Confederated Tribes of Siletz Indians
Tribal Council

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September 6, 2016

RECEIVED
OREGON OPERATIONS OFFICE
SEP 06 2016
EPA-REGION 10

Via E-mail: harborcomments@epa.gov
and Priority Mail:

Attn: Harbor Comments, U.S. EPA
805 SW Broadway
Suite 500
Portland, OR 97205

Re: Confederated Tribes of Siletz Indians' Comments on Proposed Cleanup Plan for the Portland Harbor Superfund Site

Dear Sir or Madam:

The Confederated Tribes of Siletz Indians (Siletz Tribe) fully joins in the attached Five Tribes' Comments on EPA's Proposed Plan for the Portland Harbor Superfund Site (Proposed Plan).[1] The Siletz Tribe writes separately to emphasize the importance to its members of a robust and sufficiently protective remediation of the Portland Harbor Superfund Site.

As recognized in Siletz Tribal Code § 7.200, the Siletz Tribe's Geographic Areas of Tribal Interest Ordinance, the Siletz Tribe is a federally recognized Indian Tribe comprised of Indian tribes and bands and members of Indian tribes and bands who were settled by the federal government on the "Siletz" or "Coast" Reservation (Siletz Reservation) from 1855 forward. Those tribes, bands, and persons settled on the Siletz Reservation were and are possessed of legal and customary rights of possession and use to those geographic areas in which they historically resided and occupied, in addition to legal rights associated with such tribes', bands' and persons' settlement on the Siletz Reservation. The tribes and bands of Indians which comprise the Siletz Tribe entered into the following treaties with the United States:

(1) Treaty with the Rogue River, Sept. 10, 1853, 10 Stat. 1018, ratified April 12, 1854, proclaimed Feb. 5, 1855;

(2) Treaty with the Umpqua-Cow Creek Band, Sept. 19, 1853, 10 Stat. 1027, ratified April 12, 1854, proclaimed Feb. 5, 1855;

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[1] The Siletz Tribe, one of the referenced "Five Tribes," has been working cooperatively with the Confederated Tribes of the Grand Ronde Community of Oregon, the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, and the Confederated Tribes of the Warm Springs Reservation of Oregon, in conjunction with a common technical consultant Industrial Economics, Incorporated (IEc), on Portland Harbor Superfund Site remedial issues. As noted in the Proposed Plan, the Siletz Tribe is one of the government partners that signed a Memorandum of Understanding regarding the provision of input on remedial issues at the Portland Harbor Superfund Site. Proposed Plan at 2 and n.1.

(3) Treaty with the Rogue River, Nov. 15, 1854, 10 Stat. 1119, ratified March 3, 1855, proclaimed April 7, 1855;

(4) Treaty with the Chasta, etc., Nov. 18, 1854, 10 Stat. 1122, ratified March 3, 1855, proclaimed April 10, 1855;

(5) Treaty with the Umpqua and Kalapuya, Nov. 29, 1854, 10 Stat. 1125, ratified March 3, 1855, proclaimed Mar. 30, 1855;

(6) Treaty with the Molala, Dec. 21, 1855, 12 Stat. 981, ratified March 8, 1859, proclaimed April 27, 1859;

(7) Treaty with the Kalapuya, etc., Jan. 22, 1855, 10 Stat. 1143, ratified March 3, 1855, proclaimed April 10, 1855;

(8) Treaty with the Tilamooks and other confederate tribes and bands of Indians residing along the coast west of the summit of the Coast Range of mountains and between the Columbia River on the north and the southern boundary of Oregon on the south, Aug. 11, 1855 (unratified).

The Siletz Tribe's combined aboriginal territories comprise about 20 million acres located roughly from northern California to southern Washington and encompass the location of the Portland Harbor Superfund Site.

Termination was imposed upon the Siletz Tribe by the U.S. government in 1955, but in November of 1977 the Siletz Tribe became the first Oregon tribe to be fully restored to federal recognition via the Siletz Indian Tribe Restoration Act, 25 U.S.C. § 711 et seq. A land base for the Siletz Tribe was not restored at the same time, so Congress created a Siletz "Service Area" as a substitute for a formal reservation to ensure the provision of federal services and benefits to Siletz Tribe members. The counties which comprise the Siletz Service Area include Multnomah County, where the Portland Harbor Superfund Site is located, along with Lincoln, Yamhill, Polk, Lane, Marion, Washington, Clackamas, Tillamook, Benton, and Linn Counties. The Siletz Tribe achieved self-governance in 1992 and has established a strong self-governance model that includes a comprehensive natural resources management program, through which the Siletz Tribe has participated in the remedial process and offers the attached comments.

For these reasons, and as supported by the Siletz Tribe's interests as described in Siletz Tribal Code § 7.200, the Siletz Tribe urges EPA to carefully consider the attached comments so as to assure the preservation of the Siletz Tribe's above-described legal and customary rights of possession and use to those geographic areas, and their associated natural resources, in perpetuity.

Sincerely,

Delores Pigsley
Tribal Chairman

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OREGON OPERATIONS OFFICE
SEP 06 2016
EPA-REGION 10

MEMORANDUM | September 6, 2016

TO United States Environmental Protection Agency, Region 10

FROM Portland Harbor Five Tribes and Common Consultant, Industrial Economics, Incorporated (IEc)

SUBJECT Five Tribes' Comments on EPA's Proposed Plan for the Portland Harbor Superfund Site

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INTRODUCTION

This memorandum provides comments from the Five Tribes[1] on the United States Environmental Protection Agency's (EPA's) Proposed Plan for the remediation of the Portland Harbor Superfund Site (Site; EPA 2016a), as well as the Portland Harbor Feasibility Study (FS; EPA 2016b) that supports the Proposed Plan.

The Five Tribes appreciate the opportunity to participate in the Superfund process, which we have done for more than a decade as a partner to EPA under a Memorandum of Understanding (MOU; EPA 2001). The Site's great importance to the Five Tribes underscores the need for a remedy that achieves protection of human health and the environment within a reasonable timeframe and in perpetuity. We recognize the enormous effort that EPA has expended on drafting the Feasibility Study. The Feasibility Study drafted by the Lower Willamette Group (LWG; LWG 2012) was deficient, particularly its evaluation of the potential for natural recovery, and erroneously concluded that minimal active remediation (i.e., Alternative B) would be sufficient to achieve cleanup goals. EPA's 2016 Feasibility Study is a significant improvement over the LWG's report, particularly because EPA's report correctly acknowledges that natural recovery processes at the Site are highly variable, cannot accurately be predicted, and therefore should not be relied upon to achieve protection in the Site's most contaminated areas.

As described in detail below, we do not support EPA's preferred alternative, Alternative I. EPA does not sufficiently justify Alternative I as a remedy that will achieve protection of human health and the environment in a reasonable timeframe and in perpetuity. Of the alternatives that EPA evaluates in detail, Alternative G comes the closest to meeting these objectives. In the remainder of this memo, we describe our priorities for cleanup at the Site, as well as our preferred remedy.

The remainder of this memo is organized as follows:

1. Importance of Site to Five Tribes
2. Remedy Vision

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[1] The five tribes are the Confederated Tribes of the Grand Ronde Community of Oregon, the Nez Perce Tribe, the Confederated Tribes of Siletz Indians, the Confederated Tribes of the Umatilla Indian Reservation, and the Confederated Tribes of the Warm Springs Reservation of Oregon.

3. Pathway for Achieving Vision
4. Summary Recommendations
5. Support for Elements of EPA's Preferred Alternative
6. Evaluation of Alternatives
7. Remedy Elements
8. Monitoring and Maintenance
9. Remedial Design

1. IMPORTANCE OF SITE TO FIVE TRIBES

The lower Willamette River is a resource of great importance to the Five Tribes, as well as the general public. It is utilized for an array of activities including industrial and commercial enterprises, recreational uses, and tribal uses. In addition to the many human use services that are provided, the lower Willamette River provides important ecological functions. Historically, the Willamette River meandered across the valley floor, changing directions often, which created oxbows and islands (OSMB and OSP 2007). Seasonal flooding deposited rich sediments in the floodplain areas and provided migrating fish access to additional food sources and areas of refuge. Habitat ranged from the swift waters of the main channel to shaded and quiet backwaters in the meanders and tributaries (Willamette Riverkeeper 2015). The Willamette River was a dynamic river system and provided pristine habitat for natural resources. Since the early part of the last century, the Willamette River has been modified to control flooding, improve navigation, and develop industrial facilities through filling portions of the river and shoreline areas (NOAA 2012). The industrial facilities released and discharged hazardous substances to the Willamette River during their activities (e.g., wood treatment; marine construction and repair; storage of materials, such as pesticides). Although many industrial facilities are no longer in operation, legacy contamination remains. This contamination continues to release hazardous substances to the environment during storm events and navigation channel maintenance activities through upland runoff and resuspension of contaminated sediments, for example (PHNRTC 2007). These hazardous substances have degraded the available habitat and natural resources in the Willamette River, and earned Portland Harbor its place on the National Priorities List (NOAA 2012). For example, fish tissue contaminant concentrations are so high that it is not safe for vulnerable populations to consume any amount of key resident fishes, while consumption by the general public is only safe in very small quantities (OHA 2015).

Despite these hazardous substance releases, habitat still exists along and within the river and is utilized by natural resources. For example, remnant wetlands provide ecological functions in the form of filtering pollutants from the water column, providing flood control benefits, and creating tributary system habitat (Adolfson Associates 2009). Many migratory birds, mammals, and other organisms nest and forage in and around the Willamette River for at least part of the year. This includes, but is not limited to, piscivorous bird species such as the Bald Eagle, Osprey, Double-crested Cormorant, and Great Blue Heron; mammals such as mink and river otter; and infaunal and epifaunal

benthic invertebrates (e.g., daphnids, copepods, aquatic insects, gastropods, bivalves). The main river channel also provides a critical migration corridor for anadromous fish species, habitat for juvenile fish to forage and avoid predators, and habitat for resident and benthic species. Among the anadromous species, Pacific salmon (*Onchorhynchus* spp.), Pacific lamprey (*Entosphenus tridentatus*), and white sturgeon (*Acipenser transmontanus*) are of particular cultural importance (Stratus 2010). For instance, Pacific lampreys migrate up the Willamette River to the Willamette Falls, which is home to the only major lamprey harvest opportunity for Native Americans in the area (Campbell 2012).

Native Americans have been using the Willamette Valley for thousands of years, from time immemorial, due to the abundance of salmon, game animals, seasonal migrating birds, and edible plant varieties. Subsequent to European contact and treaty agreements, many tribal bands became confederated and were moved to reservations. Despite these changes, Native American communities reserved hunting and fishing rights (particularly targeting salmon and sturgeon species) and certain gathering rights and maintain a connection with natural resources in the Willamette Valley that is unique and separate from the value that the general public holds for these resources. For example, the Pacific lamprey harvest is of great importance to many tribes, and tribal members have noted a decrease in abundance and quality of this resource due to the contamination in the Willamette River (Campbell 2012; Five Tribes, *personal communication*). The tribes' treaty-protected hunting, fishing, and gathering subsistence activities not only provide tangible benefits in terms of food for tribal families, but also provide a cultural heritage of knowledge and skills that is passed down to younger generations, as well as providing opportunities for tribal members to bond over a shared activity and to link generations. As such, remediation of the Portland Harbor Site and the attendant reduction in fish contamination is directly connected to the preservation of the cultural heritage of the Five Tribes.

2. REMEDY VISION

The Site's myriad ecological functions and human uses – past, present, and expected future – underscore the tremendous importance of a remedy that achieves protection of human health and the environment within a reasonable timeframe. It is critical that the selection of the remedy be based, first and foremost, on best available science. Where scientific knowledge is uncertain, environmentally protective assumptions must be used.

To be truly protective of human health and the environment, the remedy must be protective in perpetuity. While we understand the difficulties inherent in planning for such a far-reaching time span, the health and well-being of our future generations depend on it. We urge EPA to adopt a remedy that will reduce risk to acceptable levels (i.e., preliminary remediation goals [PRGs] for all media) as quickly as possible. This includes substantially reducing fish tissue contaminant concentrations, with the goal of eliminating the need for fish consumption advisories (FCAs) in the future. We understand that, short of dredging the entire Site, it is not feasible for any remedy to achieve acceptable risk levels, including the removal of all FCAs, immediately after construction. Realistically, the remedy will need to rely on natural recovery processes to a certain degree. However,

a remedy that is certain to achieve permanent protection must be largely based on the removal of contamination from the river.

3. PATHWAY FOR ACHIEVING VISION

1) Achieving a protective remedy within a reasonable timeframe will require an aggressive, large-scale remedy. The remedy should predominantly entail removal of contaminated sediments, rather than leaving the contamination in-place, and include the use of best management practices (BMPs) to minimize short-term impacts (e.g., those described in FS Sections 2.4.3.1 and 4.2.2.5 and the special cases for non-aqueous phase liquid (NAPL) and debris and structure removal noted in FS Sections 3.4.8.6 and 3.4.8.7, as well as those outlined in FWS and NMFS 2016). Much uncertainty remains about the timeframe for natural recovery. Thus, the remedy should not be overly dependent on natural recovery. Capping contaminated sediments in-place will be a necessary component of the remedy. However, due to the risks and limitations associated with capping, use of this technology should be limited to instances where contamination cannot feasibly be removed and the contamination can be safely contained.

2) A timeframe must be established by which to meet all remedial action objectives (RAOs) and associated acceptable risk levels (i.e., PRGs). Although the Five Tribes advocate for a remedy that will achieve cleanup goals as quickly as possible, we acknowledge that natural recovery is a necessary part of the remedy. The selected remedy should have a very high likelihood of achieving cleanup goals within 10 years following construction. After decades of contamination, we should not have to wait any longer than absolutely necessary for a clean river. The uncertainty of natural recovery processes at the Site further underscores the importance of selecting a remedy that does not rely on a lengthy (i.e., more than 10-year) recovery period following construction.

   Below, we present our recommended pathway to achieving a protective remedy.

3.1 MONITORED NATURAL RECOVERY, ENHANCED NATURAL RECOVERY, AND CAPPING

3) We acknowledge that, for practical purposes, the remedy will need to rely in part on monitored natural recovery (MNR), enhanced natural recovery (ENR), and sediment capping. However, these technologies should be used judiciously. The hydrodynamics of the Willamette River are complex, and even areas that are primarily depositional also erode. The inability of EPA and LWG to develop a hydrodynamic and sediment transport (HST) model that accurately predicts deposition and erosion highlights this complexity. Because tools are not available to accurately predict deposition and erosion on a fine spatial scale, we cannot assert the degree to which natural recovery processes will occur. Thus, EPA must use the environmentally protective assumption that natural recovery will be limited. MNR and ENR must not be used in erosional areas and must only be used in areas of low contamination. MNR should be used only in depositional environments.

4) Capping contaminated sediments in-place can be a practical, even necessary solution in certain circumstances. Sediment caps, however, come with risks, costs, and limitations. The dynamic nature of the Willamette River presents challenges in designing and maintaining a permanent cap. Bathymetric surveys and other data collected over a ten-year period or less may not be indicative of river conditions in the long term. Further, the effectiveness of even comprehensive monitoring has its limitations: breaches in cap integrity may not be immediately detected and may re-contaminate the area. With climate change, large-scale climatic events, a Cascadia Subduction Zone event, and other uncertainties, there is a very real possibility that leaving contamination in place will result in re-releases over long timescales, such as 100 years or more, to the detriment of future generations.

5) The Five Tribes are concerned with any entity's ability to manage a cap in perpetuity. Indeed, EPA has only been in existence for 45 years. Thus, there are no examples of EPA successfully managing sediment caps for long timescales. We are concerned with whether the relevant entities (the responsible parties and EPA) will even exist 100 years from now, and whether funding and political willpower will be available for monitoring and maintenance.

6) We are also concerned about the restrictions on river use that would result from capping significant portions of the Site. Capping would permanently restrict future development in the river, including placement of structures and dredging. The upcoming remedy is EPA's chance to clean up the river – likely its only chance – for the use of future generations. EPA should therefore focus on developing a remedy not only that will protect human health and the environment but that will not significantly limit uses of the river in the future. We strongly urge EPA to adopt a remedy that does not rely on capping for mere convenience and cost savings, but rather is focused on removing the contaminated material wherever practicable.

7) An aggressive, removal-focused remedy is desirable because it will limit the need for MNR and institutional controls (ICs), both until PRGs are achieved and in perpetuity. In addition to the uncertainties associated with the success of MNR and the potentially lengthy time period required to achieve PRGs, MNR requires "significant administrative effort over the long term to oversee and coordinate sampling, data evaluation, and future additional actions, if any are needed" (EPA 2016b, p. 4-40). Thus, MNR may be an easier solution than removal in the short term but requires significant effort in the long term. EPA also acknowledges that ICs are of limited effectiveness. For instance, EPA states that FCAs "are not enforceable and are generally understood to have limited effectiveness," should "be relied upon to the minimum extent practicable," and do not protect the ecological receptors themselves (EPA 2016b, p. 4-12 and 4-88). Land use restrictions are also of limited effectiveness, as they "are difficult to monitor in a river environment" (EPA 2016b, p. 4-12).

For the above reasons, we urge EPA to adopt a removal-based remedy that limits the use of caps, ENR, and MNR.

3.2 MOBILE PRINCIPAL THREAT WASTE

8) No NAPL or principal threat waste (PTW) that cannot be reliably contained (NRC PTW) should be left in the river, as these materials can migrate and act as a source of ongoing contamination. The Five Tribes are not in favor of capping these materials, no matter how engineered the cap is. These materials may migrate horizontally, either now or in the future when environmental conditions, such as hydrology, change. Any structures impeding dredging of these materials should be seriously evaluated for the feasibility of removal. In addition, NAPL and NRC PTW at depth should be dredged using all available means. These materials should only be capped if under a structure that cannot be removed or if located too deep for best available technology to reach. (For more specific comments on the treatment of NAPL and NRC PTW, see Section 7, Remedy Elements, of this document.)

4.3 STRINGENT CLEANUP GOALS

9) We understand that EPA has the ability to change PRGs as they become final cleanup levels in the Record of Decision (ROD). The PRGs are generally based on sound science and applicable or relevant and appropriate requirements (ARARs), and we strongly urge EPA not to increase these values in the ROD. Certain parties, such as the LWG, have questioned the validity of the polycyclic aromatic hydrocarbon (PAH) PRGs, specifically. We support the existing PAH PRGs, which are based on Site-specific risk calculations.

10) We acknowledge that it is possible that certain cleanup goals based on background concentrations may never be met at the Site due to inputs from outside Site boundaries (e.g., upstream, upland). The Five Tribes do not support the issuance of an ARAR waiver (e.g., based on technical impractability) at this time, and believe that EPA is making appropriate steps to issue a ROD without such a waiver. Technical impractability (TI) waivers do not adequately protect treaty-protected rights and resources. (Treaty-protected rights and resources, while not explicitly referenced in the remainder of this document, are relevant to any discussion of the adequacy of the cleanup.) EPA should adopt a remedy that is likely to achieve cleanup goals. After remedy construction, progress toward cleanup goals should be monitored periodically, and the success of the remedy should be evaluated during five-year reviews. If the Site is not on target to achieve cleanup goals, the need for additional remediation (through a ROD amendment) should be seriously considered, in consultation with MOU partners. A decision to issue a TI waiver would require: (a) a robust, long-term monitoring dataset (covering the period from construction completion through at least 10 years post-construction) that indicates that certain contaminant of concern (COC) concentrations in specific media remain at steady-state concentrations above PRGs, and (b) a determination based on thorough analysis that additional active cleanup and/or additional source control cannot be undertaken. The Five Tribes expect to be full participants in any evaluations or decisions related to consideration of TI or other ARAR waivers.

3.4 CONSTRUCTION IMPACTS ON LOCAL COMMUNITIES

11) The Five Tribes are hopeful that community concerns about construction impacts can be addressed through BMPs and monitoring. The cleanup of this important resource, a cleanup that will benefit countless future generations, should not be compromised for the sake of immediate convenience (i.e., avoiding short-term construction impacts). Anticipated construction impacts are myriad and include potential air quality impacts, increased vehicular and vessel traffic, noise, odor, and lights. EPA should work with local communities to try to address their concerns to the extent possible while still achieving stringent cleanup objectives in a timely manner. BMPs should be used to control these impacts (e.g., as outlined in FS Section 4.2.2.5), and monitoring for impacts to human health should be rigorously conducted, with adaptive management employed if monitoring indicates unacceptable human health risks.

The remainder of this document provides specific comments on EPA's preferred alternative, the Proposed Plan, and the FS. It also details the Five Tribes' preferred remedy.

4. SUMMARY RECOMMENDATIONS

12) Based on the priorities described above and a technical evaluation of the Proposed Plan and FS, the Five Tribes support a version of Alternative G (with modifications noted herein). Primarily, we support the use of Alternative G RALs, but request specific changes to the technology assignment methodology and technology applications.

    Although we support elements of Alternative I, the alternative relies too heavily on uncertain natural recovery processes and leaves too much contamination in the river, posing human health and environmental risks in both the short and long term. By EPA's own interim target analysis, Alternative I is not expected to achieve cleanup goals within a reasonable timeframe and is therefore not protective of human health or the environment. As described below and by EPA's own evaluation of the evaluated alternatives, only Alternative G meets the two threshold criteria of "Overall Protection of Human Health and the Environment" and "Compliance with ARARs." Therefore, the greater cost and construction duration (which contribute to the evaluation of balancing criteria) of Alternative G compared to other alternatives should not be the basis for rejecting Alternative G. Of the alternatives that EPA carries forward to detailed analysis, EPA must select Alternative G.

5. SUPPORT FOR ELEMENTS OF EPA'S PREFERRED ALTERNATIVE

Although EPA's preferred alternative is not sufficiently protective of human health or the environment, we do support elements of the alternative, as follows:

13) We support the PRGs and advocate for their use as cleanup levels in the ROD.

14) We support EPA's definition of PTW for the Site. PTW should be defined, in part, based on calculated risk. PTW defined by higher contaminant concentrations at other sites is not relevant to EPA's definition of PTW at this Site.

15) We support EPA's inclusion of river banks in the remedy. Including river banks gives EPA authority to direct cleanup work (in the form of excavation and capping) to prevent recontamination of the Site. Although the Oregon Department of Environmental Quality (DEQ) has historically had jurisdiction over river bank cleanup along the Site, the addition of river banks to the remedy prevents any disconnects between EPA and DEQ's work, such as delays in river bank cleanup beyond the Site cleanup. EPA is not ignoring or undermining any of DEQ's upland efforts by doing so, and we understand that additional data (e.g., remedial design or post-construction monitoring data) may show that certain river banks and groundwater plumes originally slated for remediation under the Site-wide cleanup may no longer need active cleanup. We urge EPA and DEQ to continue to work closely to ensure that cleanup under the remedy does not unnecessarily conflict with past or ongoing river bank work or create an unnecessary burden for the responsible parties.

16) We support the fish consumption rates used in the Baseline Human Health Risk Assessment (BHHRA) and carried forward to the FS. Consumption rates in Oregon are typically higher than elsewhere in the country, including for tribal fishers (FWQC 2013; CRITFC 1994). The rates used in the BHHRA accurately reflect this reality.

17) We support EPA's rejection of LWG's HST model. As outlined in Appendix H of the FS, the model over-predicted the amount of deposition occurring within the Site, which in turn overstates the potential success of MNR (EPA 2016b). The model failed to properly link the sediment transport model with the hydrodynamic model. It also did not sufficiently address the effects of wind- and wake-generated erosion, which are likely to be significant for the Site, and did not address bedload transport.

18) We support EPA's use of the current Portland Harbor dataset for the purposes of the FS and Proposed Plan, which includes data from 1997 through 2011. Although the data are not strictly recent, collecting additional data to update the database at this time would only serve to delay progress in implementing a remedy. New baseline data must be collected for remedial design and will serve a similar purpose to data that would be collected now.

19) We support EPA's determination that Alternatives B and D are not sufficiently protective of human health or the environment (e.g., EPA 2016a, p. 50).

20) We are generally supportive of the BMPs that EPA proposes to minimize impacts to local communities and the environment.

21) We support the placement of a thin layer cover immediately following dredging in order to control residuals.

6. EVALUATION OF ALTERNATIVES

22) According to Superfund regulations (40 CFR 300.430) and guidance (e.g., EPA 1988, 1990), EPA must evaluate alternatives against two threshold criteria, as well as five balancing criteria. Typically, the two threshold criteria must be met in order for an alternative to be selected. The two threshold criteria are "Overall Protection of Human Health and the Environment" and "Compliance with ARARs." In the FS, EPA evaluates the first of these threshold criteria based on whether each alternative meets "interim targets" for each RAO. Interim targets are goals set for the time period immediately following construction completion. If an alternative is expected to meet interim targets post-construction, the alternative is assumed to meet cleanup goals within a reasonable timeframe. For this Site, EPA defines a reasonable timeframe to be 30 years (measured from the start of construction). EPA's comparison of alternatives to interim targets concludes that Alternative I only meets two out of the five measurable interim targets. Based on EPA's own definition of interim targets, Alternative I is therefore not expected to meet cleanup goals within 30 years and thus does not meet the "Overall Protection of Human Health and the Environment" criterion. EPA errs when it concludes that Alternative I meets this criterion. Of the alternatives evaluated, only Alternative G meets all measurable interim targets.

23) EPA determined that all alternatives except Alternative B meet the second threshold criterion, "Compliance with ARARs." Given that many PRGs are based on chemical-specific ARARs, if the interim target analysis determines that an alternative will not meet PRGs within a reasonable timeframe, it logically follows that the alternative also does not comply with ARARs. Therefore, based on the above comment, the only alternative that complies with ARARs is Alternative G. Thus, Alternative G is the only alternative that meets the two threshold criteria and is the only defensible alternative. The higher cost and greater construction impacts of Alternative G compared to other alternatives should not be a reason for rejecting Alternative G.

24) We acknowledge that EPA's ability to determine whether and when alternatives will meet cleanup goals in the absence of an accurate natural recovery model is very limited. We appreciate EPA's attempt to evaluate the ability to meet PRGs based on the interim target concept, which sets targets for cleanup post-construction, a time point at which it is easier to predict sediment concentrations because an understanding of natural recovery is not required. We are concerned, however, about the selected interim targets. EPA does not justify why meeting these particular interim targets post-construction ensures that the alternative will meet cleanup goals after 30 years. The selection of the RAO-specific interim targets appears random and not rooted in science. Thus, we do not have confidence in this approach. Lacking a better approach, EPA must defer to the most environmentally protective option, Alternative G. Coincidentally, a strict application of EPA's interim target approach also supports the conclusion that Alternative G is the only defensible alternative, as explained above.

25) Aside from our assertion that Alternative G is the only alternative carried forward for full evaluation that meets the two threshold criteria, the substantial reductions in risk afforded by Alternative G further justify the selection of this alternative. The figures and tables in Section 4.2 of the FS illustrate these reductions. The Alternative G risk reductions are especially apparent when the data in Section 4.2 tables are graphed (Attachment 1). Although we advocate for Alternative G, we note that there are also substantial risk reductions between Alternatives E/I and F, highlighting the superiority of Alternative F over Alternatives E and I. EPA's decision to select Alternative I over alternatives that have clear risk reduction benefits is based on a value judgment of the relative importance of short-term construction impacts and cost compared to long-term protection of human health and the environment. The Five Tribes strongly believe that long-term protection of human health and the environment should drive the remedy decision; Alternative G is therefore the best alternative of those evaluated by EPA.

26) As noted in the Pathway for Achieving Vision section above, we support a remedy that is expected to achieve protection within 10 years following construction, not 30 years from the start of construction. According to EPA, Alternative G would achieve protection in 11 years following construction (i.e., the remedy would be protective 30 years following the start of construction, with a 19-year construction duration). Thus, Alternative G nearly meets our objective of achieving protection within 10 years following construction. According to EPA's analyses, the other alternatives do not.

27) Table 15 of the Proposed Plan attempts to compare the performance of each alternative against the two threshold criteria and five balancing criteria. For this exercise, a qualitative approach is used to rank alternatives from "least" (worst) to "best" for the five balancing criteria. Alternatives are ranked progressively "better" or "worse" (with the exception of "Short-Term Effectiveness"; see comment below). For instance, for the "Long-Term Effectiveness and Permanence" criterion, G is ranked better than F, which is better than E, which is better than D, which is better than B. With the exception of I, which is always ranked the same as E, no two alternatives receive the same ranking. This approach leads to a bias toward selecting the remedy in the middle (E and I are in the middle of the other alternatives) because EPA is trying to "balance" the "Short-Term Effectiveness," "Implementability," and "Cost," all of which get "worse" with increasingly aggressive remedies, against "Long-Term Effectiveness and Permanence" and "Reduction of Toxicity, Mobility, or Volume through Treatment," which get "better" with increasingly aggressive remedies. EPA should not base its decision on a system that by default selects the middle remedy. The middle remedy is not by definition the best remedy.

28) EPA notes that the "Short-Term Effectiveness" balancing criterion includes both the short-term environmental and community impacts during construction and also the environmental and human health impacts of the Site until RAOs and PRGs are attained (EPA 2016b, p. 4-13). Both of these components of the criterion are discussed in the detailed analysis of alternatives (EPA 2016b, Section 4.2). However,

the scoring in Table 4.3-3 of the FS appears to consider primarily the short-term impacts during construction, an approach that favors the less aggressive alternatives (e.g., Alternative G was scored worst). Though we agree that the construction impacts during the four-month in-river work window of each year would be greatest under Alternative G, this alternative would achieve cleanup levels the fastest and would therefore present the least human health and environmental risks in the short term. This is an important point because, as indicated in the comment above, EPA appears to arrive at Alternative I by weighing the two balancing criteria that favor more aggressive cleanups against the three that currently favor less aggressive remedies. If the "Short-Term Effectiveness" criterion is re-scored as we propose here, the evaluation would correctly tilt toward a more aggressive cleanup.

Presumably, EPA's "moderate" (rather than "best") ranking of Alternative B accounts for the fact that this alternative would have the fewest construction impacts but the greatest impacts post-construction. However, the ranking of the other alternatives does not appear to penalize alternatives for impacts post-construction. We also disagree with the designation of Alternatives E and I as "better", while Alternative F receives a "low" rank. Even if EPA is scoring these alternatives based only on construction impacts, we do not believe that the moderate increase in construction time and footprint between Alternatives E/I and F justifies this large jump.

29) EPA appears to justify selecting Alternative I over Alternative G in part because the latter alternative "impacts [benthic] habitat for the longest period of time during construction (19 years) and would take the longest time for benthic populations to recover due to the large area of habitat impacted (776 acres)" (EPA 2016a, p. 60). While dredging and capping do disturb benthic habitat during the duration of the disturbance, benthic organisms tend to recolonize within a period of several years following the end of disturbance (e.g., Wallace 1990; Lamberti et al. 1991). The duration of disturbance of any given area of benthic habitat would depend on how work is sequenced. If, for instance, remediation is conducted from upstream to downstream, the remediated areas would have the opportunity to recolonize as equipment moves downstream. In that case, the duration of impact of any given area would be expected to be significantly less than 19 years.

    Further, EPA frequently refers to the greater impact to the environment and benthic community of Alternatives F and G compared to Alternatives E and I (e.g., EPA 2016a, p. 66; EPA 2016b, p. 4-98 and p. 4-100). While we assume that EPA intends to refer to *short-term construction* impacts only, the language as written is misleading. Overall, Alternatives F and G will have a more positive impact on the environment and benthic community due to greater risk reduction following construction and a shorter time to achieve cleanup goals.

30) In relation to removing contaminated sediment and river bank soil and transporting it through local communities, EPA argues that "Alternatives F and G would impose significantly greater impacts to the environment and community and have much greater costs (1.5-2 times more than Alternatives E and I) that are not commensurate

with the additional risk reduction relative to Alternatives E and I" (EPA 2016a, p. 60; EPA 2016b, p. 4-99). Although Alternatives F and G may have greater short-term impacts and costs compared to Alternatives E and I, EPA does not sufficiently justify that these impacts are not commensurate with the additional risk reduction. We believe that the greater risk reduction does justify the additional construction impacts and costs of Alternatives F and G.

31) The FS also does not clearly present the amount of NAPL and NRC PTW material that is expected to remain in place by alternative. This information is distinctly different from the amount of PTW addressed by each alternative (e.g., EPA 2016b, Table 4.2-9), and is not easily determined through the use of existing tables and information. We ask EPA to clearly present this information.

32) The Five Tribes appreciate the addition of the GeoPDF to EPA's Portland Harbor Superfund website, which allows users to overlay various data layers presented in the FS, such as sediment contaminant concentrations and technology assignments for each alternative. The GeoPDF begins to address the concern we have expressed previously regarding our inability to readily determine whether non-focused COCs are adequately addressed by the proposed remedy. Because high concentrations of focused COCs (i.e., COCs for which RALs are developed, including PCBs, DDx, total PAHs, PeCDF, PeCDD, and TCDD) and non-focused COCs are generally co-located, areas designated for active remediation (i.e., sediment management areas, or SMAs) based on focused COC concentrations also tend to address areas of high concentrations of non-focused COCs. However, there are a few areas where this is not the case. For example, high concentrations of arsenic in surface sediment exist on the east side of the McCormick & Baxter cap, but this area is not assigned any active remediation under Alternative I. In contrast, Alternative G would require dredging with a cap in this area. Similarly, high concentrations of chromium and copper in surface sediments (and copper in subsurface sediments) are located at the north end of the RM 6.5E SDU, an area that is assigned MNR under Alternative I. Alternative G would require capping and dredging of this area. These observations support our preference for selecting Alternative G as the preferred alternative. If EPA selects a remedy less protective than Alternative G, we request that EPA expand SMAs to address areas exhibiting high concentrations of non-focused COCs, such as the examples we have described.

    In addition to the examples described above, we note several areas of relatively high non-focused COC concentrations that fall outside SDUs and are therefore assigned MNR for all alternatives. For instance, high concentrations of several contaminants (e.g., bis(2-ethylhexyl) phthalate in surface sediment) exist in the east-most portion of Swan Island Lagoon. However, this area is not included in the Swan Island SDU. In addition, high concentrations of TBT in subsurface sediments between the RM 6.5E SDU and Swan Island Lagoon (between RM 7 and 8) fall outside of any SDU. We request that EPA expand SDUs to include these areas, as well as other areas with high concentrations of non-focused COCs.

Our above analysis is based on areas of *relatively* high non-focused COC concentrations. We recommend that the contaminant intervals be expressed as multiples of the PRG or that EPA include a risk-based threshold in the legend for each of the COCs (most likely, the corresponding PRG) to enable a more meaningful evaluation of COC concentrations.

7. REMEDY ELEMENTS

7.1 REMEDIAL TECHNOLOGIES

33) EPA assumes that MNR will be applied to all areas within the Site boundary that are not otherwise actively remediated. The Five Tribes assert that MNR will only be effective in areas that are predominantly depositional, not erosional. EPA's analysis of the natural recovery potential of each sediment decision unit (SDU) indicates that all but two SDUs are considered "neutral," that is, neither consistently depositional nor erosional (EPA 2016b, Section 3.6.1.2). The other two SDUs (RM 6NAV and RM 11E) are erosional. The results of this analysis do not provide confidence that natural recovery will be effective in any of the SDUs. Further, it is clear from many of the figures in the Figure D8 series of Appendix D of the FS that most SDUs contain at least some erosional areas. The summary analysis (compilation of results across all relevant data types) is conducted on SDUs only (EPA 2016b, Table D8-3), so the natural recovery potential for areas outside the SDUs must be visually evaluated based on Figures D8-1 through D8-7. However, the areas outside of SDUs seem to have similarly mixed results.

    We are particularly concerned about the RM 6NAV SDU, which EPA acknowledges is not conducive to natural recovery but which is primarily slated for MNR under Alternative I. We understand that any area in this SDU that is not dredged under the remedy may be navigationally dredged (because it is in the navigation channel), which may remove material whose concentrations are above PRGs but below RALs. However, we are not convinced that navigational dredging will occur in a timeframe relevant to our requested recovery period of 10 years post-construction. We urge EPA to assign ENR to any area within this SDU that is not otherwise actively remediated if navigational dredging is not expected to occur within a period of 10 years post-construction, and if the navigational dredging is not expected to be implemented throughout the entire MNR area of the SDU. Further, although a significantly lower percentage of RM 11E is slated for MNR under Alternative I compared to RM 6NAV, ENR, rather than MNR, should be assigned to any areas in this SDU not assigned to dredging or capping because this SDU is also erosional, and is not primarily in the navigation channel.

    Therefore, EPA's finding that the entire river is at best neutral with regard to the potential for natural recovery highlights the need to select a remedy that is focused on active remediation and minimizes reliance on natural recovery.

34) As stated previously, we urge EPA to select removal over capping whenever feasible, and especially when NAPL or NRC PTW is present. We are skeptical about the effectiveness of EPA's proposed significantly augmented reactive caps in containing

these materials. At which sites has this technique been used to successfully contain these materials? For instance, the FS references the use of an organoclay reactive cap at the McCormick and Baxter cap but does not discuss the success of this cap (EPA 2016b, p. 3-5). EPA indicates that reactive caps may not be effective when multiple contaminants (e.g., metals and organics) are present (EPA 2016b, Table 2.4-2). How does EPA plan to assess and manage this issue? We also point out that reactive caps need to be periodically replaced, as their sorptive or chemically reactive treatment capabilities degrade over time (EPA 2016b, Table 2.4-2). We are concerned about the environmental impacts of replacing a cap over NAPL or NRC PTW. These concerns underscore the importance of removing NAPL or NRC PTW by all available means. We also point out that EPA describes the use of activated carbon for in-situ treatment as "permanent and irreversible as long as there is sufficient quantity of activated carbon to address the amount of contamination present" (EPA 2016b, p. 4-33). Based on Table 2.4-2, it appears that EPA expects that activated carbon will need to be periodically replaced. EPA should clarify its expectation regarding the permanence of activated carbon and the need to replace it over time.

35) EPA assumes that structures servicing active wharfs or shore-based facilities will remain intact during remedial activities (e.g., EPA 2016a, p. 36; EPA 2016b, p. 3-10). In contrast, we contend that EPA should seriously explore removing all such structures in active remediation areas to the extent practicable, particularly if they impede the removal of NRC PTW or NAPL. Perhaps there are major active structures whose removal is not possible. However, it may be feasible to remove minor active structures to allow for the dredging of highly contaminated material from the Willamette River and to avoid capping such material.

36) It is not currently clear why Section 3.2.2 of the FS ("Technologies Applied to PTW Areas") contains a sub-section describing containment technologies, but only describes significantly augmented reactive caps. We question why other relevant cap types used for addressing PTW are not also described in this section (e.g., reactive armored caps). Similarly, removal of PTW is not described in this section despite the fact that areas of PTW are subject to dredging. These omissions become confusing later in the document when these other technology types are applied to areas with PTW (e.g., EPA 2016b, Section 3.8.1), but their application to PTW is not described when the technology is originally presented (e.g., EPA 2016b, Section 3.4.7.4). These omissions compound our confusion when reviewing the technology assignment flowcharts. We suggest including descriptions of all technologies applied to PTW areas in Section 3.2.2 with a table to summarize when these technologies are used in each area (shallow, intermediate, river bank, and navigation channel/future maintenance dredge [FMD] regions) once the different regions are described.

37) EPA assumes a minimum thickness of 12 inches for the physical isolation layer of caps (EPA 2016b, p. D-15). This thickness is based on a maximum burrowing depth of 4 inches. (The 12 inches is calculated based on the sum of the 4-inch burrowing depth [i.e., the biologically active zone], a 2-inch buffer, and an additional 6-inch layer to increase the travel time of dissolved contaminants.) The BERA defines the biologically active zone of the riverbed as the top 20 cm (about 8 inches), not 4

inches. Further, lamprey ammocoetes (a species of cultural significance to the Five Tribes) burrow up to 6 inches (Liedtke et al. 2015) and may have the ability to burrow up to 8 inches (T. Whitesel, *personal communication*, February 9, 2016). We thus support using a biologically active zone of 8 inches instead of 4 inches. We ask EPA to evaluate whether the physical isolation layer would need to be increased accordingly or whether the 12 inches would be sufficiently thick to protect lamprey ammocoetes and other burrowing organisms.

38) FS Section 3 refers frequently to sand caps and layers of sand placed either post-dredging or to accomplish ENR (e.g., EPA 2016b, p. 3-32). We encourage EPA to consider not just pure sand but sandy material with higher organic content. Silts and clays and associated organic matter in sandy material can greatly improve the filtering and sorptive capacity of the cap. Use of a more mixed sediment cap also has the potential to be a better match to the ambient river bottom and may therefore more quickly become ecologically compatible. We suggest using a more inclusive term like "predominantly sandy sediment" or "sandy material."

39) The Five Tribes have persisting concerns about thin layer placement in the navigation channel/FMD region. The FS states that "SMAs within the federally authorized navigation channel or designated as FMD are assigned dredging as a technology due to minimum water depth requirements, the placement of thin sand layers, in-situ treatment amendments, and conventional or reactive caps because stand-alone technologies above the established navigation dredge depth are considered incompatible with current and future waterway uses" and goes on to say, "Even in the case of dredging, navigation and maintenance dredge depth requirements will need to be considered during the design and implementation of dredging activities and the placement of any thin layer covers for managing residuals" (EPA 2016b, p. 3-10).

    The first sentence is poorly structured and confusing regarding whether EPA considers thin sand layers, in-situ treatment amendments, and conventional or reactive caps all to be incompatible with current and future waterway uses. Although caps are often considered incompatible with navigation channel/FMD regions, the latter sentence appears to include thin layer covers in remedial action for that zone. It is our understanding that a 12-inch sand cover will be applied to all dredging areas, including the navigation channel and FMD areas (EPA 2016b, p. 3-23). We request that EPA clarify this apparent discrepancy (i.e., between p. 3-10 and p. 3-23). This is an important issue, since dredging will be applied to significant stretches of these areas. The Five Tribes believe that thin-layer sand covers would be effective in managing residuals in these areas and thus would be appropriate; this is especially true if navigational dredging is not anticipated for many years.

40) It is our understanding that EPA is considering giving the U.S. Army Corps of Engineers (the Corps) the authority to conduct remedial dredging in the navigation channel. The Corps would pay for the dredging (through Congressional appropriations), and the responsible parties would pay for disposal of the material. If EPA adopts this approach, we urge EPA to ensure that the Corps is following all

precautions, BMPs, and any other requirements the responsible parties would be required to implement.

It is also our understanding that the Corps will at some point conduct navigational dredging at the Site. Will this only occur after construction of the remedy, or might it occur concurrently with remedy construction (i.e., in MNR areas)? It is important that navigational dredging not interfere with the remedy, either by slowing down the remedy or by causing undue resuspension of contaminated sediment or recontamination.

41) We are open to the idea of constructing a confined disposal facility (CDF) to contain contaminated sediments on-site. Many of our concerns about capping, described above, also apply to CDFs. On balance, however, we feel that a CDF could be an appropriate, cost-effective solution for the disposal of large quantities of contaminated sediment. A CDF would greatly reduce risks and community disturbances related to transporting contaminated material to a landfill. In order for the Five Tribes to fully support a CDF, however, a number of criteria would need to be satisfied, as outlined in Table 3.4-7 of the FS and Table 8-1 of the CDF Design Analysis Report (Port of Portland 2011). The CDF must be designed to safely contain material in perpetuity, withstand a Cascadia Subduction Zone event, and be protective of human health and the environment. The design must include the best available technology (e.g., treating dredged sediment during placement) to enhance the performance of the CDF and prevent groundwater or effluent discharge from re-contaminating the river. Funds must be committed to monitor and maintain the CDF in perpetuity. The monitoring program must be comprehensive and detailed in the ROD, including but not limited to detailed emergency management and contingency plans. Material deposited in the CDF must meet rigorous standards: for instance, it must meet the substantive requirements of the 404(b)(1) guidelines under the Clean Water Act, must not be Resource Conservation and Recovery Act or State hazardous waste, and must be shown to be capable of being contained. ICs must be sufficient to protect the integrity of the CDF and prevent exposure to humans and the environment. There also must be measures in place to enforce the ICs.

In summary, although the Five Tribes prefer complete removal of contaminated sediments off-site, we could potentially support an upland CDF, if and only if the result on balance would be a more protective, permanent remedy (e.g., higher volume of sediment removal) and rigorous standards are fully met for its design, construction, operation, maintenance, and monitoring in perpetuity.

None of this section applies to a confined aquatic disposal (CAD) cell, which the Five Tribes would oppose in any instance. It is our understanding that the hydrology of the vast majority of the Site is too dynamic to safely contain subaqueous contaminated material. As noted in FS Table 2.4-3, CAD cells have not been demonstrated to be capable of safely containing contaminated material at the Site in the long term. The design of a potential CAD cell has not been sufficiently advanced to demonstrate that implementation is feasible. Key types of modeling to support an evaluation of long-term effectiveness, such as contaminant migration, were not performed. Hydrologic

and hydraulic modeling to address flood rise and flood storage also was not performed. Further, an evaluation of short-term impacts has not been conducted.

7.2 FISH CONSUMPTION ADVISORIES

42) EPA acknowledges that the current FCAs may not be sufficiently protective of all populations (EPA 2016b, p. 4-15). We agree that existing advisories are not adequately protective. We urge EPA to enact protective advisories as quickly as possible after the ROD is signed. These advisories should be based on existing data and can be revised if warranted based on data collected during remedial design.

43) EPA asserts that the preferred alternative will achieve PRGs 23 years following construction (EPA 2016c). EPA estimates that at that time, at which point the Site will presumably be de-listed, safe fish consumption will be limited to 160 fish meals per 10 years (based on a non-cancer hazard of one). This fish consumption rate is significantly lower than the tribal consumption rate for resident fish that is used in the BHHRA (1,380 resident fish meals per 10 years[2]). The Five Tribes find this discrepancy to be wholly unacceptable. We urge EPA to apply all available means to reduce contaminant inputs to the Site (e.g., from upstream, upland, and aerial sources) so that rates of safe fish consumption may be further increased in the future.

44) We are unsure which entity will have authority to issue FCAs during the remedy (i.e., EPA or Oregon Health Authority [OHA]). If OHA will be the responsible agency, then EPA should provide OHA adequate funding (e.g., through a Cooperative Agreement) to implement the advisories and collect Site-specific data on fish tissue contaminant concentrations.

45) We request that FCAs be developed that are protective of all segments of the fishing community, including tribal fishers, and that the BHHRA assumptions be used to develop the FCAs. This will require FCAs to be developed for multiple segments of the population, including nursing mothers, children, and other adults, as well as for consumption of fillets and whole-body fish. We also request that FCAs be developed based on the cumulative risk of all Site COCs, not just focused COCs.

46) As noted above, FCAs are expected to be needed after the Site is de-listed. Would OHA have authority for issuing and enforcing these FCAs? If so, we request that the FCAs be developed using the same methodology that will be used to set FCAs before the Site is de-listed (see our recommendations above). OHA's methodology for developing the current FCAs appears to be inadequate for protecting fish consumers.

47) Although EPA does not indicate that restrictions for consumption of migratory fish are currently necessary nor will be needed in the future, we urge EPA to thoroughly monitor contaminant concentrations in the tissue of migratory fish to determine whether FCAs for migratory fish are needed. Of specific concern to the Five Tribes, lamprey ammocoetes spend three to seven years burrowed in Site sediment and

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[2] The BHHRA assumes 23 fish meals per month, with half of meals being comprised of resident fish.

therefore are likely exposed to more Site contamination than other migratory fish like salmon, who spend only one to three years in freshwater before going to sea and who are not known to spend extended periods directly exposed to Site sediment.

48) The Proposed Plan outlines expected FCAs during construction (EPA 2016a, p. 58), but the underlying assumptions for those calculations do not appear to be described in either the Proposed Plan or the FS. For example, did EPA calculate expected water column concentrations during construction due to resuspension of contaminants and then model concentrations in fish tissue based those water column concentrations? Do the recommended fish meal limits represent fillet or whole body consumption?

49) The current FCA signage at the Site has been inadequate to date. We request that the Site be well-signed and that regular inspection and maintenance of those signs occur. Furthermore, surveys of fishers should be conducted with each five-year review to determine the effectiveness of the FCAs. We urge EPA to consider culturally appropriate outreach strategies in addition to signage.

7.3 OTHER INSTITUTIONAL CONTROLS

50) FS Section 3.4.7.7 (EPA 2016b, p. 3-21) describes some of the ICs that will be needed on both a short-term and long-term basis after the remedy has been constructed. One such IC is waterway use restrictions, or regulated navigation areas (RNAs), which aim to ensure that the integrity of caps is maintained by prohibiting activities such as the anchoring of vessels. The area requiring RNAs for the Site will likely be orders of magnitude greater than the existing RNAs in the vicinity. The Five Tribes are unsure about the extent to which the RNAs would affect vessel operation. It is our goal to see an environmentally protective remedy chosen for the Site that will not significantly affect (i.e., restrict) human use of the river in perpetuity. We request that the Corps and other relevant parties be consulted to determine whether RNAs in the identified capping locations will be burdensome. We would prefer their input as early in the process as possible. If RNAs would be burdensome, we urge EPA to remove contaminated material in order to avoid the need for RNAs associated with capping.

51) The Five Tribes request that an Institutional Control Implementation and Assurance Plan be developed during remedial design. The development of this plan should be referenced in the ROD.

52) Monitoring of the effectiveness of ICs is critical to the success of the remedy. Certain ICs will need to be monitored, at a sufficient frequency and in perpetuity, including RNAs and land use/access restrictions. The ROD should specify the frequency of these types of monitoring, as well as actions that EPA will consider if the ICs are shown to be ineffective.

7.4 FLEXIBILITY IN THE REMEDY

53) The LWG has expressed concern that EPA's technology assignment approach is not nuanced enough. For instance, the LWG seems concerned that remedial design data will indicate that dredging in a designated dredge area is not technically feasible, and

another active remediation technology must be employed (e.g., a small area is too close to a major structure to be dredged to the required depth, or slope failure is predicted due to deep dredging depths in a confined area). It is our understanding, based on conversations with EPA, that if the ROD requires an area to be dredged, the responsible parties do not have the flexibility to cap that area (i.e., if it entails a deviation from the technology assignment approach). A decision to cap in an area previously designated as dredge would require a ROD amendment. More broadly, if a point of flexibility is not specified in the ROD, it is not a flexibility that the responsible parties can exercise during remedial design in the absence of a ROD amendment. We generally support this approach and believe it is important for all interested parties to understand what the ROD does and does not allow. Transparency is essential.

54) We do consider it a possibility that remedial design data may indicate that an assigned technology is not feasible to employ at a particular location. Lacking in the Proposed Plan and FS is a description of how flexibility during remedial design would be granted, if at all, or how MOU partners would be involved. We request clarification in the ROD that MOU partners will be consulted when EPA is considering granting deviations from the selected remedy. The Five Tribes are generally in favor of responsible parties dredging in areas designated for capping (e.g., if they would like to avoid monitoring/maintenance costs for a cap), such as if material is under a structure that the responsible parties can remove. Conversely, the rationale for capping instead of dredging would need to be compelling to gain our support.

    An example of where a small degree of flexibility may be needed is at the border of the shallow and intermediate regions in some cases. We understand that intermediate regions may be dredged to depths of up to 15 feet below the current mudline. The bathymetry of the adjacent shallow areas will be maintained. Therefore, there may be a significant difference in depth between these two adjacent areas. We are concerned about cap stability in shallow areas that are adjacent to areas up to 15 feet deeper. Even with an adequately shallow side slope, sloughing may occur, compromising the stability of the cap. EPA's assumptions are sufficient for FS purposes; EPA likely intends to address this concern in remedial design. However, this example does raise the question of the degree to which EPA will grant the responsible parties flexibility during remedial design (e.g., deviations from the exact technology footprints resulting from a combination of sediment contamination data, RALs, and the technology assignment flowcharts). The Five Tribes expect to be involved in any considerations of deviations from the selected remedy.

55) We understand that new data will be collected during remedial design, and the result of these new data may be that the SMAs change in area. We do not consider this to be a deviation from the ROD or a flexibility. We do, however, request that EPA engage MOU partners in the evaluation of proposed sampling plans to collect new data, data quality assessments, and the use of new data, such as whether the new data should replace the old data (e.g., as evidence of recovery) or merely be added to it (e.g., due to the heterogeneous nature of the system).

7.5 TECHNOLOGY ASSIGNMENT APPROACH

The following comments address the multi-criteria decision matrix of the FS, which EPA uses to assign active remediation technologies throughout the intermediate region of the Site (EPA 2016b, Figure 3.4-16).

56) For areas of moderate to heavy debris, we question EPA's decision to score capping higher than dredging. EPA notes that a debris removal pass may be needed prior to dredging in areas of moderate to heavy debris. Depending on the environmental, logistical, and cost implications of a debris removal pass, such a pass may well be worthwhile to guarantee permanent removal of contaminated material from under the debris. Thus, it may be more appropriate to score capping and dredging the same.

57) The deposition section of FS Section 3.4.6.1 states that areas were evaluated using two lines of evidence: the difference in elevations between bathymetric surveys and the ratio of surface to subsurface sediment concentrations (EPA 2016b, p. 3-14). Figure 3.4-16 implies that only one of these criteria must be satisfied to consider an area depositional, as opposed to both needing to be satisfied. It also implies that a cell would only receive one score for the depositional category, not one score for each of the deposition lines of evidence. We instead request that either: (1) the two lines of evidence each receive their own score or (2) in order to receive a depositional designation, both lines of evidence must be satisfied. EPA's methods regarding the above points need to be clearly stated in the text.

58) In depositional areas, we think it would be most appropriate to assign a 0 rather than -1 to dredging since deposition is not an impediment to dredging. A depositional area may necessitate more dredging than a non-depositional area, but this possibility does not limit the application of this technology.

59) The FS states that "When dredging and capping score equally, capping is selected due to the lower initial capital cost." (EPA 2016b, p. 3-17). The Five Tribes disagree with this decision rule. As stated above, we have a strong preference for the removal of contaminated material. Further, the above quotation implies that EPA selects capping over dredging because it is more cost-effective. We point out that capping generates long-term costs associated with monitoring, maintenance, and oversight of the caps. Because caps must be maintained in perpetuity, these costs may be significant and eventually eclipse the larger initial capital cost of dredging, in non-discounted terms. Without an understanding of the frequency of instances when dredging and capping are scored equally and the overall effect on the technology assignments due to this decision rule, we are in favor of selecting dredging, rather than capping, in the event of a tie.

60) The matrix currently assigns a score of 1 to armored cap and cap categories in the presence of rock, cobble, or bedrock, and structures or pilings. The Five Tribes do not believe that these conditions favor these technologies. Rather, we believe that they neither favor nor limit the technologies. Thus, we feel these conditions merit a score of 0 for these technologies.

The following comments pertain to the technology assignment flowcharts (EPA 2016b, Figures 3.8-1a through d).

61) In general, we find the technology assignment flowcharts to be confusing since the text of the FS does not always match what is presented in the figures. We provide two examples of these inconsistencies, though additional inconsistencies exist. First, the text of the FS states that for river banks, "if NAPL or PTW that is not reliably contained is present, a reactive armored cap is assumed" (EPA 2016b, p. ES-9). However, Figure 3.8-1d does not show the use of a reactive armored cap. Instead, options include excavation with a significantly augmented reactive cap and excavation with an engineered cap. A second example is dredging in the shallow region. The FS states that "the shallow region is assigned dredging with backfilling or capping after dredging to remove or contain contamination while maintaining water depths" (EPA 2016b, p. 3-11). However, Figure 3.8-1c does not specify that dredging will occur for NAPL or NRC PTW that is under a structure, despite the fact that a significantly augmented reactive cap with armor stone is the assigned technology. This problem exists for other cap types in the flowchart as well (e.g., reactive armored cap and armored cap) even though many technology descriptions do specify that dredging will occur. We understand that dredging is difficult under structures, but EPA has also stated its intention to maintain existing bathymetry in shallow areas. It is unclear which source, the FS text or the figure, accurately reflects EPA's intentions. To reduce confusion, we strongly suggest ensuring that the text of the FS and the technology assignment flowcharts are consistent. We support the use of significantly augmented reactive caps on river banks where NAPL or NRC PTW is present. We also support dredging before capping in the shallow and intermediate zones when NAPL or NRC PTW is present.

62) Related to the above comment, the term "reactive armored cap" is used consistently in the FS, but the section where that type of cap is described is titled "armored reactive cap." We suggest using consistent nomenclature to avoid confusion.

63) As noted above, we strongly urge EPA to remove NAPL and NRC PTW if at all possible. Any structures impeding dredging of these materials should be seriously evaluated for the feasibility of removal. In line with our preference for removal of these structures, we suggest an additional decision point for NAPL and NRC PTW that are under a structure in shallow and intermediate regions (EPA 2016b, Figures 3.8-1c and 3.8-1b). This decision point should be "Can structure be removed?" A "Y" answer would lead to dredging rather than (or in addition to) a significantly augmented reactive cap. The Five Tribes expect to be involved in decisions regarding whether individual structures can be removed.

64) Similarly, for highly toxic PTW that is under a structure (in the intermediate and shallow areas), we support adding a decision point that asks "Can structure be removed?" A "Y" answer would lead to dredging. Because we prioritize removal of NAPL and NRC PTW that are under structures compared to highly toxic PTW under structures, we would support EPA applying a higher standard for leaving a structure in place for NAPL and NRC PTW compared to highly toxic PTW (i.e., EPA should

go to greater lengths to remove structures prohibiting the removal of NAPL and NRC PTW compared to highly toxic PTW).

65) According to the shallow zone flowchart, if NAPL or NRC PTW is not under a structure and is at a depth of greater than 15 feet, then a reactive cap, rather than a reactive residual layer, would be used at the bottom of the dredge prism (also as described in EPA 2016b, p. 3-38). Although it seems less likely that the material would migrate vertically through a reactive cap and other material totaling 15 feet in thickness, we are concerned about lateral migration. How does EPA envision evaluating the potential for lateral migration during remedial design? The potential for lateral migration underscores the importance of removing NRC PTW if at all possible.

66) The shallow water flowchart indicates that, unless NAPL or NRC PTW is present, if the RAL concentrations are not expected to be reached within 5 feet of depth, the contaminated sediment will be dredged to 3 feet and replaced with an engineered cap + beach mix (also described in EPA 2016b, p. 3-38). The depth criterion in this analysis is an important decision point. Shallow areas provide important habitat and support numerous human uses; for these reasons, as well as reasons stated elsewhere in this document, the Five Tribes would like to minimize capping in shallow areas to the extent practicable. Figure 3.4-32h indicates that using the 5-foot criterion would leave substantial contamination in the river, especially for Alternatives E through G (EPA 2016b, Figures 3.4-32d through f). In contrast, using a 10-foot criterion would remove most of the shallow water contamination. We believe that the 10-foot criterion is more appropriate. However, we would consider supporting an intermediate depth, such as 7 feet, if the evidence showed that intermediate depth would be nearly as effective at removing contamination as the 10-foot criterion.

67) The intermediate area flow chart indicates that an area originally assigned an engineered cap could be "demoted" to broadcast granulated activated carbon (GAC), ENR, or MNR (i.e., if the area is outside of RAL boundaries and outside of NAPL and NRC PTW areas; EPA 2016b, Figure 3.8-1b). We are concerned about an area originally assigned to capping being reassigned to a less protective technology. However, it is not clear which circumstances would lead to an original assignment of an engineered cap if the area was outside of RAL boundaries and neither NAPL nor NRC PTW was present. Is the "designated engineered cap" box in this section of the flowchart erroneous?

68) As illustrated in the intermediate area flowchart (EPA 2016b, Figure 3.8-1b), broadcast GAC is a meaningful change over MNR for reliably contained PTW that is outside of RAL boundaries. We support this assignment, but only if the area is depositional or neutral, not erosive. Similarly, MNR and ENR should only be applied in depositional and neutral areas. Dredging should generally be assigned to erosive areas. Additionally, we question why the shallow water flowchart does not illustrate this same set of decision rules related to highly toxic PTW outside of RAL boundaries (EPA 2016b, Figure 3.8-1c). We suggest incorporating this same decision rule for shallow areas.

69) We assume that the following note on the navigation channel/FMD areas flowchart implies that EPA intends to remove all NAPL and NRC PTW in these areas: "All Concentrations greater than RAL alternative are less than 18 feet deep in the FMD and 15 feet in the Navigation Channel. The diagram is based on the assumption that no PTW or sediment concentrations are found below these depths" (EPA 2016b, Figure 3.8-1a). EPA should clearly state in the FS text their intention to remove all NAPL and NRC PTW in these areas.

    Additional sampling during remedial design may identify NAPL or NRC PTW below these previously-identified depths. If this proves to be the case, would the decision still be to dredge to the greater of the RAL depth or depth of PTW and then cover with a reactive residual layer, as indicated in the flowchart (EPA 2016b, Figure 3.8-1a)? Or would this decision be invalidated based on EPA's note that the diagram is based on the assumption that NAPL and NRC PTW are not found below 18 feet in the FMD area and 15 feet in the navigation channel? We strongly urge EPA to remove all NAPL and NRC PTW in the navigation channel/FMD areas no matter the depth of contamination. Capping is impractical in these areas due to the use restrictions that capping requires. EPA must clarify their intention regarding the possibility of NAPL or NRC PTW being found below the specified depths. It is our understanding that the flowcharts in Figures 3.8-1a through d will form the basis for the remedy. Thus, they should be able to be applied to any findings during remedial design and should not be invalidated based on remedial design data.

7.6 GENERAL COMMENTS ON REMEDY

70) EPA has consistently maintained that background levels of some COCs are high and will prevent the remedy from achieving all of the remediation goals. We encourage EPA to continue to work with DEQ, so that DEQ may continue to investigate and control upriver sources under their state authority. Since remedial design and construction will take many years, a sustained state effort upriver may improve conditions over this timeframe and allow all PRGs to be met post-construction.

71) The Five Tribes are concerned that cleanup standards used for areas in the Site that were previously remediated (e.g., McCormick & Baxter) may not be as stringent as the cleanup alternatives outlined in the Proposed Plan. If they are not as stringent, we request that a risk analysis be conducted using monitoring data for these areas in order to determine whether these areas are sufficiently protective based on the currently proposed cleanup standards. If not, we suggest exploring additional remediation options for these areas.

72) We are concerned that only 65% of contaminated river banks are currently identified for active remediation. How does this 65% intersect with DEQ's current and future work on river banks? Will DEQ continue to evaluate the 35% of contaminated river banks not currently slated for remediation and then remediate them if they pose a risk for recontaminating areas of in-river work (e.g., evidence of slope failures and unconsolidated material versus armored shoreline)? Has some portion of this 35% already been evaluated and/or remediated by DEQ? Will EPA have the authority to remediate additional river banks if they gain supporting evidence of their

recontamination potential during remedial design? Further explanation is needed to address the above questions.

Further, EPA notes that while increasing the extent of capping, dredging, in-situ treatment, or ENR for the in-water portion of the Site would be easily implemented for each of the alternatives if they failed to be sufficiently protective, "[a]dditional remediation on river banks could be more problematic due to factors such as adjacent land use, structures, steepness, use of the adjacent waterways, and community concerns" (EPA 2016b, p. 4-39). We are unclear on why additional river bank remediation would be more challenging than other types of remediation. If this is indeed the case, our concerns about DEQ's role in additional river bank remediation and the timing of that work are more salient.

73) We are similarly concerned that only 33% of known groundwater plume areas would be addressed (i.e., with a reactive cap or reactive residual layer) under Alternative I. Groundwater plume areas that are not addressed may continue to serve as a source of contamination to the river and may recontaminate the river post-remedy. Even assuming that DEQ will continue to remediate groundwater sources of contamination, there are likely to be instances where "a portion of the plume… has moved beyond the control point and continues to seep into the river" (EPA 2016b, p. 3-6). If these plumes fall outside of the 33% of plume areas that EPA will address, it seems likely that they will continue to recontaminate the river. What justification can EPA provide to demonstrate that treatment of only 33% of these areas will support a protective remedy? In the absence of additional information, we support remediation of a much higher percentage of groundwater plume areas.

74) EPA defines the benthic risk area as the area exceeding RAO 5 PRGs. FS Figure 4.2-29 maps the benthic risk area against Alternative I SMAs, illustrating that a small percentage of the benthic risk area is encompassed by SMAs (17%), but larger percentages of the areas defined as 10 or 100 times (10x or 100x) the RAO 5 PRGs are encompassed by the SMAs (64% and 87%, respectively; EPA 2016b, Table 4.2-7). Considering that the BERA benthic risk exceedance points are not well correlated with the 10x and 100x benthic risk areas (EPA 2016b, Figure 4.2-29), the percent of areas that are likely to pose a benthic risk (including the BERA points) that are encompassed by SMAs is considerably smaller than the values presented in Table 4.2-7. The poor correlation between the BERA benthic risk exceedance points and the 10x and 100x benthic risk areas, as well as high number of BERA points not actively remediated under Alternative I, support the need for a remedy that is more protective than Alternative I.

75) Many questions persist around the concept of "beaches." Does EPA define beaches as above the high tide line or some other water-based or vertical datum, and is this area outside of the scope of active remediation? If so, what is the relationship between beaches and river banks (i.e., are beaches a subset of river banks, sediments, or neither)? What would be the mechanism for risk reduction on beaches (e.g., river bank capping, upland source control, deposition of cleaner material from the

remediated Willamette River sediment bed during high water events)? These points should be clarified in the ROD.

76) Regarding the Green Remediation Plan outline presented in Appendix M, the Five Tribes encourage EPA to not only review BMPs for each technology and process, but also to identify ways to decrease the carbon footprint of the remedy on a Site-wide scale. For example, evaluating ways to minimize total energy use and maximize use of renewable energy will likely be a more feasible and cost-effective option when evaluated on a Site-wide scale rather than by individual technology or process. We also encourage EPA to consider employing strategies such as opting for time-of-use or market-based electricity pricing plans. For example, costs may be driven down by operating treatment systems at a heavier load during nonpeak, lower-cost hours and constructing small-scale renewable energy systems to supply power directly to certain components of a treatment system. Annual energy costs for implementing a remedy are typically high, so managing energy requirements creatively may help in driving down those costs (EPA 2011).

77) We understand that there does not currently exist an on-site transfer (transloading) facility to transfer dredged material to trucks or rail for permanent disposal at an off-site landfill. In the absence of an on-site facility, the material would likely be shipped by barge to a transloading facility on the Columbia River, where it would then be transferred to an off-site disposal facility via truck or rail. The Proposed Plan states that if an on-site facility is constructed, the material is expected to be transloaded to an off-site disposal facility via rail, rather than via truck (EPA 2016a, p. 31). We encourage EPA to thoroughly evaluate the feasibility of an on-site facility and to carefully weigh the environmental risks and benefits of each approach. Shipping material to an off-site facility on the Columbia River runs the risk of spilling contaminated material into the Columbia River either during transit or during offloading. EPA should also carefully weigh the environmental and community impacts of truck transport versus rail transport. Truck transport entails environmental risks and costs such as spills, fuel emissions, increased neighborhood traffic, and noise. An on-site transfer facility followed by rail transport may be the best option. When EPA has more details about the various options, we look forward to participating in the discussion to determine the best approach.

78) EPA's evaluation of the ability of PTW to be reliably contained assumes a 100-year time period (EPA 2016b, p. D-20). The Five Tribes emphasize the importance of a remedy that is protective in perpetuity, not merely for 100 years. Would the results of the evaluation differ if EPA had used a longer time period? If so, we urge EPA to select a longer time period for the evaluation.

79) The FS explains that "The determination of 4 feet NAVD88 as the boundary for [the shallow] region was based on an assumed cap thickness of 3 feet (if capping were to be applied) and a mean low water level (MLLW) elevation of 7 feet NAVD88" (EPA 2016b, p. 3-11). We do not know how this definition of shallow water relates to the National Marine Fisheries Service (NMFS) definition of shallow water of 20 feet below MLLW. We support the authority of the NMFS for determining habitats that

are of importance to fish. It is our understanding that EPA gives separate consideration to shallow water areas due to the important habitat value that these areas provide to aquatic life. We ask that EPA ensure that their definition of shallow water is consistent with the NMFS definition.

80) The Five Tribes do not agree with EPA's reasoning for not including Disposed Material Management (DMM) Scenario 1 in the Flood Rise Evaluation presented in Appendix P of the FS (EPA 2016b, p. P-3). Some uncertainties may exist regarding the siting and construction of the CDF. However, sufficient certainty exists (e.g., the existence of a 60% design and the assumption of the Terminal 4 location) to justify conducting a "cursory evaluation" of the sort presented in Appendix P. The CDF will undoubtedly convert a portion of the Willamette River into upland, which will affect flood rise. We request that EPA conduct such an analysis in order to allow for a more complete understanding of the effects of a potential CDF.

81) The Five Tribes are very much in favor of the implementation of any measures that would prevent incidental and accidental discharges of contaminated materials into the water column. EPA identifies several BMPs and "precautions and controls" (EPA 2016b, p. 4-37). Unfortunately, factual support for the effectiveness of these methods is scant in the remediation literature. Implementation of these methods may not increase protectiveness and could decrease overall performance (for instance, in terms of construction duration and cost). The effectiveness of these methods should be examined. For instance, what are the impacts of installing and removing sheet piles? Do sheet piles disturb and redistribute contaminated sediment? How much of a carbon footprint is created by having to manufacture, transport, install, remove, and recycle the sheet pile? What other wastes are produced in the process? BMPs such as sheet piles are often heavily marketed by vendors, but there is little sound science on their effectiveness. We ask that EPA review the relevant literature and consult with experts in remedial dredging to determine the measures with the greatest likelihood of reducing discharges and increasing environmental protectiveness.

82) Figures 4.2-9 through 4.2-17 of the FS appear to depict predicted ecological risk post-construction for each alternative. (We assume that, despite the figure captions, these figures are not intended to show residual risk as defined in the FS; that is, risk once PRGs are achieved.) These figures are helpful in comparing alternatives. However, it is not clear how the depicted COCs were selected: some are focused COCs and some are not. These figures do not appear to be referenced in the text. We recommend that EPA include an in-text explanation of the figures.

83) We support a timely implementation of the remedy. Ideally, responsible parties will fully cooperate with EPA to construct the remedy as quickly as possible. However, if needed, we support EPA's use of enforcement actions to compel responsible parties to cooperate.

8. MONITORING AND MAINTENANCE

84) The Proposed Plan and FS provide insufficient detail on monitoring activities. The success of the remedy is dependent on diligent monitoring activities to identify and correct any potential technology failures before they cause widespread recontamination. Monitoring is also essential for determining whether the Site achieves protective levels within a pre-determined period of time; if it does not, a ROD amendment may be needed to require additional remediation. The importance of this monitoring cannot be overstated. As such, we strongly encourage EPA to provide additional information regarding their anticipated monitoring activities and reporting of monitoring data. In the ROD, we expect to see details regarding how often monitoring will be conducted, who will conduct it, who will oversee it, and what reporting will be required. We request that the ROD describe in detail the decision-making process regarding monitoring and adaptive management; specifically, how monitoring data will be used to inform construction activities and future monitoring.

85) The ROD should identify time-dependent decision points for the purpose of determining progress toward achieving remediation goals as well as the actions that would be taken should sufficient progress not be made. Specific standards or interim goals should be stated for each five-year review that would trigger the need for additional active remediation. For example, will EPA evaluate whether the cleanup actually achieves the interim targets post-construction? If interim targets are not met, what actions will EPA take? Because EPA assumes that interim targets will be met immediately post-construction, if these targets are not met by the five-year review, additional remediation may be warranted. The Site should be evaluated on a Site-wide, SDU, and river mile basis. All relevant media (sediment, fish tissue, river bank soil, beach soil/sediment, surface water, pore water) should be considered.

86) EPA notes that "Upland source control measures will… need to be evaluated for necessary repairs and maintenance performed under five-year reviews of the CERCLA action" (EPA 2016b, p. 4-12). While we understand that a comprehensive review of upland source control measures will occur during the five-year reviews, it is our expectation that the success of individual upland source control measures, particularly more significant ones, will be evaluated more frequently than once every five years, either by DEQ or EPA. The frequency of monitoring should depend on the characteristics of the particular measure.

87) EPA notes in the discussion of Adequacy and Reliability of Engineering and ICs for Alternatives D, E, F, and G that "Additional O&M [operations and maintenance], ICs, and monitoring would be required than [the previous alternative] due to the increase in the acreage of caps" (e.g., EPA 2016, p. 4-47). This statement is misleading as written. More intensive alternatives may require fewer ICs and less monitoring of certain types. For instance, more intensive alternatives may have fewer, shorter, or less comprehensive FCAs than less intensive alternatives. More intensive alternatives may also have less monitoring because PRGs may be reached sooner. We assume that the statement as written refers to ICs and monitoring directly

associated with capping. However, that point should be clarified. One suggestion is "Additional cap-related O&M, ICs, and monitoring would be required as compared to..."

9. REMEDIAL DESIGN

88) Of great importance to the Five Tribes is that we remain engaged throughout remedial design and be given opportunities to provide feedback, including instances where EPA is considering granting the responsible parties the opportunity to deviate from the ROD. We expect that our involvement during remedial design will include, but not be limited to, providing meaningful input on the development and review of work plans, sampling and analysis plans, data reports, monitoring, design plans, and granting any deviations from the preferred alternative due to unforeseen design or field challenges. In particular, we expect to be given the opportunity for input on the consideration of any additional remediation (through a ROD amendment) or a TI or other ARAR waiver.

89) During remedial design, it is imperative to collect additional data regarding erosion and deposition trends in the Site. This will help in identifying areas that may be inappropriate for certain technology assignments (e.g., MNR in erosive areas). We suggest conducting field and laboratory studies to measure sediment stability (or erodibility) using tools such as Sedflume, Gust Microcosm, and consolidation tests.

90) In accordance with methods outlined in the working draft Programmatic Biological Assessment (FWS and NMFS 2016), we request that EPA incorporate effective BMPs during remedial design for reducing the mortality of fish, including lamprey, during construction (FWS 2010).

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Data from Tables 4.2-1, 4.2-3, 4.2-4, and 4.2-7 displayed graphically.

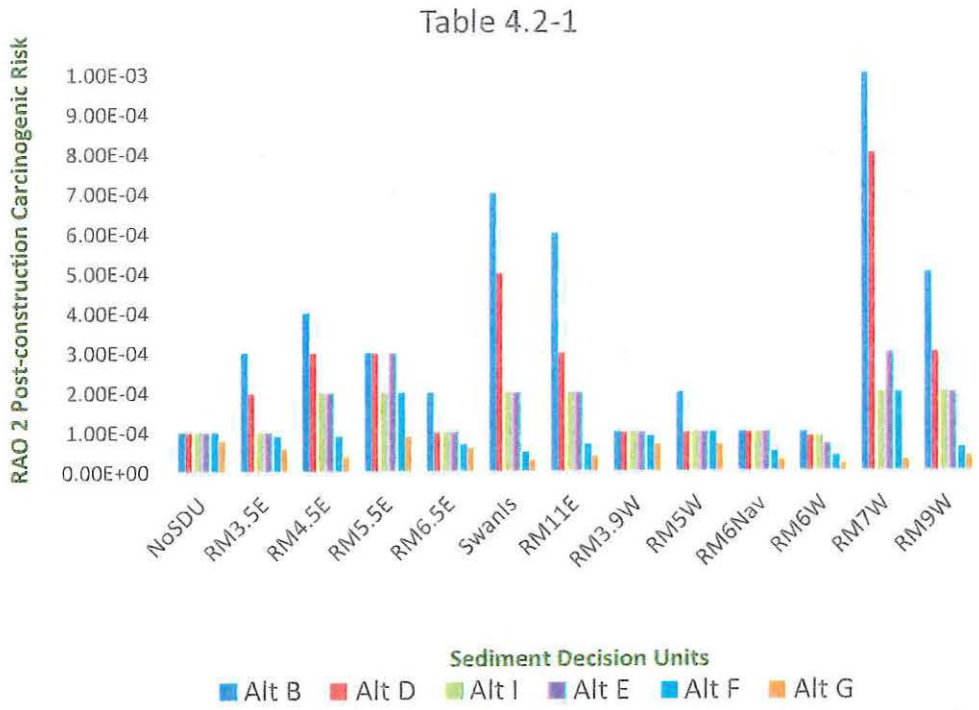


Table 4.2-3

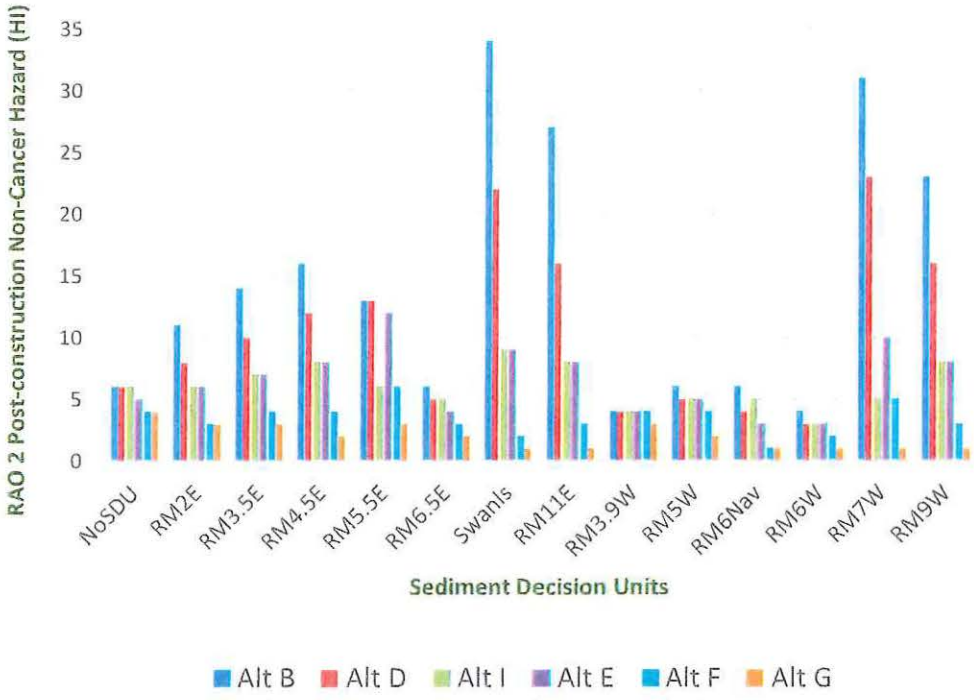


Table 4.2-4

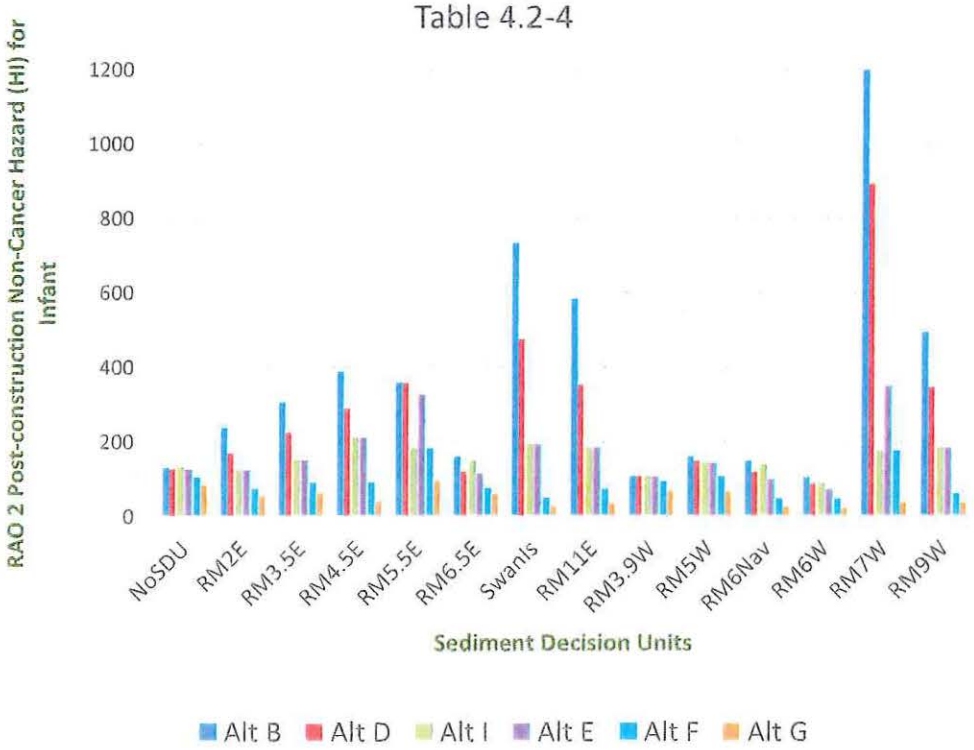
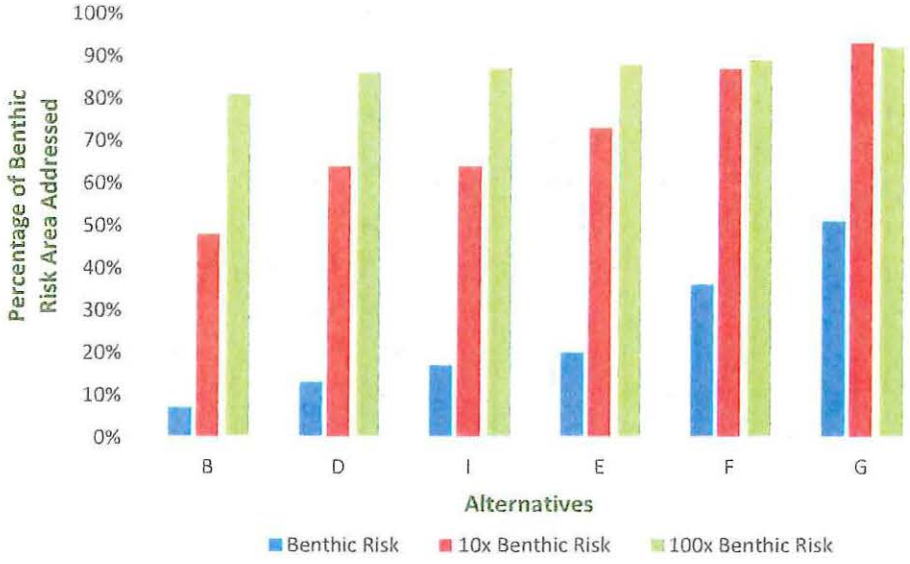


Table 4.2-7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