the other conservative assumptions (i.e., assuming beach play at an exposure frequency of 65 days per year at each beach play location) results in a conservative point of compliance for direct contact exposures in intertidal areas.

Response

See response to comment 2.7.1. In particular, see the discussion of factors involved in choosing a depth of 45 cm.

EPA's risk assessment guidance (EPA 1989) has long used "reasonable maximum exposure" for decision making. Exposure is deliberately overestimated to insure that risk estimation and consequent cleanup protect the public.

2.30.6 Comment: Include Suquamish Tribe exposure parameters

The Suquamish Tribe commented that Suquamish consumption data are relevant in estimating potential risks to Suquamish tribal members, who retain their traditional rights to harvest throughout the Suquamish Usual and Accustomed fishing area, and represent a reasonable future use scenario for Suquamish tribal members. They asked that Suquamish risk estimates be included in the discussion, tables, and figures related to the HHRA in the Proposed Plan.

Response

EPA agrees, and has included risk estimates using the Suquamish seafood consumption rates in the ROD.

2.31 Ecological Risk

2.31.1 Comment: Risks to fish overestimated in ERA

LDWG commented the PCB and cadmium toxicity reference values (TRVs) required by EPA in the Ecological Risk Assessment were inappropriately low and resulted in overestimates of risks to fish. Specifically, LDWG believes that EPA inappropriately required LDWG to develop the fish TRV for PCBs using a study with questionable methods and results (Hugla and Thome 1999). Using this TRV, hazard quotients (HQs) for fish based on exposure to PCBs were greater than 1.0. No other study supported an HQ that was greater than 1.0. LDWG also commented that the effects-based TRV for cadmium (0.5 mg/kg) that was required by EPA, based on Kang et al. (2005) and Kim et al. (2004), was 2 to 3 orders of magnitude lower than the no-effects levels in 11 other studies. The no-effect TRV in Mount et al. (1994) was much more defensible and would have resulted in HQs less than 1 for all fish.

Response

EPA disagrees that TRVs in the ERA were inappropriately low. The residue-effect values for PCBs from Hugla and Thome (1999) represented the lowest effect concentrations reported for fish from a laboratory experiment and as such represented a potentially important line of evidence for consideration in TRV development. After careful review of this study (as well as an earlier Barbel-PCB study published by the same authors in 1995), EPA, Ecology, and LDWG had several concerns and questions regarding the experimental design and generation of the whole body PCB data. EPA undertook an extensive review process to answer these questions and evaluate whether this study should be eliminated from TRV consideration. This process included correspondence with the authors, peer review by EPA Office of Research and Development (ORD) and National Oceanic and Atmospheric Administration (NOAA) scientists, and numerous discussions with LDWG and their consultants (summarized in two EPA memos dated February 23, 2007 and April 20, 2007).

What emerged from these discussions (as well as those for the cadmium TRV) was a marked difference in opinion between EPA and LDWG on what criteria a study must meet in order to set a TRV. EPA's conclusion was that while there were uncertainties associated with using the effects residue thresholds from the Hugla and Thome study, none of these uncertainties would eliminate it from consideration in TRV development. LDWG, on the other hand, judged this study's acceptability using additional criteria that were applied only to this single paper. While many of these criteria are useful for consideration in evaluating published toxicity data, the implied requirement that every detail must be met in order for a study to "qualify" as acceptable ignores the reality of conducting and publishing residue-effects information. Relatively few residue-effect studies are explicitly designed with TRV derivation in mind. LDWG's acceptability criteria would not be met by most of the other studies that were considered for TRV development including the study (Hansen et al.1973) that LDWG originally proposed as the basis of the PCB TRV. EPA maintains that the selection of one or more studies to be used as the basis for TRV development should be based on the intended use(s) of the TRV, not on acceptability criteria that may or may not be appropriate in a given situation.

2.31.2 Comment: Disagree with conclusion of low risks to fish

NOAA commented that they disagree with the characterization in the Proposed Plan that risks to crabs, fish, birds, and mammals was low, with the exception of river otters. Hazard quotients for many species other than river otters exceeded 1.0 for a variety of contaminants: PCBs for crabs, fish, birds, and mammals; cadmium and vanadium for fish; and chromium, copper, lead, mercury, and vanadium for birds. Risk drivers were selected from that list on the basis of uncertainties in the data. The reason that fish are not included in the list of risk drivers is because of perceived uncertainties by EPA in the scientific studies used to develop the toxicity information not because risk to fish is low. NOAA maintains that the contaminants in the LDW pose risk to fish, and this risk is not low.

Response

It is true that risk drivers were selected based on consideration of both the magnitude of HQ and uncertainties associated with its calculation. EPA directed LDWG to make modifications to the text of both the ERA and RI to balance the discussion of how uncertainties may have been underestimated with how they may have been overestimated. Furthermore, the summary in the RI (LDWG 2010) of how risk drivers for ecological receptors were selected summarizes the decision process without specifically identifying risk to unselected receptors as "low":

"Other COCs that exceeded risk thresholds (LOAEL-based HQ greater than or equal to 1.0) were not selected as risk drivers because of high uncertainty in the effects or exposure data, comparisons to preliminary background concentrations, or the expectation of low residual risk following remediation in EAAs, as discussed in detail in Section 7 of the ERA. COCs that were not selected as risk drivers will be addressed through focused evaluation in the FS. These chemicals may also be considered in remedial design for specific areas in or near the LDW and in the post-remedial monitoring program that is part of the 5-year review…"

The Selected Remedy includes as COCs all but one of the contaminants listed in NOAA's comment because they are COCs for receptors other than those listed in the comment. PCBs are COCs for human health, benthic invertebrates, and river otters. Cadmium, chromium, copper, lead, and mercury are COCs for benthic invertebrates. The only contaminant listed in NOAA's comment that is not a COC for the Selected Remedy is vanadium, however, the ROD does call for limited monitoring of vanadium (see ROD Section 13.2.3). Thus, long-term monitoring will include analysis of all of the COCs listed in NOAA's comment, so progress in reducing risks to all receptors can be assessed.

2.31.3 Comment: Tributyltin (TBT) poses risk to fish and invertebrates

NOAA commented that TBT poses non-negligible risk to invertebrates and fish in the waterway. The Ecological Risk Assessment (ERA) noted several uncertainties in its assessment of the effects of TBT on gastropod invertebrates (snails): low numbers of gastropods were collected in the LDW, and no females of the species *Nassarius mendicus* could be collected at several of the locations. One major effect of TBT on gastropods is imposex, which may indicate that this species may already have been affected by TBT in the LDW. Fish are also sensitive to low concentrations of TBT. The Ecological Risk Assessment found that concentrations of TBT in sculpin and shiner surfperch from the LDW were at least twice the literature-based no-effects level.

Response

Nowhere in the LDW ERA is risk to fish or invertebrates characterized as "negligible". However, based on several lines of evidence including imposex and tissue-residue comparisons, the ERA concludes that ecological risks from exposure to TBT are low.

EPA consulted with NOAA and incorporated their input during the design of the gastropod imposex study, which was unique in that risk was evaluated via field collection of in situ exposed gastropods and evaluation of adverse effects. No signs of imposex were found in 2 of the 3 species of neogastropods collected in large numbers on the LDW. The third species of gastropod collected that did exhibit signs of imposex was characterized at Stage 2 (according to methods of Oehlmann et al. 1991) representing a level of penis development in females which does not affect fertility/reproduction. Based on this information, the risk to gastropods currently present in the LDW from exposure to TBT appears to be low. Nevertheless, the data generated by this study did not definitively rule out the possibility that TBT in the waterway had already altered the distribution and abundance of neo- and mesogastropods. NOAA and EPA commented extensively on the interpretive limitations of this study, a discussion of which was included in the uncertainty section of the ERA.

For fish, the TBT TRV selected was based on the lowest adverse effects level ever observed in a fish (larval development in flounder). LOAEL HQs calculated using the upper confidence limit on the mean for TBT in tissue for both staghorn sculpin (0.23) and shiner perch (0.43) were less than 1. Although the NOAEL HQs exceeded 2 for both fish species, the fact that upper estimates of tissue concentrations in adult fish did not exceed a very protective effects-based TRV would indicate that it is unlikely that accumulated TBT poses a significant risk to fish in the LDW.

2.31.4 Comment: Shiner surfperch foraging ranges

LDWG commented that the ROD should provide references to support the statement that shiner surfperch have smaller foraging ranges. LDWG met with various fish experts during the RI development; none had specifics on shiner surfperch home ranges.

Response

EPA agrees that shiner surfperch foraging ranges are uncertain. The Proposed Plan statement cited in LDWG's comments does not appear in the ROD. The ROD states in Section 5.3.2: "Tissue PCB concentrations in benthic invertebrates were often higher in areas with higher sediment PCB concentrations. A similar pattern was observed for some species of fish (shiner surfperch, and staghorn sculpin) indicating that they may have smaller foraging ranges; in others (English sole and crabs), tissue concentrations did not show a clear relationship to sediment concentrations, indicating they may have larger foraging ranges."

2.32 Incorporation of Environmental Justice in the Proposed Plan

2.32.1 Comment: Support incorporation of environmental justice in the Proposed Plan

Comments from many individuals, groups, and businesses supported EPA's efforts to incorporate environmental justice considerations in developing the Proposed Plan and ROD. Boeing commented that notwithstanding their concern about certain aspects (see comments 2.32.10 and 2.32.11) of EPA's EJ Analysis, they support efforts by EPA and Ecology to assess and address potential disproportionate impacts of a sediment cleanup on local communities. Boeing and many other commenters stated their support for many of the recommendations in the EJ Analysis to mitigate adverse disproportionate impacts, such as improving traditional institutional controls to be socially and culturally relevant, enhanced educational outreach, green remediation, and the Superfund Job Training Initiative.

Response

EPA agrees.

2.32.2 Comment: Establish pollution prevention and mitigation fund

DRCC/TAG and many individuals and community members recommended establishing a mitigation or health revitalization fund to protect and revitalize the Duwamish Valley by addressing historical and ongoing cumulative health impacts, using funding from potentially responsible parties. The health revitalization fund could be employed to remedy health disparities by addressing impacts contributing to cumulative impacts (such as lack of parks, poor housing, transportation, jobs) until environmental exposures are reduced or eliminated. DRCC/TAG commented that the evidence of cumulative risks, environmental injustices, and health inequities among Duwamish Valley residents and river users (Tribes, non-tribal subsistence fishers) point clearly to the need to mitigate health impacts on the community until cleanup goals are met. One model for a health revitalization fund is that established for the Harbor Community Benefit Foundation (*http://hcbf.org*). The foundation is funded by the Port of Los Angeles to improve community health, access to open space, and economic opportunities until cumulative health impacts on the community from Port operations are reduced.

Response

EPA expects that voluntary efforts by interested parties to establish a fund to address cumulative health impacts could be very useful and commendable. Such a fund is beyond the scope of CERCLA remedy selection, but EPA would stand ready to coordinate implementation of the Selected Remedy with any such voluntary efforts, to the extent practicable.

2.32.3 Comment: Support offsets

DRCC/TAG and other individuals commented that EPA's cleanup order should ensure that people who fish in the Duwamish have access to healthy alternatives until the cleanup goals are met.

Response

EPA has not included the recommendation in the EJ Analysis to provide for fish trading or similar offsets in the ROD. Instead, as described in Section 13.2.8 of the ROD, EPA intends to gather recommendations

from a community advisory group on approaches to minimize impacts of the cleanup on the affected community. If the group recommends an approach to ensuring that people who fish in the Duwamish have healthy alternatives, and EPA, the parties implementing the cleanup, the community, Tribes and other stakeholders can find a workable approach to implementing the recommendations, EPA will consider selecting them in the future. See also response to comment 2.32.10.

2.32.4 Comment: Fish Advisories increase health inequities in impacted populations

DRCC/TAG commented that evidence is available in the scientific literature on how the "behavior change" imposed by fish advisories increases health inequities in impacted populations, including increases in obesity, diabetes, depression, and more (NEJAC 2002). Some people fish either because of a lack of financial resources or a desire to continue cultural traditions. Many of the people commonly observed fishing from the river are children and/or adults harvesting fish for consumption by their families, including children and women of childbearing age. They commented that risk avoidance strategies fail to actually protect human health, are unjust, and more expensive in the long run than just cleaning up the contamination in the first place. Adverse health impacts due to disrupting the fishing behavior and practices and their related costs are not given due consideration in Proposed Plan.

They believe statements in the Proposed Plan that "the preferred alternative is recommended because it is protective of human health and the environment….and minimizes reliance on institutional controls" are disingenuous and inaccurate, as both the Proposed Plan and the Environmental Justice Analysis acknowledge that institutional controls do not adequately protect the health of the targeted population.

There are at least three populations disproportionately exposed to contamination from the site:

1. Residents of South Park and Georgetown, predominantly low-income and minority neighborhoods adjacent to the LDW site and surrounded by Seattle's Industrial District;

2. Native American Tribes that have cultural resources, treaty rights, and/or actively fish in the LDW; and

3. Immigrant and low-income subsistence fishers.

Since residual cancer and non-cancer risks are expected to remain after remediation for several decades, these three populations will remain disproportionately exposed to contamination, and additional measures must be taken to protect their health. In addition to health risks from the river, these communities are exposed to cumulative stressors including poverty, air pollution, lack of health insurance, proximity to contaminated sites, limited environmental amenities and services, and food insecurity, all of which make them more susceptible to disease (Gould and Cummings, 2013; Daniell et al, 2013). EPA's decisions about institutional controls need to appropriately account for these cumulative impacts.

Response

Institutional controls are a necessary part of the Selected Remedy to reduce the potential for exposure while contaminant concentrations in fish and shellfish remain above the criteria for protecting human

health. However, EPA recognizes that limitations on seafood consumption negatively impact tribal and community members who rely on seafood as a protein source. The Proposed Plan and EJ Analysis acknowledged that fish advisories have limited effectiveness. To address these concerns, the ROD calls for minimizing reliance on seafood consumption advisories to the extent practicable, and formation of a community advisory group to provide input on how to make such controls and other communication tools as effective as practicable.

2.32.5 Comment: It is not clear how the EJ Analysis was considered in the Proposed Plan

DRCC/TAG commented that it is not clear how the EJ Analysis was considered in the development and evaluation of the remedial alternatives. DRCC/TAG further commented that EPA, in the Proposed Plan, inappropriately used the EJ Analysis to justify its preferred remedy. They commented that the Proposed Plan summarizes the findings of the EJ Analysis as: "EPA's Environmental Justice Analysis determined that the Preferred Alternative balances the need to reduce human health risks quickly while providing certainty that the methods used in the cleanup will be effective and will remain effective in the future." and that there is no reference to this determination in the EJ Analysis, and thus, that statement should be removed.

Response

Although the EJ Analysis was developed late in the RI/FS, EPA considered environmental justice throughout the RI/FS, including consideration of Tribal and Asian Pacific Islander seafood consumption rates in the development of exposure scenarios for the HHRA and in the development of cleanup levels for the Site. Impacts to low income and minority LDW community members and Tribes were also considered as part of evaluation of cleanup alternatives using the nine CERCLA evaluation criteria, in particular the evaluation of overall protection of human health and the environment, short-term effectiveness, long-term effectiveness and permanence, community acceptance, and state/Tribal acceptance.

EPA also engaged in enhanced community involvement activities throughout the RI/FS, as described in Section 1 of this Responsiveness Summary, to obtain input from low-income and minority community members. EPA developed the EJ Analysis, the first in the country for a Superfund site, at the request of community members. The EJ Analysis evaluated the rate at which each alternative was projected to reduce human health risks, and Alternatives 5C, 5C Plus, and 6C were found to have the largest decrease in cancer risk for all populations over the shortest timeframe, and 5C Plus (the Preferred Alternative in the Proposed Plan and the Selected Remedy in the ROD) reduced the cancer risks most quickly for tribal children . Option 5C Plus (along with options 3C and 4C) had the fewest overall short-term impacts, which are of significant concern to community members who live along the LDW. The adaptive management approach outlined in 5C Plus (and the Selected Remedy) will also ensure that any methods used in cleanup will be effective in the long term.

2.32.6 Comment: Proposed Plan does not address health inequities

DRCC/TAG, along with many individuals and community members, commented that they do not think EPA went far enough in incorporating environmental justice principles in its preferred remedy. Some

commenters stated that in not selecting a more comprehensive remedy for the LDW, EPA is not going far enough to address risks to disproportionately impacted communities, including those who use the river as subsistence fishers. Some commenters felt the Preferred Alternative did not adequately address treaty rights for fishable waters for tribal fishers. One commenter stated: "The cleanup project is not only about environmental cleanup, it is about social justice, racial justice, and human rights. An incomplete cleanup harms most low-income folks and people of color. Do the right thing and do the whole job."

DRCC/TAG commented that in order to address health inequities that are caused or contributed to by the Superfund site, differences in health impacts between exposure to the Duwamish River and the rest of the region need to be remedied. They disagree that the Proposed Plan represents a reasonable balance of cost, health protectiveness, and certainty that the cleanup will be effective. They believe the analysis views investment in cleanup through a lens that interprets increasing investments as having diminishing returns. This analysis fails to recognize the inequity of this lens, as the people who will not be protected by the proposed cleanup plan are those who already have the greatest health disparities and are most exposed and vulnerable to contamination that will remain in the river's sediments. Rather than a lens that says, for example, "$300 million gets us 90% removal; another $300 million will only get us 10% cleaner – it's not worth it," a health equity lens would see the first $300 million as protecting environmental receptors and recreational river users, and the second $300 million as protecting Tribal members and subsistence fishermen. The investments needed to attain the greater level of protection would be made in upriver pollution source control and removal of more contaminated sediments from the river, which together would result in a more certain, permanent and health protective cleanup.

Response

EPA considered risks to disproportionately impacted communities by using seafood consumption rates of tribal populations who consume larger quantities of fish and shellfish in assessing risks and making cleanup decisions for the In-waterway Portion of the Site (see ROD Section 7.1). EPA has also considered the risks to disproportionately impacted communities who live, work, and play in the LDW area. EPA has selected a remedy that EPA believes will fully address threats to recreational users of the LDW. EPA has selected a remedy for the LDW that EPA believes goes as far as is practicable to reduce risks through in-waterway cleanup and source control and minimizes the use of fish advisories to reduce exposures. As discussed in ROD Section 13.1, EPA's analysis indicates that additional investment in cleanup for the In-waterway Portion of the Site will not result in greater protection of human health and the environment.

2.32.7 Selected Remedy must address disproportionately impacted communities

Many commenters emphasized that protection of low-income, immigrant, homeless, and tribal communities should be of paramount importance in selecting a remedy for the LDW. Some commenters stated that for justice to be served the cleanup needs to make sure that the community surrounding the LDW be just as protected from environmental and health hazards as any other neighborhood in Seattle no matter its socioeconomic and racial demographics. Other commenters stated that, based on the findings of the EJ Analysis, the remedy must address disproportionate impacts to tribal health.

One commenter stated that the South Park neighborhood has demonstrably lower life expectancies than other Seattle neighborhoods and that "the synergistic contributions of numerous unhealthy exposures all

play a part. This poor, highly diverse neighborhood deserves vigorous efforts to protect a most vulnerable population. The largest percentages of South Park residents are children who should live where it is safe to play on the mud flats at low tide without shortening their lives."

Response

EPA agrees that a Superfund remedy in this community should be at least as protective as for any other community regardless of its socioeconomic or demographic makeup. See response to comment 2.32.6.

EPA recognizes the diversity of LDW community members and the potential for disproportionate impacts on them from stressors including environmental pollution. Accordingly, EPA has specifically carried out its community engagement efforts during the course of the LDW RI/FS to ensure opportunities for meaningful involvement by all stakeholders, including members of immigrant, low-income and Tribal communities. As the Selected Remedy moves forward to remedial design and implementation, EPA will welcome continued input on how to improve on its efforts to engage members of the LDW community in a meaningful way.

2.32.8 Comment: Implement recommendations of health impact analysis

One commenter submitted a Health Impact Analysis (HIA) prepared by University of Washington, Just Health Action, and DRCC/TAG as a public comment on the Proposed Plan. The HIA contained the following recommendations for EPA:

Construction measures

• Negotiate transport routes and associated mitigation measures for cleanup-related truck and rail traffic with potentially affected residents.
• Use modern clean engines or those with best available emission controls, cleanest available fuels, and "green remediation" techniques to minimize air emissions, plus effective noise and light minimization measures during active cleanup.

Jobs for community members

• Provide cleanup job training and placement assistance to local community members.

Institutional controls

• Apply institutional controls, including educational signage and washing stations, at local beaches until health protective standards are met.
• Institutional controls should go beyond restrictive and informational actions, such as fish advisories. Interventions should emphasize positive alternatives, such as identifying, encouraging, and providing options for safe fishing and healthful fish consumption. There is a clear need for innovative thinking.
• Efforts to promote safer fishing should acknowledge that the target audience is more than just people who currently fish on the Duwamish River, and should include people who may fish there in the future.
• All efforts to provide information and promote safe and healthful fishing options should: a) be culturally appropriate for each audience, b) be designed to help people make informed choices, and c) engage and empower people to participate meaningfully in planning, implementation, and monitoring for success.

• Follow EPA guidance for institutional controls, especially to evaluate them as rigorously as other alternatives.
• Evaluate the true health impact of institutional controls to vulnerable populations.
• Develop a robust Institutional Controls Program Implementation Plan to protect all vulnerable populations who consume seafood from the Duwamish River, to be funded by Potentially Responsible Parties as long as institutional controls are in effect.

Actions to protect Tribal health
• Collaborate with Tribes to more fully address their health concerns about the river cleanup.
• Restore Tribes' traditional resource use in accordance with Treaty Rights.
• Ensure that site-related institutional controls are temporary, not permanent.
• Establish a "Revitalization Fund" to enhance Tribal empowerment and health, until institutional controls are removed.

Response

EPA appreciates the many thoughtful comments and ideas included in the Health Impact Analysis and agrees with many of the specific recommendations. EPA agrees, for example, that the cleanup of the LDW would likely benefit from innovative thinking, cultural competence, "green" technologies, and local hiring. As EPA moves forward with remedial design and remedial action in the LDW, EPA looks forward to implementing many of these suggestions to the extent they are consistent with CERCLA and the NCP and welcomes continued input from commenters including proponents of these ideas.

See also the following responses to other comments that address these topics:

- Work with the community to mitigate impacts of construction on the community – 2.17.3
- Use green remediation techniques - 2.17.3;
- Provide jobs to community members - 2.2.6;
- Employ appropriate institutional controls - 2.24.1 and 2.32.4; and
- Protect Tribal health, establish revitalization fund - 2.32.2, 2.3.7, 2.32.6, and responses to comments in Sections 3.9 and 3.10.

2.32.9 Comment: Health Impact Assessment recommendations should be interpreted with caution

Anchor QEA commented that the health impacts discussed in the Health Impact Assessment (HIA) dated May 2013 and prepared by the University of Washington School of Public Health, Just Health Action, and the Duwamish River Cleanup Coalition, such as heart disease, childhood asthma, lung cancer, diabetes, and death from stroke are primarily related to urban pollution sources from highway traffic, port activities, and industrial facilities, not contaminated sediments. They asked that in considering the public comments requesting more dredging and more capping based recommendations in the HIA, EPA be careful to identify which health risks may be reduced by the sediment cleanup and which risks are unrelated to sediment contamination. They asked that EPA also consider the additional costs that are associated with the mitigation measures and best management practices recommended for implementation of the cleanup by the HIA and whether use of such measures will appreciably improve health impacts that already exist in the surrounding neighborhoods due to sources outside the Site. They believe that many of

the other recommendations in the HIA are beyond the scope of EPA's authority in conducting the cleanup of the Site.

Response

The HIA was submitted as a public comment on the Proposed Plan. In considering it and all other public comments, EPA considered whether the measures recommended in the HIA were necessary and appropriate to address the risks posed by LDW contamination consistent with EPA authorities under CERCLA. As discussed in the response to comment 2.32.8, many of the recommendations of the HIA are included in the ROD, but some are not because they are beyond the scope of CERCLA or inappropriate for this site.

2.32.10 Comment: Offsets are not authorized as part of CERCLA

Boeing commented at considerable length that EPA's EJ Analysis (an appendix to the Proposed Plan) recommends actions (offsets) "that are not authorized by CERCLA and cannot be included in the ROD (and) are bad public policy." The EJ Analysis defines "offsets" as "mitigations which consist of the temporary substitution of healthier seafoods or bolstering of healthier seafoods as alternatives to consuming contaminated resident seafood." These offsets include direct compensation for lost fishing access, enhanced habitat restoration solely as mitigation, and substitute seafood.

With this as background Boeing's comments are further summarized below:

- EPA does not point to or cite to any authority in CERCLA, MTCA or the NCP to support requiring an alternative fish supply requirement (or offsets more generally). "The plain language and structure of CERCLA, the implementing regulations, and EPA's own guidance do not support (EPA's "offset" recommendation). … The NCP requires EPA to only consider nine specified criteria when selecting a cleanup alternative. … (The Proposed Plan) incorrectly adds the EJ analysis to the CERCLA-required modifying criteria, state/tribal acceptance and community acceptance."
- "Congress provided EPA with limited authority to require one, and only one, natural resource substitution -- the "provision of alternative water supplies"--as part of a removal or remedial action. 42 U.S.C. § 9601(23), (24) (definitions of "remedial action" and "removal action")."
- "Congress vested federal and state natural resources trustees (subject to Executive appointment) with authority over damages to natural resources…. Accordingly, EPA has no authority under CERCLA to require the provision of substitute natural resources other than alternative water supplies….EPA has never issued any guidance explaining its authority or process for implementing any other resource substitution action -- because EPA does not have authority to require such substitutions….Moreover, the recommendation to include offsets interferes with the oversight and settlement authority of the designated Natural Resource Trustees."
- "Fish offsets (either in the form of a substitute fish source or compensation for lost fishing) are not authorized as institutional controls under CERCLA. Institutional controls are (1) non-engineering controls that prevent or limit exposures to hazardous substances, (2) not active response measures such as treatment or containment, and (3) supplement engineering controls. See 40 CFR 300.430(a)(1)(iii)(C)-(D). Providing an alternative fish source does not fit this definition of 'institutional control.' Under the NCP, institutional controls limit the use of

resources, such as through water use and deed restrictions or fish advisories. Requiring compensation for lost fishing at the LDW is not a land or resource use restriction and is not an institutional control as defined by the NCP." A 2000 EPA fact sheet describes four categories of institutional controls, proprietary controls, enforcement and permit tools, government controls and informational devices. "The offsets recommended by the EJ Analysis do not fit within these categories…."

- Washington's Model Toxics Control Act (MTCA) "similarly does not authorize the proposed alternative fish requirement (offsets). MTCA defines 'institutional controls' as 'measures undertaken to limit or prohibit activities that may interfere with the integrity of a remedial action or result in exposure to or migration of hazardous substances at a site.' RCW 70.105D.020(l5)….Compensation or substitution for lost resources is not a 'measure undertaken to limit or prohibit' an activity at the LDW site, and thus may not be implemented as an institutional control under MTCA. See RCW 70.105D.020(15)."
- Fishers "who exchange LDW seafood for similar species harvested from other 'uncontaminated' areas would still be exposed to unacceptable risks if consumed at the reasonable maximum exposure (RME) rates assumed (for the LDW). Unfortunately, fish all over the world -- including nonurban areas of Puget Sound -- contain sufficiently high concentrations of contaminants as a result of global atmospheric transport to exceed acceptable risks if consumed at the RME rates assumed (for the LDW)." Chinook salmon from Oregon and Southeast Alaska contain PCB concentrations of approximately 10 parts per billion, about the same as bottom fish from non-urban areas of Puget Sound. See Table B-10. PCB concentrations in substitute seafood would have to be several orders of magnitude lower--approximately 0.42 to 2.3 parts per billion--to sufficiently reduce risk to consumers ingesting fish at the assumed RME rates.

Response

EPA does not agree that it does not have the authority to select offsets (such as fish trading) and EPA does not consider offsets as contrary to sound public policy. EPA recognizes, however, that there would be a number of administrative and other challenges in implementing offsets and for that reason did not include them in the ROD. EPA intends to work with a community advisory committee, and if this committee recommends offsets, and EPA, the parties implementing the cleanup, the community, Tribes and other stakeholders can find a workable approach to implementing offsets, EPA will consider selecting them in the future. EPA agrees that an EJ Analysis is not a separate criterion for CERCLA remedy selection. EPA does maintain that considering it as part of the NCP nine criteria for remedy selection is an appropriate means of implementing Executive Order 12898 which directs federal agencies to identify and address in federal actions to the maximum extent practicable environmental justice concerns in minority populations and low income populations.

Boeing stated in its comments that: "Boeing supports efforts by EPA and (Ecology) to assess and address potential disproportionate impacts of…cleanup on local communities. Boeing also supports many of the recommendations in the EJ Analysis to mitigate adverse disproportionate impacts, such as improving traditional institutional controls to be socially and culturally relevant, enhanced educational outreach, green remediation, and the Superfund Job Training Initiative." EPA appreciates this support and emphasizes that formal EJ analyses for Superfund cleanups and the potential selection of offsets as part of, or in conjunction with, such cleanups are new. The LDW EJ Analysis was the first EPA has published

for a Superfund site. As Boeing correctly noted in urging "EPA to clarify the role of the EJ analysis in the agency's consideration of alternatives and remedy selection," there is to date no published Superfund guidance or policy on the selection and/or implementation of offsets. Among implementation difficulties for fish trading or a similar offset for the LDW is that it might have the unintended consequence of increasing fishing in the LDW, if a contaminated resident fish caught from the LDW were required for a trade. Further, regardless of whether a fish were required for trade, it would be difficult for an offset provider to know whether a potential offset recipient would have fished in the LDW for resident fish or shellfish if no offset were available.

The remainder of this response is to address what EPA sees as errors in Boeing's analysis. First, the definitions of removal and remedial action in Sections 101(23) and (24) of CERCLA both clearly state that these terms include, but are not limited to, among other listed examples, the provision of alternative water supplies. Boeing correctly cites the general principle of statutory construction that every word and every exclusion in a statute has a purpose or should be given effect, but then appears to argue that not merely the word "include" but the express addition of "not limited to" means "one and only one." Boeing also characterizes the provision of alternative water supplies not as removal or remedial action but as a "natural resource substitution." Neither definition makes this characterization. Both definitions refer to the provision of alternative water supplies as removal or remedial action. EPA maintains that this language readily supports response actions that are not expressly listed, including the provision of alternative food supplies in appropriate circumstances. These definitions also include the "provision of…temporary evacuation and housing of threatened individuals not otherwise provided for" (for removals) and "the costs of permanent relocation of residents and businesses and community facilities" as may be necessary to protect public health or welfare (for remedial action). These measures emphasize the breadth of CERCLA response action selection authority, consistent with numerous expressions of this sort of broad Congressional intent in CERCLA legislative history.

Second, characterization of the provision of alternative water supplies (or food supplies) as a "natural resource substitution" in EPA's view misses the purpose of the inclusion of such a remedy component within the removal and remedial action definitions. The authority given to natural resource trustees to pursue natural resource damages, including damages to water and fish, is not what EPA would be exercising in selecting a fish trading or a similar offset. Wholly consistent with its delegated CERCLA authority, EPA would be protecting human health by preventing or limiting exposure to contaminated resident fish and shellfish, particularly during a period when seafood tissue concentrations of hazardous substances may be temporarily elevated as a result of other environmental response activities. This would directly parallel what EPA is doing when it provides alternative water supplies to prevent or limit exposure to contaminated water, which is expressly authorized by CERCLA as Boeing states. In neither case is EPA addressing natural resource damages, or as Boeing has attempted to characterize it, providing a "natural resource substitute."

Third, the NCP does not expressly define institutional controls in 40 CFR 300.5, its definition section. In 40 CFR 300.430(a)(1)(iii)(D) in a statement of Agency expectations in developing appropriate remedial alternatives, to which Boeing refers to in describing what it characterizes as the NCP definition, institutional controls are contrasted with engineering controls as follows. "EPA expects to use institutional controls such as water use and deed restrictions to supplement engineering controls as

appropriate for short- and long-term management to prevent or limit exposure to hazardous substances, pollutants, or contaminants." In this way, the NCP may be seen to characterize non-engineering measures that prevent or limit exposures, such as alternative water or food supplies, as institutional controls. It is difficult to see how this provision of the NCP can be said to exclude this characterization. As Boeing notes, EPA agrees that institutional controls are typically categorized or summarized by EPA as proprietary, enforcement, governmental or informational tools or controls. However, EPA cannot see whether fish trading or similar offset (or the provision of alternative water supplies) may be better categorized as active or passive response action, or as institutional controls rather than engineering controls for what may be administrative ease or preference, or for any other reason, makes any difference. Such remedy components are clearly within EPA authority to select where appropriate, as set forth above in the statutory definitions of removal and remedial action. EPA also agrees that MTCA authority is similar to CERCLA authority with respect to offsets, and that Ecology has broad authority to employ such remedy components where appropriate.

Fourth, EPA maintains that the exchange of a substantially cleaner, but not contaminant-free fish for a more contaminated resident LDW fish remains a viable protective measure for persons who would otherwise consume the more contaminated LDW resident fish. The fact that the less contaminated fish is not contamination-free does not in any reasonable way in EPA's judgment refute the validity of such an offset.

Lastly, EPA sees no basis for Boeing's allegation that providing fish trading or a similar offset to prevent or limit exposures to more contaminated LDW resident seafood in any way interferes with the oversight and settlement authority of the designated Natural Resource Trustees. EPA notes for the record that none of these trustees has made a similar comment or argument. Tribal resistance to offsets is premised on the significance of fishing to tribal life and culture, and a resulting opposition to anything that suggests limitations on sufficient remediation of releases of contaminants to allow for the full exercise of tribal treaty-secured fishing rights.

2.32.11 Comment: Disagree with advisory group recommendation

Boeing commented that the recommendation to form and fund an advisory group to facilitate community involvement in mitigation development is poorly conceived and must not be a component of the final remedy. Boeing stated that the EJ Analysis does not provide any details as to the proposed advisory group's participants, objectives, role in remedy implementation, or authority, and does not explain when the advisory group would no longer be necessary, and that without these details, stakeholders and cleanup parties cannot reasonably comment on the appropriateness of forming and funding the group as part of a CERCLA sediment cleanup. Boeing also commented that: 1) From the vague description of the advisory group in the EJ Analysis, it does not appear that stakeholders and potentially responsible parties will have the opportunity to comment on the group's recommendations or directives after it is formed. 2) It is unreasonable to expect potentially responsible parties to commit public and private resources to an advisory group with an undefined mission and an unclear role in remedial design and implementation. 3) It would be arbitrary and capricious to require as a component of the selected remedy funding for an advisory group that has an undefined scope of authority, unexplained objectives, and no endpoint.

Other commenters stated that the draft EJ Analysis seems to ask for deferring important decision-making roles to "community experts," where CERCLA requires such decisions generally to remain with the

agency, consistent with the NCP. When, as here, there appears to be a parallel process that is at odds with the Proposed Plan and outside of the legal framework of CERCLA, it is hard for commenters to know exactly what the ultimate plan will call for and how much it will cost.

Response

EPA has a long history of working with community advisory groups to obtain input from community members prior to and during implementation of CERCLA remedies, including throughout the LDW RI/FS. As is typical, EPA expects that the participants, objectives, and roles for the advisory group will be defined, at least in part, by the members themselves. A community advisory group does not supersede EPA's authority. EPA retains the authority to determine what recommendations from the group would be implemented within its authority under CERCLA. If implementation of any recommendations would constitute a significant change to the remedy, EPA will issue a ROD amendment or ESD to document these changes.

2.33 Public Participation

2.33.1 Comment: Public meeting format and language

EPA received many comments about the public meetings that EPA hosted to take comments on the Proposed Plan. The majority of comments about the number, format, and accessibility of the public meetings were positive. Some commenters objected to EPA's decision to hold one public meeting entirely in Spanish, while others praised this decision.

Response

EPA held five public meetings at different times of day, in Georgetown, South Park and downtown Seattle, in order to accommodate a variety of schedules and transportation needs. Spanish and Vietnamese simultaneous translators were available at four of the meetings and one meeting was held in Spanish with English simultaneous translation.

The agency offered a public meeting in Spanish because a large number of residents in the Duwamish Valley, especially in South Park, are native Spanish speakers. The goal was two-fold:

a) engage residents who might not otherwise learn about and comment on the Proposed Plan and,

b) raise awareness within this sector of the population of the risks associated with contaminated fish and shellfish in the Lower Duwamish Waterway.

Despite signage along the Waterway, many people continue to fish and consume fish from the Waterway – an especially risky practice for pregnant women and children. The Spanish language public meeting was consistent with the Agency's environmental justice goals of protecting health in communities disproportionately burdened by pollution and of empowering communities to improve their health and the environment.

2.33.2 Comment: Future communication with the public

A number of commenters expressed ideas and concerns about the way EPA will communicate and engage with the public about the cleanup in the future. EPA was requested to keep community members, Tribes, and the community advisory group informed about the status of the cleanup. EPA was encouraged to use traditional as well as non-traditional communications channels, especially when addressing the topic of consumption of contaminated fish and shellfish.

Response

EPA has been working with and through a variety of organizations and methods to update community members, Tribes, and other interested groups about the status of the cleanup plan and to seek their input. The agency will continue this effort throughout the cleanup process. EPA understands that seeking early input from stakeholders is a necessary component of a successful cleanup. Formal and informal consultation with the Muckleshoot and Suquamish Tribes will continue.

EPA has, in partnership with health and environmental agencies at the federal, state, and local levels supported the development of consistent and clear messaging about fish and shellfish contamination in the Lower Duwamish Waterway. These agencies focus on encouraging those who fish from the Lower Duwamish to eat only salmon and to not eat other fish or shellfish from the Waterway. To date, the agencies have used a variety of channels including Spanish-language radio and Sea-Mar clinic to disseminate information about Duwamish fish contamination. EPA will continue to work with community-based groups, including the site's Community Advisory Group (DRCC/TAG), because community groups will continue to be critical to the success of creating an informed public.

3 Comments from the State and from Tribes

This section includes the full text of comments from Ecology and from federally recognized Tribes and EPA's responses to their comments. In some cases, similar comments are grouped under a common heading; in other cases, each comment is given a separate heading. In the comments from Ecology, some of the headings were included in the original comments; others have been added to indicate organization of the comments. In the comments from the Suquamish Tribe and the Muckleshoot Indian Tribe, headings and comments are verbatim from the comment letters, except where indicated with square brackets that show where headings were added.

Some of the comments that were similar to those submitted by others were also included in Section 2; in those cases, the comment is provided here and a cross reference is provided to the corresponding response in Section 2.

Water Quality Comments — Washington State Department of Ecology

3.1 Ecology comments: Acknowledge the Relationship Between the CERCLA Sediment Cleanup and Clean Water Act Obligations

3.1.1 Comment: The proposed CERCLA remedial action will not result in the attainment of designated uses and applicable water quality standards in Washington State.

- Section 5.3, page 42, of the Plan states: "It is EPA's expectation that once all anticipated action for the Site has been implemented, COC concentrations in the sediment, surface water, and fish and shellfish tissue will be protective of all anticipated uses." In addition, the Plan states the "actions" referenced in the sentence includes institutional controls to limit fish and shellfish consumption. The ROD should

describe that the Plan's stated expectation is incongruent with Clean Water Act objectives and existing designated uses.

Response

The sentence above quoted from the Proposed Plan does not appear in the ROD. The sentence referred to all anticipated action for the Site, including all early actions and all source control in addition to the Preferred Alternative for the in-waterway portion. In the quoted sentence, meaning of the word "uses" is consistent with CERCLA usage. Meeting CERCLA cleanup requirements is not the same as "attaining" Washington's designated uses under the Clean Water Act that are identified in WAC 173-201A-602. The ROD does briefly discuss designated uses for the LDW according to the Clean Water Act in Section 6.2, Waterway Use.

The Selected Remedy in the ROD is one component of several efforts to protect fish consumers and aquatic life within the LDW. Under the Clean Water Act, pollutants in the water column are also addressed through the NPDES permitting program and the CWA §303(d) program.

EPA anticipates that the CERCLA Remedial Action, in conjunction with other ongoing regulatory efforts by EPA and Ecology, such as the PLA (EPA and Ecology 2014), will reduce contaminant loading and significantly improve water quality in the waterway.

3.1.2 Comment: Ecology, per EPA's delegated authority under the Clean Water Act, is obligated and will continue to implement Clean Water Act programs, including NPDES permitting, water quality assessment 305(b) and 303(d) reports, and Total Maximum Daily Loads (TMDLs) or other water pollution control plans

- EPA should acknowledge the CWA obligations are distinct from endpoints established under the CERCLA sediment cleanup effort. The sediment remediation will contribute toward Clean Water Act goals and objectives but will not independently meet them.

Response

EPA agrees with Ecology's statement of its Clean Water Act obligations, and acknowledges that CWA obligations are distinct from the endpoints of the Selected Remedy.

3.1.3 Comment (continued)

- Please be aware of the implementation challenges that Ecology and EPA will face as a result of EPA's selection of various media cleanup levels. It is entirely possible that LDW cleanup levels will influence NPDES permit conditions. However, the practical effects are not known at this time and may only be determined on a permit specific basis. With EPA oversight, NPDES and state Waste Discharge Permits issued by Ecology are done so in accordance with several Washington Administrative Codes (WACs). These WACs specify the relevant information that must be considered in the development of permit effluent limitations. Such information includes but is not limited to, where relevant: all known available and reasonable methods of prevention, control, and treatment; pretreatment requirements; limitations to meet water quality standards, implement total maximum daily loads, and meet any federal law or regulation other than the FWPCA (aka Clean

Water Act). Refer to the following WAC citations for additional information: WAC 173-220-130, WAC 173- 216-110 and WAC 173-226-070. Additional information is available in the Permit Writer's Manual available online at http://www.ecy.wa.gov/programs/wg/pennits/guidance.html. A specific task that will help with these issues is for EPA to work with Ecology in providing a "reasonable potential" methodology to determine whether a discharge presents a risk to post-remediated sediments.

Response

As noted in many prior responses (see responses to comments in Section 2.3), the ROD does not select any surface water or tissue cleanup level; all cleanup levels for the Selected Remedy are for sediments. See Section 8.2 of the ROD for a discussion of cleanup levels, ARARs, and fish and shellfish target tissue concentrations. Coordination between agencies will remain important throughout the remedy design, implementation, and monitoring phases of the Selected Remedy for the In-waterway Portion of the Site. However, developing methodologies to determine whether a discharge presents a risk to post-remediated sediments appears beyond the scope of the Selected Remedy. As previously noted, EPA has supported Ecology in the development of the Green/Duwamish River Watershed Pollutant Loading Assessment EPA and Ecolology 2014). When development of the PLA watershed model is completed, EPA anticipates that the model will have the capacity to assess relative contribution of pollutants from various sources and pathways to the LDW, and inform the development of targets and strategies for reducing those sources of pollution.

3.1.4 Comment (continued)

- Furthermore, care should be exercised to avoid the immediate assumption that surface water and tissue PRGs, if established as cleanup levels by EPA under a CERCLA ROD, would be the most stringent criteria applicable to NPDES permits. This may not always be the correct assumption. A fundamental difference between cleanup regulation and water quality regulation requirements is that NPDES permitting is predicated on meeting water quality standards, while CERCLA and MTCA/SMS cleanup levels may be set at background levels or practical quantitation limits.

Response

As noted above, the surface water and tissue PRGs in the Proposed Plan were not established as cleanup levels in the ROD. EPA agrees with the stated difference between CERCLA or MTCA cleanup decisions and implementation and water quality regulation.

3.1.5 Comment: EPA suggests that a technical impracticability (TI) waiver is a potential future outcome under CERCLA.

- It is not clear whether a TI waiver under CERCLA is paralleled with a Use Attainability Analysis (UAA) under the Clean Water Act. Ecology believes there is a potential relationship between these two regulatory tools. At this time, it is not known if use of either such tool is appropriate. However, it is possible that water quality criteria for bioaccumulative toxic compounds based on the protection of human health for unrestricted consumption of fish will be unattainable in the near term and potentially the long term, as EPA acknowledges in the Plan. It is therefore important that EPA similarly acknowledge that potential future designated use changes may be necessary. Changing designated uses for the LDW would offer a pathway towards compliance with water quality standards

should a TI waiver be necessary due to background concentrations from ubiquitous and world-wide sources. Ecology requests that EPA develop UAA guidance specific to changing fish/shellfish consumption-related uses in the LDW. Such guidance should be developed with input from the state, Tribes and other stakeholders. This would help LDW source control efforts aimed at attaining applicable water quality standards and designated uses.

Response

Any consideration or discussion of revising a Clean Water Act designated use via Use Attainability Analysis is beyond the scope of CERCLA remedy selection. The ROD requires long term monitoring of the sediment, water column, and fish and shellfish tissue throughout the active remedial and natural attenuation phases of the Selected Remedy. The uncertainties inherent in modeling conditions into future decades are such that whether, and to what extent, ARARs are met will be determined empirically as data become available.

Cleanup Comments — Washington State Department of Ecology

3.2 Ecology Comments: Plan Needs Discussion of New Sediment Management Standards (SMS), Including How Sediment Recovery Zones (SRZs) Will Be Used and Regional Background Will Be Addressed

3.2.1 Comment: The state has adopted a rule revising Part V of the SMS rule, which will go into effect September 1, 2013.

- Ecology anticipates that the ROD will reference the "new" SMS rule.

Response

EPA agrees. The ROD references the SMS rule that went into effect September 1, 2013, explains the relationship between terminology used in the previous SMS and in the 2013 SMS, and explains how SMS related to the Proposed Plan (which was issued before the 2013 SMS took effect) and how the 2013 SMS relate to the ROD.

3.2.2 Comment: New SMS rule will clarify requirements for cleanup of contaminated sediments under MTCA and the Plan needs to reflect this improvement.

- One of our concerns is that while the Plan states that it based the sediment PRGs off the SMS rule, it did not provide the necessary details to explain how the PRGs were set. Ecology encourages EPA to clearly state how the PRGs levels were set using the factors in WAC 173-204-560. In particular, for bioaccumulative contaminants, human health risk should always be a factor used along with conservative assumptions unless substantial evidence shows that is not a pathway. For example, the Plan discusses that no sediment PRGs were identified for arsenic or cPAH for the human health seafood consumption pathway because data did not indicate a relationship between arsenic or cPAH concentrations in sediment and in clam tissue. More detail is needed if this assumption is to be accepted. In particular, whether the clam tissue used in the study were sediment ingestors or filter

feeders. There is a need to be conservative in estimates, so the assumption would be that any chemical concentration in the tissue is from sediment. And finally, the SMS rule requires in review of the Reasonable Maximum Exposure (RME) that current and potential use be considered. There is a need to consider both the fish/shellfish at the site and also those that potentially could be there.

Response

The ROD, supported by the RI and FS reports, provides information to support EPA's selection of cleanup levels consistent with the factors described in WAC 173-204-560. The substantive requirements of the new Part V of the SMS are explained in ROD Section 5.3.1 and other sections, and will be implemented as ARARs which are the basis for the cleanup levels for the Selected Remedy. Section 8.2 in the ROD, along with other sections, explains how compliance with these requirements will be achieved. Specifically, EPA considered risks to humans, higher trophic-level species, and benthic invertebrates, consistent with the SMS, the risk assessments in the RI, and the risk-based threshold concentrations developed as part of the FS. In the ROD, EPA selected the lowest cleanup levels needed to protect all of these receptors for each COC, then revised cleanup levels upward to natural background where natural background concentrations are higher than risk-based threshold concentrations, consistent with the sediment cleanup objectives (SCOs) of the SMS. Ecology is correct that EPA did not set cPAH and arsenic sediment cleanup levels protective of humans consuming clams. The ROD (in Section 13.2.3) does call for conducting research to further assess the relationship between arsenic and cPAH concentrations in sediment and in clam tissue, and to assess whether remedial action can reduce clam tissue concentrations to achieve RAO 1. EPA anticipates that implementation of the Selected Remedy, along with implementation of source control actions, will achieve the RAO 2 (direct contact) cleanup levels for arsenic and cPAHs, which will also result in lower clam inorganic arsenic and cPAH concentrations that will achieve RAO 1 the extent practicable; however, at this time, the amount of reduction is uncertain. If EPA determines, based on these studies, that additional remedial action is needed to reduce clam tissue arsenic and cPAH concentrations for the purpose of achieving RAO 1, EPA will document and select those actions in a future decision document.

3.2.3 Comment (continued)

- The SMS rule also requires review of impacts to higher trophic level species, which includes fish, as part of the Ecological Risk Narrative (WAC 173-204-564). This is one of the factors used in setting cleanup levels, and it should be more clearly stated how that factor was reviewed by EPA. [Ecology inserted a flow chart describing the process for establishing cleanup levels. This flow chart appears in Section 5.3.1.1 of the ROD.]

Response

The ROD establishes a cleanup level to protect river otter (see ROD Section 8.1.2) and determined that the cleanup levels to protect human health and benthic invertebrates would also protect other higher trophic level species. See response to comment 3.2.1.

3.2.4 Comment (continued)

- A new aspect of the SMS rule is the use of regional background as a factor in setting cleanup levels. Ecology has not determined a regional background for the Lower Duwamish River, and therefore the regional background may be established at natural background at this time. The agencies should

consult to determine if it would be appropriate to compile and collect sufficient sampling data to establish regional background and how that might be best accomplished.

Response

The ROD explains in Section 8.2 that under the revised SMS, cleanup levels may be adjusted upward to regional background or other CSL-based cleanup levels if it is not technically possible to meet SCO-based cleanup levels or to do so will have a net adverse impact on the aquatic environment, WAC 173-204-560(2)(a)(ii)(A) and (B). The ROD states that there is insufficient information at this time to determine whether it is technically possible to achieve the SCO-based cleanup levels selected in this ROD and that neither EPA nor Ecology has established regional background for the LDW. It further states that if EPA determines that the In-waterway Portion of the Site meets the conditions for upward adjustment of the cleanup level for any COC from its selected SCO level to a CSL level, EPA will issue a ROD Amendment or ESD adjusting those cleanup levels. See also Section 2.6 of this Responsiveness Summary.

3.2.5 Comment (continued)

- An aspect of the SMS rule, which was not addressed in the Plan, is the need for SRZs. The new SMS rule clarifies that a SRZ is required if the selected cleanup action cannot achieve sediment cleanup standards within 10 years after completion of construction of active components of the cleanup action. Since it is known that cleanup standards will likely not be met within the 10 year timeframe, particularly the human health cleanup levels, then the SRZ must be documented in the Cleanup Action Plan (in this case, the ROD) and incorporated in any order or decree. Requirements for a SRZ are located in WAC 173-204-590.

Response

EPA interprets all requirements for sediment recovery zones (SRZs) in the 2013 SMS as administrative and not substantive, and therefore not as ARARs. SRZs appear to EPA to require no more stringent cleanup or monitoring than CERCLA requires, with the substantive requirements of the SMS as ARARs. WAC 173-204-590 requires establishment of an SRZ for any portion of a selected cleanup action that cannot achieve sediment cleanup standards within ten years after completion of construction of the active components of the remedy, or if performance monitoring or periodic review indicates the cleanup action is not projected to achieve cleanup standards within ten years after completion of the active components of the remedy. However, while SRZs provide a sensible administrative means of focusing on areas where cleanup standards may not be timely attained, there appear to be no substantive environmental requirements beyond an unspecified degree of monitoring until cleanup standards are achieved and the administrative designation may be removed (or maintained if they are not achieved). Although the ROD does not use the term "sediment recovery zone", it contains provisions for monitoring areas where the cleanup standards have not been met and considering additional action if they are not projected to be met, consistent with WAC 173-204-590.

3.3 Ecology Comment: Site Monitoring Needs to be Expanded in the Plan

3.3.1 Comment: There are mutually beneficial, substantial, multi-media monitoring needs to provide early information for implementing source control activities necessary to ensure success of the cleanup.

- The Plan provides for a baseline monitoring event for sediments that will begin following cleanup of Early Action Areas (EAAs) in the LDW. As EPA is aware, most of the LDW RI data was collected several years ago and is outdated or incomplete to support source control needs. Ecology believes there needs to be sampling done early to provide timely information for prioritizing our source control efforts. This would include continuous, and rigorous, storm water and sediment monitoring at outfalls, bank samples, and river-wide sediment samples. The nature and density of monitoring needs to be much greater than was detailed in Appendix K of the LDW Feasibility Study to ensure success of source control efforts.

Response

EPA agrees that a baseline monitoring event is needed following cleanup of the EAAs. EPA also agrees that Appendix K in the LDW Feasibility Study likely underestimates the nature and density of monitoring needs and will need substantial revision in the remedial design phase. However, the objective of the remedial design sampling will be to collect sufficient data to design the remedy and to provide for a sufficient baseline to allow for a comparison of pre- and post-cleanup data. Although much of the remedial design data may be useful in measuring the success of source control, it will need to be supplemented by data collected by parties performing source control at individual outfalls and facilities.

3.3.2 Comment: Data gaps from the LDW Remedial Investigation (RI) need to be addressed.

- There are data gaps in the intertidal and bank areas that need to be investigated. Ecology has conducted some bank investigations from the upland side of the river when possible, as well as sediments in the waterway, to evaluate nature and extent of potential impacts. However, this information is not sufficient to fully substitute for the amount of samples that are needed to inform source control decisions and the technology assignments for the sediment cleanup.
- Background concentration data needs to be collected for all COCs in surface water, fish tissue, and sediment. The plan seems to discuss only fish tissue sampling of limited COCs.

Response

EPA agrees that there are gaps in the RI data that will have to be addressed in remedial design sampling. EPA plans to coordinate with Ecology in developing the remedial design sampling program. During the remedial design phase, EPA (in coordination with Ecology) will evaluate existing data and determine what additional background tissue, water, or sediment data are needed. EPA will also continue to support the Green/Duwamish River Pollutant Loading Assessment (EPA and Ecology 2014) as a mechanism to assess relative source contributions from various sources and pathways to surface water, fish tissue, and sediment. This effort will include working with the Technical Advisory Group supporting the PLA developing to compile existing data to address known data gaps.

3.3.3 Comment: The remedy selection for the site relies heavily on monitored natural recovery (MNR), so the Plan needs to establish periodic decision making criteria to assess the projected success of the remedy.

- Please provide monitoring goals and contingencies which relate to criteria used to justify using MNR at this site, such as verifying the recovery rates used in the Sediment Transport Model (STM). This type of monitoring and contingencies could be part of a SRZ.

Response

EPA disagrees that the Selected Remedy relies "heavily" on MNR. Although the ROD calls for a large area to be addressed by MNR, much of the LDW has very low levels of contamination. The remedy relies mainly on dredging, capping, and ENR to address areas with high to moderate levels of contamination. MNR is used only for areas with low levels of contamination. The ROD specifies that a detailed baseline sampling program will be conducted in the remedial design phase to redefine areas suitable for active cleanup and for MNR, using the decision criteria set forth in Section 13 of the ROD. The ROD states in Section 13.2.2: "More intensive long-term monitoring will be conducted in these areas [where the concentration of any of the 39 RAO 3 COCs (excluding the human health COCs PCBs and arsenic) is less than the RAL but greater than the RAO 3 cleanup levels], and should MNR not achieve RAO 3 cleanup levels or progress sufficiently toward achieving them in 10 years, additional actions (dredging, capping, or ENR) will be implemented. Those actions will be determined using the same approach set forth in this decision document as described in Section 13.2.1 and illustrated in Figures 19 and 20." Specific monitoring goals to measure MNR progress will be developed in remedial design. See response to comment 3.2.5 regarding SRZs.

3.3.4 Comment: The Proposed Plan distinguishes two categories of Monitored Natural Recovery (MNR) with Different Objectives for Attaining Cleanup Goals.

- Sections 8, and 10, in the Plan distinguish two categories for monitored natural recovery (MNR-to-SQS PRGs and MNR-below-SQS PRGs) [SQS in the Proposed Plan is equivalent to SCO in the ROD]. The language in the Plan seems to suggest that the area of MNR-to-SQS PRGs no longer requires monitoring after sediment COC concentrations fall below the SQS criteria. This is not the case, as the sediments defined as "to SQS" criteria still need to be monitored until the sediment human health-based cleanup levels are also achieved. Please revise language in the Plan to reflect this understanding.

Response

The ROD makes clear that long-term monitoring will occur over all areas where cleanup levels have not been met. See ROD Section 13.2.3.

3.3.5 Comment: [Ecology believes that Sediment Recovery Zones (required under the SMS rule) will be necessary]

As discussed above, Ecology believes that Sediment Recovery Zones (required under the SMS rule) will be necessary at the site, and monitoring requirements will be considered as part of the Sediment Recovery Zone conditions

Response

See response to comment 3.2.5.

3.4 Ecology Comment: *Clarify How Any ROD provisions Relate To Cleanup Levels For Upland Sites*

3.4.1 Comment: MTCA requires consideration of cross-media contamination when establishing cleanup levels.

- Soil and groundwater cleanup levels cannot cause a violation of surface water standards due to a release of a hazardous substance (WAC 1 73-340-700(6)(b)). Please clarify which PRGs will become cleanup levels that must be adhered to in order to establish appropriate cleanup levels for upland site cleanups.

Response

- The ROD contains requirements that apply only to the Selected Remedy for the In-waterway Portion of the Site. ROD Section 13.2.7 states: "This ROD addresses the In-waterway Portion of the Site only and does not impose requirements on or in any way limit Ecology in its implementation of source control under state law, including MTCA and the WPCA. Furthermore, this ROD does not limit Ecology's implementation of Clean Water Act delegated authorities. Over time, the integrated approach of CERCLA and longer-term clean water actions are expected to result in attainment of applicable surface water criteria and uses under the Clean Water Act." Upland source control cleanups meeting MTCA cleanup standards and water permitting to meet state water quality standards are the extent of EPA's present expectations and projections for source control.
- EPA and the state have agreed to work together on sufficient upland source control to minimize recontamination and meet ARARs to the extent practicable. EPA will continue to work with the state to consider what is needed for upland site cleanups to meet that goal.

3.5 Ecology Comment: *Upland Source Control Needs to be Tied to the Cleanup in the Consent Decree*

3.5.1 Comment: Ecology believes that EPA needs to provide active support, both legally and with additional resources, for the long-term source control efforts at this site.

- Source control continues to be a separate requirement for this project. Whereas with previous Superfund sites, source control has been an integral part of the cleanup. The principles of long-term source control and protection of the in-water cleanup needs to be established in the consent decree. Language in the consent decree should recognize the PLPs [PRP s'] responsibility for source control sufficiency and long-term source reduction to protect the cleanup from recontamination.

Response

Enforcement mechanisms for the implementation of the Selected Remedy in the ROD, such as CERCLA consent decrees or unilateral orders for remedial action, are beyond the scope of comments and responses on a Proposed Plan. Generally, such enforcement mechanisms are limited to the scope of the Selected

Remedy. See model decrees or orders for remedial design/remedial action published by the United States on EPA or U.S. Department of Justice websites. EPA would need a ROD or Action Memorandum (as it issued, e.g., for the T-117 EAA) selecting specified source control based on a RI/FS or EE/CA to require such CERCLA response action. The RI/FS for the In-waterway Portion of the Site did not study source control areas or evaluate source control alternatives.

3.6 Ecology Comment: The Plan Indicates this Cleanup Will be Sufficient for the ROD to be a Final Action

3.6.1 Comment: Under MTCA, a cleanup action that only partially addresses the cleanup of a site is considered an interim action.

A remedial action which cleans up hazardous substances from all or a part of the site but does not achieve cleanup standards is considered an interim action. The interim action may be considered the final cleanup action for the site if the interim action is subsequently shown to comply with WAC 173-340-350 through 173-340-390. The Plan does not provide enough detail about the process to get to a final cleanup determination without TI waivers. The state may agree with EPA that the ROD can be considered a final cleanup under CERCLA when the remedy has been performed to the maximum extent practicable and a TI waiver is fully justified. Again, as Ecology's described in the Water Quality Comments, a TI waiver must be coordinated with EPA's development of UAA guidance.

Response

The MTCA administrative status determination for interim or final actions is not an ARAR. See response to comment 2.9.3. for a more complete discussion of this issue. EPA reiterates 1) its accord with Ecology that meeting CERCLA cleanup requirements is not the same as “attaining” Washington’s designated uses under the Clean Water Act, and 2) any consideration or discussion of a CWA Use Attainability Analysis is wholly beyond the scope of CERCLA remedy selection. In any case, a UAA is not required for a CERCLA TI waiver.

Integrated Water Quality and Cleanup Comments — Washington State Department of Ecology

3.7 Ecology Comments: Surface Water and Tissue Preliminary Remediation Goals (PRGs) need clarification

3.7.1 Comment: Ecology has some concerns about including surface water and/or tissue PRGs.

- Since the RI/FS was not conducted to support use of tissue and surface water PRGs as cleanup levels, we are having some difficulty understanding the use for them now.

Response

The ROD does not contain cleanup levels for surface water or tissue. See responses to comments in Sections 2.4 and 2.5.

3.7.2 Comment (continued)

- Section 3.5.3, p. 25, of the Plan states: "EPA determined that more water quality sampling during the RI would not have affected the analysis of human health or ecological risks, or have influenced the development of alternatives for the in-waterway portion of the site." EPA should consider collecting more water quality samples prior to the ROD to influence the selection of more appropriate tissue and/or surface water PRGs.

Response

EPA disagrees that additional sampling of surface water or tissue are needed for the ROD. Additional sediment, water column, and fish tissue data will be collected during remedial design. EPA will coordinate with Ecology on development of remedial design sampling plans.

3.7.3 Comment

- Section 5.3, p. 42, of the Plan states: "Although no alternatives directly address surface water, COC [Contaminants of Concern] concentrations in surface water will be reduced through implementation of source control and sediment cleanup." Please explain how EPA will support this conclusion, i.e., through technical analyses and/or modeling. As you well know, Ecology plays the key role in source control, so a mutual understanding of how COC's will be reduced and accounted for is critical.

Response

Reducing loading to surface water from sources, including from contaminated sediments, will reduce surface water pollutant concentrations. EPA will use sampling data collected before, during, and after remedial action to measure reductions in surface water, sediment and tissue contaminant concentrations. EPA will seek Ecology's input in developing these sampling plans and conducting this data analysis.

3.7.4 Comment (continued)

- Section 7.3, p. 49, of the Plan states: "During remedial design sampling, EPA intends to fully evaluate surface water COC concentrations. If other COC surface water concentrations exceed the recommended federal AWQC (Ambient Water Quality Criteria, Clean Water Act Section 304(a) guidance values) or state Water Quality Standards, the more stringent of the two will be used to monitor progress towards achieving the RAOs [Remedial Action Objectives]." Please clarify how other surface water COCs will be formally recognized and approved during the cleanup process."

Response

The ROD specifies that the most stringent of federal AWQC, the National Toxics Rule (NTR), and state water quality standards are ARARs. Monitoring for compliance with these ARARs in accordance with an approved long-term modeling plan required by the ROD will identify and formally recognize pollutant-specific criteria that are not in compliance. EPA also anticipates having a better modeling tool via the PLA (EPA and Ecolology 2014) that takes into account relative contributions from various sources and pathways and their impact on sediment, water column, and fish and shellfish tissue concentrations. That, along with the data collected through the remedial design phase and the long-term surface water modeling that will follow, will allow EPA to track how the COCs are being reduced.

3.7.5 Comment: Surface water PRGs, if included, should be based upon an evaluation of background levels.

- Section 7, page 45, of the Plan states: "Consistent with EPA policy and as required by the MTCA [Model Toxics Control Act], where this concentration [risk-based threshold concentration (RBTC)] is more stringent than the background levels, the PRG was set at the MTCA natural background level." The sediment and fish tissue, PRGs are based on natural background levels. The surface water PRG is not based on natural background, but instead is based on a risk-based criterion. EPA should consider collecting background surface water data as the basis for a final PCB surface water PRG to be consistent with the other PRGs.
- Section 7.2, page 49, of the Plan states: "Additional fish and shellfish background data will be collected during the remedial design phase to increase understanding of non-urban tissue concentration of human health COCs." Ecology recommends the collection of surface water background data as well which may also be used as the basis for EPA to adjust the PRGs in a ROD Amendment. Relevant background surface water quality is both freshwater from the up-gradient Green/Duwamish River and marine water from Elliott Bay and Puget Sound.

Response

The ROD does not contain surface water cleanup levels. Surface water quality criteria are ARARs as required by Section 121(d)(2)(A)(ii) and (B)(i) of CERCLA. In the Proposed Plan, based on the RI/FS, the surface water PCB PRG was selected for emphasis (see Section 2.4) and based solely on the federal CWA 304(a) value which is risk-based, so an RBTC was not developed. Similarly, no attempt was made to calculate MTCA natural background, which would be very difficult to derive, and is unnecessary. Any TI waiver of water quality criteria will be based on empirical data showing that a steady state above the ARAR value had been reached. See Section 2.3 above, among other sections discussing possible surface water ARAR waiver(s).

3.7.6 Comment: Explain how the tissue and surface water PRGs will be used.

- PRGs in a Proposed Plan generally become cleanup levels in the ROD, subject to public comment. Please explain which PRGs will become cleanup levels and which are meant to be used only for "guidance" or only to gauge progress toward remediation goals. Also, it's not clear how it will be determined whether the PRGs can be achieved in the long-term when the relationship between fish tissue, surface water, and the sediment cleanup is theoretical or unknown. Please describe a process for potential contingencies if it becomes apparent that the PRGs, including the sediment PRGs, cannot be achieved through sediment cleanup actions alone because the current source control efforts have not achieved the desired success.
- The Plan does not address whether sediment PRGs for arsenic or carcinogenic polynuclear aromatic hydrocarbons (cPAH) will be adjusted based upon tissue or water research that is being conducted by EPA.
- The Plan does not address how revised PRGs for surface water or sediment will be established in the ROD (e.g., ROD amendment).

Response

The ROD does not contain any surface water or tissue cleanup levels. If sediment cleanup levels cannot be achieved, the applicability of the criteria for adjusting from SCO-based cleanup levels to CSL-based

cleanup levels will be analyzed, including the possible use of regional background, followed if necessary by TI waiver analysis for any cleanup levels that still cannot be achieved. See ROD Section 13.4 and responses to comments in Section 2.3 and 2.6. See response to comment 3.2.1 regarding potential future adjustments to address arsenic and cPAH contamination in clams.

ROD revisions are not made within an existing or issued ROD, any revised cleanup levels will be established in a subsequent ROD Amendment or ESD, as appropriate, consistent with the NCP.

3.7.7 Comment (continued)

- The PRGs will influence source control targets. Ecology is developing an implementation plan that identifies the planned activities of Ecology's relevant programs to support LDW source control efforts in the near and the long term. In developing the plan, Ecology is evaluating the potential end points associated with the LDW CERCLA sediment cleanup (the concepts of source control sufficiency and recontamination) as well as the necessary Clean Water Act end point of attaining applicable water quality standards and designated uses. As previously stated, we will need EPA's help and support in formulating and implementing the policies necessary to dovetail the near-term cleanup work with the longer-term clean water objectives (e.g., monitoring, modeling of toxic reductions, coordinated UAA and TI decisions, etc.).

Response

EPA has been discussing these concepts with Ecology since the completion of the public comment period on the Proposed Plan, and the outcome of those discussions is reflected in the ROD. EPA's expectation for the source control program prior to the initiation of remedial action is to limit incoming contaminants associated with sediment, as it has been focused on since its conception. The ROD states in Section 4.2 that "EPA and Ecology will coordinate to find and sufficiently control sources of sediment contamination. Based on conversations with Ecology, EPA understand that the process for determining source control sufficiency will be fully described in Ecology's Final Source Control Strategy. Based on those conversations, EPA understands that Ecology plans to divide the waterway into three sections for the purposes of making sufficiency determinations, sequencing the determinations from the lower to upper sections of the LDW. Source control actions may be implemented in phases to reduce source concentrations below the benthic SCO criteria and human health remedial action levels (RALs) (see Section 13.2) for all known or suspected sources, before EPA starts in-waterway remedial action." EPA recognizes that this is a complicated and challenging task and that the state has taken extraordinary strides to identify and manage ongoing sources of contamination to the LDW.

EPA's long-term expectation for the source control program is to prevent recontamination of the sediments and achieve the CWA ARARs in conjunction with the Selected Remedy. The ROD describes the strategy for conducting source control activities in Section 4.2, stating that source control will be conducted at two scales: "1) the immediate source area to the LDW where source control activities are focused on controlling sources and pathways of contamination to LDW sediments to prevent or minimize the likelihood that sediments will be recontaminated at levels that trigger additional active in-waterway sediment remediation; and 2) the larger watershed where source control activities are focused on regional efforts to address toxics that are present at ubiquitous concentrations in sediments, surface water, and

stormwater, and via air deposition. The final Source Control Strategy is expected to reference a PLA (EPA and Ecology 2014) for the watershed to address the activities in the larger watershed (described in item 2 above)."

EPA will support Ecology in its efforts towards these goals. For example, EPA is currently supporting Ecology's PLA to further characterize the contaminant loading to LDW sediment, fish tissue, and the water column from the entire Green/Duwamish Watershed basin. In previous responses, EPA has noted it will coordinate with Ecology regarding baseline monitoring during the remedial design process. EPA's Implementation Plan, which will be an attachment to Ecology's Source Control Strategy, will detail the long-term coordination within and between agencies to support Ecology in these efforts. This includes internal coordination within EPA between the Superfund and Clean Water Act programs.

3.8 Ecology comments: Clarifications are Needed Regarding Source Control Sufficiency, Recontamination, and Designated Use/Water Quality Standards Attainment

3.8.1 Comment: Ecology and EPA continue to work together to bring clarity and definition to the concept of source control sufficiency.

- Near-term activities are focused on controlling known pollution sources to levels supportive of the CERCLA remedial action levels (e.g., source control "sufficiency" to begin remedy construction). Significant work in this level of source control has already been conducted.

Response

- EPA agrees the Agencies are continuing to work together in this regard and all others. See response to comment 3.7.7.

3.8.2 Comment: Ecology and EPA will need to work together to define recontamination.

- The water quality programs in Ecology and EPA are joining the discussions to bring clarity to water quality endpoints and to support source control implementation. A general framework to correlate the concepts of sufficiency, recontamination and attainment of standards is beginning to take shape. As this framework of a comprehensive Green/Duwamish River watershed approach is refined, it should assist EPA and Ecology in responding to official public comments received on the Plan, Revised Source Control Strategy and Environmental Justice Analysis.

Response

EPA agrees. See response to comment 3.7.7.

3.8.3 Comment: The Plan should acknowledge its relationship to the long-term goals of the river ecology.

- Over the long term, source control efforts aimed at attaining applicable water quality standards and designated uses in the LDW will involve building further on the comprehensive Green/Duwamish River watershed approach and identifying and deploying water quality implementation tools as well as other source control programs (i.e., chemical action plans, air quality management, toxic

substances controls, and product replacement). We would accomplish this through a comprehensive Green/Duwamish River watershed approach involving substantial stakeholder involvement, data collection, sophisticated modeling, and pollutant loading analyses. It is also possible that additional sediment remedial actions may be determined to be necessary based on the results of the comprehensive watershed approach.

Response

EPA agrees that the Selected Remedy for the In-waterway Portion of the Site is just one action within the Green/Duwamish River watershed aimed at protecting consumers of resident fish and shellfish, recreation, and wildlife. EPA also agrees with the stated long-term source control goals building further on a comprehensive Green/Duwamish River watershed approach. EPA and Ecology have undertaken a Pollutant Loading Assessment of the Green/Duwamish Watershed (EPA and Ecolology 2014) which will provide a tool to better understand the loading of various toxics in to the LDW from various media (surface water, atmospheric deposition, etc.).

3.9 Suquamish Tribe Comments

3.9.1 Comment: [Tribal trust responsibility]

The Suquamish Tribe appreciates the opportunity to provide comment on the Environmental Protection Agency (EPA) Proposed Plan Alternative 5c "Plus". The Suquamish Tribe has been working cooperatively with EPA and stakeholders on the Lower Duwamish Waterway (LDW) Superfund clean-up site.

The site for this proposed project is within the usual and accustomed fishing area (U&A) of the Suquamish Tribe. The Suquamish Tribe has traditionally harvested and consumed fish and shellfish from the LDW and intends to do so in the future. Risk management decisions should be protective of tribal rights to access and harvest and should not limit or restrict future expression of those rights based on current contaminated conditions. As a federal trustee of tribal treaty-reserved resources, the EPA has the responsibility of ensuring that tribes have the inexorable ability to exercise their constitutionally protected treaty rights (including the ability to harvest resources as well as protection of the habitat). The trust responsibility stems from various legal authorities including the U.S. Constitution, Treaties, statutes, executive orders, and historical relations with Indian tribes.

Response

EPA agrees, and has appreciated the input from the Suquamish Tribe throughout the RI/FS about potential impacts to their treaty-reserved resources. EPA intends to continue to consult with the Suquamish Tribe throughout remedial design and remedial action.

3.9.2 Comment: Interim vs. final remedy

EPA intends that the preferred alternative will be the final remedy for the in-waterway portion of the LDW. Implementation of this remedy, however, is dependent upon completion of Early Action Area (EAA) cleanups and achievement of sufficient source control. In addition, EPA indicates that achievement of Preliminary Remediation Goals (PRGs) is not considered feasible and has already set the stage for a technical impracticability waiver for sediment and water quality compliance criteria. Given the

high degree of uncertainty that the remedy will be successful in achieving all of the remedial action objectives, the Proposed Plan does not provide justification for why this alternative is considered the final remedy.

Response

See response to comment 2.9.3 for an explanation of the Selected Remedy as a final rather than interim remedy.

3.9.3 Comment: Technical impracticability (TI) waivers

The Suquamish Tribe does not support the use of TI waivers because it erodes treaty-reserved rights and resources. The Tribe strives to work diligently to restore resources and habitat throughout the U&A for future generations. We understand that it may not be technically possible to meet cleanup levels in the required timeline but we would prefer flexibility in the clean-up timeline (interim Record of Decision) over a TI waiver. Not only does a TI waiver set unacceptable precedent regarding sediment remedies but a TI waiver does not protect Tribal treaty rights for future generations and precludes future use of new, innovative technologies.

Response

TI waivers do not preclude the future use of new innovative technologies to protect human health and the environment. To the extent that risks remaining at any site are above actionable levels, EPA has authority to address them based on new information, whether ARARs have been met or waived, or whether a site has been delisted from the National Priorities List or otherwise administratively closed. TI ARAR waivers document that one or more substantive qualifying requirements are technically impracticable to achieve when the waiver is issued. They allow sites not to remain perpetually open-ended when there is no practicable means to address them. For this reason, EPA does not believe TI waivers erode treaty-reserved rights and resources or set unacceptable precedent regarding sediment remedies. EPA does not have natural resource damage restoration authority but strives to work cooperatively with Tribes and natural resources agencies toward mutually compatible goals.

3.9.4 Comment: Institutional controls

Institutional controls (IC's) should not be used as long term, permanent clean up options. ICs must consider impacts to treaty protected rights to harvest in usual and accustomed areas. The Tribe does not consider limitation of treaty rights to be "positive behavior change". ICs such as fish advisories, environmental covenants and restricted navigation areas are not enforceable nor are they within the jurisdiction of the responsible parties to implement. Fish advisories cannot be used to achieve risk reduction objectives by "limiting fish and shellfish consumption". Institutional controls should not be considered remediation measures or long term remedies but provide for temporary measure to achieving clean up. ICs do not protect human health, which requires achievement of protective levels through the reduction of contaminant levels in sediment. Development of an IC plan should be done in coordination with affected Tribes to meet EPA objectives while remaining protective of Tribal Treaty resources and harvest activities.

Response

EPA acknowledges the Tribe's concern about the long term use of ICs. However, given this urban environment and the ubiquitous sources of contamination, EPA believes ICs are a necessary part of the Selected Remedy. See responses to comments 2.3.7 and 2.24.1. EPA agrees that development of ICs should be coordinated with affected Tribes and plans to do so as ICs are developed.

3.9.5 Comment: Activated carbon enhancement or in situ treatment

Caps cannot conflict with or restrict Tribal treaty fishing rights or tribal treaty natural resources. That said, the Tribe is interested in potentially having innovative reactive capping technologies included in the remedial alternative (Proposed Plan Alternative 5c "Plus"). However, the Tribe strongly recommends a small pilot project to evaluate potential impacts to the substrate (habitat) and associated biota prior to more extensive use. The preferred plan mentions monitoring effectiveness and impacts to biota but does not specifically mention alterations to habitat and the resulting potential effects. We know that Slip 4 is already utilizing a carbon amended filter material. We have heard no updates or seen any monitoring data/information to date. Why is this site not being used as a pilot?

Response

EPA agrees that an important consideration in developing ICs for caps, ENR (with our without (in situ treatment), and other remedy components is that they should not conflict with treaty fishing rights or tribal treaty natural resources. EPA plans to work with the Tribes to address this concern. Although activated carbon (AC) amendment has been implemented successfully at several Superfund sites, EPA agrees that a pilot project is needed to evaluate the efficacy and potential impacts of AC at LDW. EPA has been working with LDWG on planning a pilot study for AC application and has had several conversations with Suquamish and Muckleshoot Tribe representatives, as well as DRCC/TAG and natural resource agencies to get their input on the pilot study.

Slip 4 cap surface sediment monitoring results are available on EPA's web site at *www.epa.gov/region10/duwamish.html*, however, the use of AC at Slip 4 (amending a cap) is different than application as part of ENR, so Slip 4 monitoring data would provide information for application as part of a cap, but not as part of ENR. In addition, only surface sediments were sampled, and these data would not address the question of the effectiveness of AC amendment.

3.9.6 Comment: Environmental Justice Analysis (EJ Analysis)

Residual risks will continue to have a disproportional impact on tribal communities. It is not clear how the EJ Analysis was considered in the development and evaluation of the remedial alternatives. How will the preferred alternative address disproportionate impacts to tribal health and resources?

Response

See responses to comments in Section 2.32.

3.9.7 Comment: Sediment Management Standards (SMS) as an Applicable or Relevant and Appropriate Requirement (ARAR).

Please add text discussing the recent SMS update and include, if any, changes that will result.

Response

See responses to comments in Section 2.6.

3.9.8 Comment: Non risk driver chemicals of concern (COCs)

How does the preferred alternative address non-risk driver COCs that exceed risk thresholds?

Response

As discussed in Section 13.2.3 of the ROD, during remedial design, a subset of sediment and tissue samples will be analyzed for other contaminants not selected as COCs but identified in the HHRA as posing an excess cancer risk of greater than 1×10^{-6} or noncancer HQ of 1 at the adult Tribal reasonable maximum exposure (RME) level to assess their reduction over time. If warranted based on the results of remedial design sampling, monitoring for these analytes will continue in the long-term monitoring phase.

3.9.9 Comment: Tribal consultation/coordination

The Proposed Plan provides only a preliminary description of a remedial action package. The final remedy design, including the designation of remedial footprints, will occur after the Record of Decision (ROD) has been signed. It is crucial that EPA continue to consult with, and provide support for, the Suquamish Tribe throughout the remedial design process. The Suquamish Tribe expects to have meaningful input in the development and review of work plans, sampling and analysis plans, data reports, monitoring plans and modeling efforts conducted as part of the remedial design.

Response

EPA agrees, and plans to consult with the Suquamish and Muckleshoot Tribes throughout remedial design, remedial action, and long-term monitoring.

3.9.10 Comment: Human health risks

Section 4.1. Additional text regarding the tribal Reasonable Maximum Exposure (RME) scenarios (and consumption rates) is needed. Application of EPA's tribal seafood consumption framework has resulted in the use of Tulalip seafood consumption survey data to characterize adult tribal RME seafood consumption. The rate based on the Tulalip Tribes study (Toy et al. 1996) was a policy determination by EPA to be the most appropriate for application to the LDW. Although the framework supports consistency in internal EPA policy regarding tribal seafood consumption risk assessment, the recommendations of the framework (EPA 2007) do not replace or supersede the need for consultation between EPA and the tribes to develop site-specific risk assessments. Although the Tulalip Tribe does not have adjudicated fishing rights in the LDW, the tribal RME consumption rate based on the Tulalip consumption survey was agreed to by the Suquamish Tribe only because the Risk Based Threshold Concentrations (RBTCs) were expected to trigger a default to background concentrations as PRGs and provided that risk to Suquamish Tribal members was included in the Human Health Risk Assessment (HHRA). As discussed with EPA on numerous occasions and included in previously submitted written comments, the Suquamish consumption data are relevant in estimating potential risks to Suquamish tribal members, who retain their traditional rights to harvest throughout the Suquamish U&A. This is a reasonable future use scenario for Suquamish tribal members. Risk estimates for the Suquamish Tribe

have apparently been dropped and are not included in the Proposed Plan. Suquamish risk estimates must be included in the discussion, tables, and figures related to the HHRA.

Response

EPA agrees, and has included seafood consumption rates from the Suquamish Tribe seafood consumption study as upper bound estimates in the HHRA and the ROD (see Section 7.1).

3.9.11 Comment: [Dioxins and furans]

Page 33. Given the toxicity of dioxins and furans, it was assumed that risks related to these substances would be unacceptably high (> 10^{-4} to 10^{-6} excess cancer risks). Although the risk estimates are uncertain, [they] indicate that it is likely that they are biased low and may underestimate the potential cumulative risks associated with consumption of seafood and direct exposure to sediments.

Response

EPA agrees and has included the following statement in Section 7.1.5 of the ROD: "Dioxins and furans were not analyzed in seafood samples, as discussed in Section 7.1.4. This data gap contributes to an underestimation of risk because these contaminants were not included in the risk assessment for the seafood consumption scenarios."

3.9.12 Comment: [Environmental Justice Analysis]

Page 31. The text implies that the EJ Analysis was considered during the development of the RME scenarios used in the HHRA. The EJ Analysis was completed after the HHRA and was not part of the risk assessment process. Please add additional text to clarify.

Response

See response to comment 2.32.5. Although the EJ Analysis was developed after the HHRA, EPA considered environmental justice throughout the RI/FS, including in the development of exposure scenarios for the HHRA, consistent with Executive Order 12898.

3.9.13 Comment: Section 5.1. Early identification and cleanup of EAAs

Are the EAA cleanups and the Natural Resource Damage Assessment (NRDA) actions consistent with the preferred plan including cleanup objectives and compliance levels at least as stringent as those in the preferred alternative? If not, how do they deviate and how will EPA provide assurance that these actions support the selected remedy? If EAAs are not included in the ROD, what would compel the responsible parties to take additional action, if necessary?

Response

See response to comment 2.21.1.

3.9.14 Comment: Section 5.2. controlling sources of contamination

The Proposed Plan states, "EPA and Ecology will coordinate to sufficiently control ongoing sources to the extent possible before initiating sediment clean up in a specific area." The Proposed Plan then refers to Appendix A, Ecology's Source Control Strategy, for a description of the process that will be used to

determine when source control is sufficient to begin sediment clean up without significant risk of recontamination. However, the process described in Appendix A is very general and does not provide any definition of "sufficient" or "significant". Given that source control is a primary component of the Proposed Plan (i.e. implementation of remedial actions is contingent upon sufficient source control), provide more detail regarding sufficient source control, agency responsibility and an expected timeline for achieving performance standards relative to implementing remedial action.

Response

See response to comment 3.7.7.

3.9.15 Comment: [Risks related to "other" contaminants of concern]

Table 6, Page 32. Include the second footnote from Figure 8 and provide additional explanation regarding risks related to "other" COCs.

Response

As noted in response to comment 2.29.1, EPA considered the language changes suggested by commenters when drafting the ROD.

3.9.16 Comment: Section 7.2. Fish and Shellfish Tissue PRGs

The Tribe appreciates the inclusion of remedial goals for tissue. However, due to uncertainty in background concentrations based on existing tissue data, the Tribe agreed that these data, and any tissue PRGs derived from these data, would be clearly identified as provisional values. Furthermore, the Tribe understood that a plan for collecting additional relevant background tissue data would be developed during the remedial design and used to set appropriate tissue PRGs. The Proposed Plan states that EPA may adjust the values identified as tissue PRGs, if appropriate, and that such a change would require a ROD amendment or Explanation of Significant Differences (ESD). The Tribe believes that this is a significant change in approach that unnecessarily complicates the process of establishing relevant tissue PRGs. The Tribe expects that remedial goals for fish and shellfish tissue will be considered real remedial goals and not simply placeholders that will be later dismissed as being technically impracticable.

Response

See responses to comments in Section 2.5.

3.9.17 Comment: Section 7.3. Surface water PRGs

The Tribe appreciates the inclusion of remedial goals for surface water. However, if the recommended AWQC are not based on fish consumption rates consistent with tribal exposures, they cannot be considered protective of human health for the consumption of organisms at this site. Please verify the protectiveness of the surface water PRGs or revise as necessary. As with tissue PRGs, the Tribe expects that remedial goals for surface water will be considered real remedial goals and not simply placeholders that will be later dismissed as being technically impracticable.

Response

See response to comment 2.4.5.

3.9.18 Comment: Development of remedial alternatives

Provide more detail regarding the timeframe and endpoints considered in establishing recovery categories. Was recovery only assumed to be achievement of Sediment Quality Standards (SQS) [renamed the SCO under the 2013 SMS] within 10 years after completion of remedial action? Does the 10 year timeframe apply to the completion of remedial action within each specific action area, or does it apply to completion of remedial actions site-wide? How does the recent listing of steelhead affect the in water work window and schedule?

Response

For development of remedial alternatives in the FS, the BCM was used to evaluate time to achieve the SCO (and the time to achieve long-term model-predicted values) via natural recovery over the entire waterway. The predicted rate of natural recovery is different for the various FS alternatives, but the Selected Remedy is predicted to achieve the SCO over the entire waterway within 10 years after completion of the remedial action.

Recovery categories were developed based upon model predictions and other supporting evidence of recovery in a particular area. As shown in ROD Table 23, several criteria were used to develop recovery categories, including BCM model predictions and empirical data, including as data showing net sedimentation, and decreasing contaminant concentrations over time.

EPA is not aware of any changes in in-water work windows due to the listing of steelhead, but will continue to work with NOAA and the U. S. Fish and Wildlife Service to determine appropriate work windows at the time of construction.

3.10 Muckleshoot Indian Tribe Comments

The Muckleshoot Indian Tribe has historically relied on the Duwamish River as an important area for exercising its Treaty Fishing Rights. Given this history, the Tribe's Fish Commission has long been a loud and consistent voice advocating the need to cleanup and restore habitat along the River. In the late 1990's, the Tribe was one of the governments instrumental in supporting the listing of the Lower Duwamish Waterway as a federal Superfund Site, in order to help ensure cleanup of the River. Since the Lower Duwamish Superfund Site was designated on September 13, 2001, Muckleshoot Fisheries has been working diligently with the U.S. Environmental Protection Agency (EPA) on the approach for the cleanup of the River. After nearly 12 years as a Superfund Site, EPA has produced a Proposed Plan to cleanup the River. We appreciate the opportunity to provide comments on this approach, as well as participate in government-to-government meetings with EPA to ensure that EPA's Record of Decision for the site is adequate.

As you know, the Muckleshoot Indian Tribe's Usual and Accustomed Fishing Grounds includes all of the aquatic area that is the focus of the Lower Duwamish Waterway Superfund Site. Adequate cleanup of this site is a necessary step for the protection of the health of tribal fishers exercising their treaty rights in this area and for the protection of the aquatic ecosystem, which contributes to the health of the fishery itself.

It is within this context that the Fish Commission is relying on EPA to ensure an appropriate long-term and effective cleanup of the River. At the same time, we are committed to work with EPA on the proposed cleanup activities themselves, so that we can ensure that potential impacts to the Tribe's fishing activities in the River during the proposed multi-year cleanup are both minimized and mitigated to satisfactorily meet our Tribal needs. This last point is of great significance, due to the importance and timing of the Tribe's fishery in the River.

With any in-water cleanup, and especially one of this magnitude, we expect that the cleanup technologies utilized to remove contaminated sediments from the River will be selected and utilized in a way that minimizes any potential sediment or water column recontamination. Upon initial observation of methods used by Boeing during their first season of sediment cleanup at Plant 2, their equipment and dredge-water treatment seem to set a new protective standard that should be followed for other cleanups in the River.

We are encouraged that EPA has responded to previous comments by including both fish tissue and surface water cleanup levels for the River in addition to sediment cleanup levels. Monitoring of these additional media will help to monitor how successful cleanup measures are over the long-term and inform additional actions that may be necessary. We do want to emphasize, however, that the data set that you have evaluated to date for background concentrations of fish and shellfish tissue is not an adequate data set to use for site-wide cleanup levels. Please include Muckleshoot Fisheries in scoping the additional data collection that would be needed.

Since we are focusing on more broad issues within this comment letter, we reserve the right to provide additional, more detailed comments at a later date during our government-to-government discussions.

Thank you for the opportunity to comment on this very important activity. We look forward to working with you closely on this issue at a government-to-government level as you develop a Record of Decision and proceed to the river-wide cleanup.

Response

EPA appreciates the Muckleshoot Tribe's participation throughout the RI/FS and looks forward to continued consultation with the Tribe throughout remedial design and remedial action. EPA agrees that potential impacts to the Tribe's fishing activities in the LDW will be an important consideration in developing specific cleanup plans, and will consult with the Tribes regarding minimizing impacts to their fishery. EPA will require use of best management practices to minimize releases to sediment or the water column, see response to comment 2.17.3. See responses to comments in Sections 2.4 and 2.5 regarding surface water and tissue PRGs and the development of additional background data.