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MEMORANDUM | October 19, 2015

TO National Remedy Review Board (NRRB) and Contaminated Sediments Technical Advisory Group (CSTAG), U.S. Environmental Protection Agency (EPA)

FROM Gail Fricano, Rita Cabral, Tom Fredette, and Rachel DelVecchio, IEc

SUBJECT Five Tribes' Comments on Portland Harbor Superfund Site

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This memorandum provides comments on behalf of the Five Tribes[1] on EPA's studies of and plans for remediation of the Portland Harbor Superfund Site (site). These comments are provided for the consideration of NRRB and CSTAG leading up to and during their meetings and deliberations on November 18 and 19, 2015. Our comments are based on the draft Remedial Investigation (RI) and Feasibility Study (FS), conversations with EPA regarding their vision for a remedy, and EPA's email to Memorandum of Understanding (MOU) partners dated September 18, 2015, with the subject "Portland Harbor Update".

Our comments are organized in the following sections:

I. Remedy vision
II. Pathway to achieving vision
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V. Comments on technology assignment approach
VI. Consideration of flexibilities

I. REMEDY VISION

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

[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.

the Willamette River during their activities (e.g., wood treatment; marine construction and repair; storage of materials, such as pesticides). Although many facilities are no longer in operation, other facilities continue to release or discharge hazardous substances, and legacy contamination remains (PHNRTC 2007). This contamination degraded the available habitat and natural resources in the Willamette River, and earned Portland Harbor its place on the National Priorities List due to elevated concentrations of hazardous substances in the river (NOAA 2012). 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 (ODEQ 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). Also, many migratory birds, mammals, and lower trophic level organisms nest and forage in and around the Willamette River for at least part of the year. This includes 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' 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 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.

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 in the future. We understand that it is not feasible for any remedy to achieve acceptable risk levels, including the removal of all fish consumption advisories, 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 be protective in perpetuity must be largely based on the removal of contamination from the river.

A timeframe must be established by which to meet all remedial action objectives (RAOs) and associated acceptable risk levels (i.e., PRGs). The Five Tribes advocate for the use of a 10-year timeframe following construction completion; this is the time period specified in relevant remediation regulations (40 CFR §300.435(f)(3)). After decades of contamination, the Five Tribes should not have to wait any longer than absolutely necessary for a clean river. EPA should select a remedy that has a high likelihood of achieving RAOs and PRGs within 10 years.

II. PATHWAY TO ACHIEVING VISION

(1) Achieving a protective remedy within 10 years of construction completion will require an aggressive, large-scale remedy. The remedy should predominantly entail removal of contaminated sediments, rather than leaving the contamination in-place. 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 material is not mobile. Below, we present our recommended pathway to achieving a protective remedy.

Schedule for Proposed Plan and Record of Decision

(2) Some of our recommendations include requests for additional analyses. We appreciate EPA's commitment to staying on an aggressive schedule for FS completion, with a goal of having the Record of Decision (ROD) signed by the end of 2016. While we acknowledge the advantages to having the ROD signed in 2016, and while we are very eager to start remedy implementation, we prefer that EPA take the time necessary to develop the best possible remedy. If this requires delaying the schedule by six months, we support a delay of that order of magnitude. After more than 10 years of remedial studies by EPA and the Lower Willamette Group (LWG), we would not like to see

corners cut at this very critical stage of the process.

Protectiveness of FS alternatives

(3) EPA has not demonstrated that any of their alternatives achieve adequate protection. EPA asserts in the FS that Alternatives B through G are each protective of human health and the environment and meet applicable or relevant and appropriate requirements (ARARs). The Five Tribes do not agree with these assertions. EPA acknowledges that all of the alternatives result in unacceptable risk levels following construction. For instance, for Alternative G, the most protective alternative, residual cumulative carcinogenic risks associated with consumption of contaminated fish and shellfish are approximately 1×10^{-3} site-wide (6×10^{-3} for the west side of the river) and the non-cancer hazard to nursing infants is estimated at 6,000. In contrast, relevant acceptable residual risk levels (according to the Oregon Hazardous Substance Remedial Action Rules, OAR 340-122-0040(2)(a)) are a cumulative cancer risk of less than 1×10^{-5} and a non-cancer hazard index of less than 1.

EPA's assertion that the alternatives are protective is based on the presumption that natural recovery will occur to a sufficient degree to achieve acceptable risks and that this recovery will occur within an acceptable (yet undefined) time period. EPA is not able to back up these assumptions with specific predictions, such as results based on numeric modeling. Without any degree of certainty that natural recovery will result in acceptable risk levels in a reasonable timeframe, the Five Tribes do not stand behind these alternatives.

Beyond the FS alternatives

(4) The Five Tribes acknowledge the potentially vast scope of the remedy, in terms of cost, impacts to adjacent communities during construction, and short-term environmental impacts. Concentrations currently exceed risk-based levels and ARARs, often substantially, for focus and non-focus contaminants of concern (COCs), in sediment, surface water, groundwater, and pore water. Reducing risk to acceptable levels, even with a heavy reliance on natural recovery processes, will require a large-scale remedy. Devising the most appropriate remedy requires not only best science, but also creative problem solving to determine the most effective way to achieve a protective remedy. EPA noted that they are looking at a hybrid approach to the remedy, possibly combining several alternatives. We support and encourage this sort of creative thinking, which is especially critical given that the FS does not convincingly demonstrate that even Alternative G is sufficiently protective.

(5) The Five Tribes recognize that selecting an alternative that is more aggressive than Alternative G would result in a very long construction period (greater than 18 years), with the attendant construction-related impacts to local communities and the environment (both in-river and out of river). Therefore, we urge EPA to explore development of a new alternative that more effectively targets risk reduction. We ask that EPA evaluate whether there is a way to "mix and match" the remedial action levels (RALs) to maximize risk reduction while minimizing construction impacts. This approach may include selecting, for instance, the Alternative E RAL for one contaminant, the Alternative G RAL for another contaminant, and an even more protective RAL than Alternative G for yet

another contaminant. The approach may also potentially include selecting one set of RALs for one sediment decision unit (SDU) and another set for another SDU. The Five Tribes are not able to conduct this evaluation using the information presented in the FS; we request that EPA investigate this approach using the underlying data.

(6) It is our understanding that EPA is considering conducting active remediation in SDUs only. Areas outside of SDUs would be assigned monitored natural recovery (MNR). A visual comparison of the SDUs delineated in Figure 4.1-2 of the FS against the technologies assigned in Figures 3.6-2 through 3.6-7 indicates that the vast majority of sediment management areas (SMAs) fall within SDUs for Alternatives B through E. Alternatives F and G have more significant SMAs that fall outside of SDUs. The Five Tribes feel that focusing on SDUs is a practical approach to targeting remediation to the most contaminated areas and allowing natural recovery to occur outside of SDUs. Natural recovery outside of SDUs will presumably occur more quickly if all hot spots are actively remediated. Limiting work to the SDUs would limit the construction duration beyond what is estimated in the FS (for Alternatives F and G), which would minimize construction-related adverse environmental effects and impacts to the local communities. However, the Five Tribes will only support this approach if SDUs are expanded to incorporate any principal threat waste (PTW) or non-aqueous phase liquid (NAPL) that fall outside of current SDUs. In addition, the SMA in River Mile 7 East (RM7E) that is across from the RM7W SDU should also receive active remediation (if it is not already incorporated based on the PTW/NAPL rule stipulated above). This area is an SMA even under Alternative B, indicating that contaminant concentrations are high.

Technology assignment approach

(7) We support the technology assignment approach that EPA outlines in Section 3 and that is illustrated with a matrix and a series of flowcharts (Figures 3.3-14, 3.3-26, 3.6-1). We provide our recommendations for improving this approach in Section V, "comments on the technology assignment approach", below. With the important exceptions outlined in our recommendations below, we feel that the approach leads to a reproducible, relatively balanced outcome (again, with the exception of our comments below). Although we advocate using the technology assignment approach (with requested modifications) to build a remedy for the purpose of the FS and Proposed Plan, we also provide below our broader concerns on MNR, enhanced monitored natural recovery (EMNR), and capping. It is especially important for EPA to consider our broader concerns on these technologies if EPA decides to make significant changes to the technology assignment approach or to abandon the approach entirely.

MNR, EMNR, and capping

(8) We acknowledge that, for practical purposes, the remedy will need to rely in part on MNR, EMNR, 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 we do not have the tools to accurately predict deposition and erosion on a fine spatial scale, we cannot assert the degree to which natural recovery processes will occur. Thus, we must use environmentally

protective assumptions that natural recovery will be limited in nature. MNR must be used only in areas of relatively low contamination. Similarly, EMNR must not be used for highly contaminated sediments such as PTW or within SMAs.

(9) 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 cap in perpetuity. Bathymetric surveys and other data collected over a ten-year period or less may not be indicative of river conditions in the long term. Thus, the bathymetry data from 2002 to 2009 cannot be used as incontrovertible evidence that caps will be effective in the long term. 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, and any number of other uncertainties, there is a very real possibility that leaving contamination in place will cause problems over long timescales, such as 100 years or more, to the detriment of future generations.

(10) 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.

(11) We are also concerned about the restrictions on river use that would result from capping significant portions of the site. Capping would restrict future development in the river, including placement of structures and dredging, in perpetuity. 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 that will protect human health and the environment and not significantly limit uses far into the future. We strongly urge EPA to adopt a remedy that is not dominated by capping but rather is focused on removing the contaminated material wherever practicable.

Mobile PTW

(12) No mobile PTW should be left in the river. By its very definition, mobile PTW cannot be reliably contained. The Five Tribes do not support capping of this material, no matter how engineered the cap is. This material may migrate horizontally, either now or in the future when environmental conditions, such as hydrology, change. Any structures impeding dredging of this material should be removed. Mobile PTW at depth should be dredged using all available means.

Riverbanks

(13) We support EPA's inclusion of riverbanks in the remedy. Including riverbanks gives EPA authority to direct cleanup work (in the form of capping) to prevent recontamination of the site. Although the Oregon Department of Environmental Quality (DEQ) has historically had jurisdiction over riverbank cleanup along the site, the addition of riverbanks to the remedy prevents any disconnects between EPA and DEQ's work, such as delays in riverbank cleanup beyond the site 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 riverbank work or create an unnecessary burden for the responsible parties.

Definition of PTW

(14) We support EPA's definition of PTW for the site. PTW should be defined 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.

Fish consumption rates

(15) 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 BHHRA accurately reflects this reality.

Confined Disposal Facilities

(16) 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. The CDF would need to be designed to safely contain material in perpetuity, and to be protective of human health and the environment. The design would need to include the best available technology (e.g., treating dredged sediment during placement or installing a permeable reactive wall in the berm) 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 Proposed Plan, 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. Institutional controls 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 institutional controls. 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.

Responsibility for dredging the navigation channel

(17) 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 them to ensure that the Corps is following all precautions, best management practices, and any other requirements the responsible parties would be required to implement.

Construction impacts on local communities

(18) The Five Tribes are concerned about the impacts that a lengthy remedy construction will have on the local community. These impacts are myriad and include potential air quality impacts, increased vehicular and vessel traffic, noise, odor, and lights. EPA should work with the community to try to address their concerns to the extent possible while still achieving stringent cleanup objectives in a timely manner. Best management practices should be used to control these impacts, and monitoring for impacts to human health should be rigorously conducted, with adaptive management employed if monitoring indicates unacceptable human health risks. The Five Tribes are hopeful that community concerns can be addressed by these means. The cleanup of this important resource, a cleanup that will benefit countless future generations, should not be compromised for the sake of immediate convenience.

III. GENERAL COMMENTS ON THE FS

(19) The ability of the Five Tribes to provide a detailed recommendation for the remedy is hindered by the limitations of EPA's draft FS. In particular, the Five Tribes find the analysis of alternatives in Section 4 of the FS (dated August 18, 2015) to be rather superficial and primarily qualitative in nature. The sheer magnitude of the decisions that will be made based on the FS requires a more rigorous, quantitative evaluation of the alternatives. Without such an analysis, we do not feel that EPA can adequately evaluate the merits of each alternative. Similarly, the Five Tribes are limited in our ability to recommend an alternative, combination of alternatives, or specific components of alternatives in the absence of a rigorous evaluation. The Five Tribes do not have the resources to conduct independent in-depth, quantitative analyses. It was our understanding, up until the weeks before the release of Section 4, that EPA would be presenting such an analysis.

(20) In particular, we recommend that, to the extent possible, EPA apply a quantitative analysis to: (1) estimate natural recovery post-remedy, (2) more explicitly compare risk reductions at construction completion (T=0) across the alternatives, (3) evaluate the adequacy of the remedy in addressing non-focus COCs, and (4) integrate benthic toxicity data in a more robust manner. We also welcome additional ideas for strengthening the analysis of alternatives.

(21) We are also concerned that a weak evaluation of alternatives leaves EPA more vulnerable to attacks from all sides – the responsible parties, the public, and elected officials, for example – that EPA did not select the most appropriate alternative. Given the highly contentious nature of this project and the serious potential for political pressure to have a strong influence on the outcome, EPA needs to present a strong, clear evaluation in the FS that is rooted in sound science and, where the science is uncertain,

uses environmentally protective assumptions. For all of the reasons stated above, we strongly urge EPA to adopt a more rigorous, quantitative approach to the evaluation of alternatives in the FS.

(22) Further, supporting evidence is lacking for key assumptions and decisions throughout the FS; examples are provided in our comments below. We encourage EPA to add this support to strengthen the persuasiveness of the FS.

IV. SPECIFIC COMMENTS ON THE FS

(23) The selection of an appropriate remedy is hindered by the lack of a numeric model to estimate natural recovery post-remedy. Without such a tool, there is no ability to predict whether the site will achieve PRGs over time, and if so, when. All of the alternatives described in the FS rely heavily on natural recovery processes to achieve protective levels. The Five Tribes do not object to some degree of reliance on natural recovery where scientifically defensible; achieving protective levels immediately following construction may not be technically feasible. However, a model would greatly assist in determining the extent to which natural recovery will occur in order to compare alternatives.

This lack of a model is a troubling gap in our understanding. EPA asserts that Alternatives B through G are expected to protect human health and the environment. Assuming for a moment that all alternatives are protective, a key difference between them is the time to achieve protectiveness. Without a quantitative assessment, there is no means to compare the time to achieve protectiveness. We can reasonably assume (as EPA did in Section 4) that Alternative G will achieve protectiveness sooner than Alternative B. Beyond generalities such as these, we cannot know whether, for instance, Alternative G will achieve protectiveness in 5 years or 100 years, or whether Alternative B lags behind Alternative G by 10 years or 75 years. Answers to these questions are essential in selecting the appropriate alternative.

The Five Tribes understand that LWG's HST model that was used for their 2012 draft FS was flawed and that it was not able to predict with any accuracy sediment deposition as measured by a series of bathymetry surveys. For this reason, we agree with EPA's decision to eschew this version of the model. We also understand that EPA's SEDCAM model was similarly flawed and could not be used. The hydrodynamics of the Willamette River are complex, which contributes to the challenges of modeling it. Further, EPA was working under a tight and inflexible schedule to release Section 4, and it is our understanding that the decision to abandon the SEDCAM model was made soon before the Section 4 release date with no time to redo the model. We believe, however, that due to the critical role of such a model, EPA should explore the feasibility of taking the time needed to develop a more reliable model, which may include modifying LWG's HST model. The tool would no doubt be imperfect, but predicting natural recovery with some level of confidence seems preferable to not predicting natural recovery at all, especially if uncertainties and biases are explained. If efforts to revise the model are not successful, EPA must use environmentally protective assumptions and select a remedy that does not rely heavily on natural recovery. Of the alternatives presented in the FS, Alternative G

would be the most appropriate remedy in the absence of reliable natural recovery predictions; however, as explained above, the Five Tribes' first preference is development of a model to reasonably forecast natural recovery and provide a more solid basis for alternative selection.

(24) EPA asserts in Section 4 of the FS that Alternatives B through G are each expected to achieve protection of human health and the environment. However, EPA does not present sufficient evidence to support this assertion. With no estimate of time to reach PRGs, we do not have confidence that all alternatives will ever achieve PRGs, let alone in a reasonable timeframe. According to EPA's analysis for Alternative B, reductions in surface-area weighted average concentrations (SWACs) on a site-wide basis compared to the no-action alternative are only 42 percent for polychlorinated biphenyls (PCBs), 37 percent for TCDD, and 24 percent for PeCDD. Residual cumulative carcinogenic risks to nursing infants from maternal consumption of fish and shellfish are nearly 3×10^{-3}, and the non-cancer hazard to nursing infants is estimated to be 15,000. Better enforcement of fish consumption advisories may mitigate these risks, but they will do nothing to mitigate ecological risks, which exceed EPA's acceptable levels. Further, there are a large number of locations that demonstrated unacceptable benthic toxicity that would not be actively remediated. We do not understand EPA's rationale for determining that this alternative is protective of human health and the environment. This concern is also relevant for each of the other alternatives.

(25) EPA asserts that Alternatives B through G "will attain their respective Federal and State ARARs" (p. 4-67). For chemical-specific ARARs, we do not believe that this statement is supported by the evaluation. Post-construction non-sediment COC concentrations are not estimated, but it is highly unlikely that chemical-specific ARARs (which in many cases form the PRGs for non-sediment media) would be achieved immediately post-construction. Similarly, EPA predicts that post-construction COC concentrations in sediment will not meet cancer and non-cancer risk standards under the Oregon Environmental Cleanup Law ORS 465.315(b)(A) and Oregon Hazardous Substance Remedial Action Rules OAR 340- 122-0040(2)(a) and (c), 0115(2-4). There is no information to support the extent to which sediment or non-sediment COC concentrations would decrease over time. Thus, we do not believe that it is accurate to say that all alternatives will comply with ARARs. We believe that it is more accurate to say that Alternative G is more likely to achieve ARARs than Alternative B.

(26) The evaluation of alternatives does not sufficiently account for benthic risk. To our knowledge, PRGs do not adequately incorporate benthic risk. Section 4.1.6.1 states that benthic risk is "evaluated by determining the percentage of measured or predicted benthic toxicity points addressed by the construction of the alternative." We did not see any such evaluation in the text. We are disappointed that EPA is not using benthic risk more explicitly in their cleanup decisions. Benthic risk information and toxicity testing add important and distinct information to the focus COC concentrations approach upon which EPA currently relies. Benthic risk data provide information on bioavailability and the toxicity of the entire suite of contaminants in a given sample, not just the focus COCs. The fact that a large number of benthic risk points fall outside of the SMAs is evidence that these data provide important information on environmental risk that is

complementary to and not redundant with the focus COC RALs. Toxicity testing is not a perfect indication of benthic risk, as it often does not use appropriately sensitive test organisms. Further, toxicity testing exposure durations are typically significantly shorter than the durations that organisms are exposed to contaminants in situ. However, without better information, we strongly urge EPA to more rigorously incorporate the benthic risk data into its evaluation of alternatives. This information could be integrated for comparison purposes with sediment criteria such as the Washington State freshwater sediment standards.

(27) We request that EPA present a comparison of numeric risk reduction for each alternative. These reductions are provided for each alternative, but they are not compared in tabular or graphical format. It would be helpful to show a side-by-side comparison of the risk reduction that occurs from one alternative to another. In comparing alternatives, it would also be useful to create an analysis where the Alternative B values are set to unity (1), and values for all other alternatives are expressed as a multiple of Alternative B.

(28) Section 4 evaluates the impacts of the alternatives on non-focus COCs by calculating post-construction SWACs. This exercise is helpful in determining the extent to which the alternatives achieve non-focus COC PRGs. What is lacking is an easy way for the reader to determine whether any targeted active remediation outside of the current SMAs would result in significant reductions in non-focus COC concentrations. The series of graphs that depict SWACs on the Y-axis and river miles on the X-axis (Figures 4.2-7 through 4.2-10) are helpful in elucidating where the concentration peaks are. However, we are not aware of a clear method to match up these peaks with the SMAs to identify hot spots that are not currently proposed for active remediation. We request that EPA add SMA "footprints" to this series of figures to facilitate the evaluation of the effectiveness of the alternatives in addressing non-focus COCs.

(29) The rationale for SDU selection is not always clear. Proper selection of SDUs is especially important if EPA's remedy includes active remediation only within SDUs. It is our understanding based on past EPA presentations that the SDU selection process was more prescribed (i.e., the ratio of the SWAC-to-RAL needed to be greater than 1). We are not sure whether EPA's method for delineating SDUs has changed, but the language in the FS is less prescribed ("generally identified as areas where focused COC rolling 1 RM averages [sic] concentrations were the highest", p. 4-2). One example of our uncertainty about the appropriate delineation of the SDUs is the navigation channel at RM11, where PCB concentrations are as high as or higher than those in RM5.5E and RM6.5E SDUs. Table 1.1-1 indicates that selection of these latter SDUs was driven by PCBs. Thus, we do not understand why RM11 in the navigation channel is not also an SDU. In general, the SDU selection process needs to be better described. Also, figures and tables need to be clarified as related to SDUs. For instance, Table 4.2-21 (and others in the series) presents blank cells, cells with "x" marks, cells with red "x" marks, and text in red font. These designations need to be defined. Also, SDU boundaries should be drawn on all figures with river miles on the X-axis to assist in following EPA's SDU-based analyses.

(30) EPA states that the protectiveness of RAO 1 (beaches) will be qualitatively evaluated. First, we do not see any evaluation of RAO 1 (beaches) in the FS. Second, we

believe that EPA should better define beaches and should describe the anticipated mechanisms for risk reduction. Does EPA define beaches as above the high tide line or some other water-based or vertical datum, resulting in beaches being outside of the scope of active remediation? If so, what is the relationship between beaches and riverbanks (i.e., are beaches a subset of riverbanks)? What would be the mechanism for risk reduction on beaches (e.g., riverbank capping, upland source control, deposition of cleaner material from the remediated Willamette River sediment bed during high tide events)? These points should be clarified in the FS and Proposed Plan.

(31) The FS assumes that structures servicing active wharfs or shore-based facilities will remain intact during remedial activities (p. 3-15). In contrast, we contend that EPA should explore removing all such structures to the extent practicable, particularly if they impede the removal of highly contaminated material. Perhaps there are major active structures whose removal is not possible. However, minor structures should be removed to allow for the dredging of highly contaminated material from the Willamette River and to avoid capping such material. Doing so is in line with our goal of a remedy that is protective of human health and the environment and that does not demand monitoring and use restrictions in perpetuity, to the detriment of future generations.

(32) EPA selected organoclay reactive caps for locations where NAPL is present and where containment is assigned (p. 3-14). However, since EPA does not provide evidence that these caps will be effective at containing NAPL, the Five Tribes are skeptical of the potential success of this type of cap. The Five Tribes are in favor of removal of all NAPL. If any is to be left in place, EPA should provide sufficient supporting evidence that these caps can be successful. For instance, the McCormick and Baxter cap is referenced, but there is no mention of its success or failure.

(33) EPA proposes deploying a 12-inch sand layer over all dredged areas to "control residuals and releases" (p. 3-19). We question whether a 12-inch sand layer will sufficiently contain the residuals. We would like to see a cap model applied to residuals, using conservative (i.e., environmentally protective) assumptions about residual surface sediment concentrations post-dredging. Without such an analysis, we are not confident that a 12-inch sand layer will be adequately protective.

(34) The FS assumes that enhanced monitored natural recovery will be accomplished through the placement of a 12-inch layer of sand (p. 3-27). The Five Tribes are not confident that a 12-inch layer of sand without additives will sufficiently reduce risk within a reasonable timeframe for non-PTW areas. We would like to know what information was used to support this decision to use sand without additives in non-PTW areas. Similar to the use of a 12-inch sand layer over all dredged areas, we would like to see a cap model applied to EMNR areas, using pre-remedy surface sediment concentrations. Without such an analysis, we are not confident that a 12-inch sand layer without additives will be adequately protective.

(35) The FS states that the placement of thin-layer sand covers in the navigation channel and future maintenance dredge areas is "incompatible with current and future waterway uses" (p. 3-7). It is our understanding that a 12-inch sand cover will be applied to all dredging areas, including the navigation channel and future maintenance dredge areas

(e.g., p. 3-32 of the July 29, 2015, version of FS Section 3). We request that EPA clarify this apparent discrepancy. Will a thin-layer sand cover be used in these areas? This is an important question, 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 maintenance dredging is not anticipated to be required for many years.

(36) Insufficient detail is provided 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 key for determining whether the site achieves protective levels within a pre-determined period of time; if it does not, a ROD amendment may need to be issued 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 both in the FS and particularly in the Proposed Plan. In the Proposed Plan, 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 Proposed Plan 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.

(37) We believe that the construction duration for each alternative is significantly underestimated. It seems very unlikely that the adjacent communities would tolerate dredging 24 hours per day. It also seems unlikely that dredges could operate so efficiently (i.e., without interruption) over such a long duration. We recommend using more realistic estimates based on past experiences with similar urban sites to allow for a more accurate comparison of alternatives.

(38) Reliance on the optimistic dredge production estimates from Schroeder and Gustavson (2013; Section 4.1.8 of FS) likely underestimates construction durations for the alternatives, and therefore the cost. Schroeder and Gustavson (2013) do not provide sufficient rationale for their estimates; thus, we consider them to be unreliable. Data from the Willamette system could be used to create a far more reliable predictor than the non-regional projects used in the Schroeder and Gustavson (2013) estimates. If EPA continues to use the Schroeder and Gustavson (2013) estimates, the uncertainty associated with these numbers should be described.

(39) The FS explains that the "shallow water criterion of 4 feet NAVD88 was based on an assumed cap thickness of 3 feet (if capping were to be applied) and a mean lower low water (MLLW) elevation of 7 feet NAVD88" (p. 3-9). We do not know how this definition of shallow water relates to the National Marine Fisheries Service (NMFS) definition 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's intention in giving separate consideration to shallow water areas is that they acknowledge the important habitat value that these areas provide to aquatic life. We ask that EPA rectify their definition of shallow water to be consistent with the NMFS definition.

(40) EPA's discussion of shallow water areas (p. 3-9) does not explicitly consider

changing water levels in the Willamette River. Factors such as low-water level years and river water level trends (particularly due to climate change) should be discussed in this section to justify or modify the shallow water designation.

(41) EPA currently only considers the effects of climate change in their analysis of flooding. Climate change has the potential to affect many aspects of the remedy, including the effectiveness of capping. We urge EPA to consider the anticipated effects of climate change across a wider spectrum of remedial issues, including, but not limited to, the long-term effectiveness of capping.

(42) Section 3.3.3.7 (p. 3-16) describes some of the institutional controls that will be needed after the remedy has been completed on both a short-term and long-term basis. One such institutional control 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. 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 Army Corps of Engineers be consulted during the FS phase to determine whether RNAs in the identified capping locations will be burdensome. We would prefer their input as early in the process as possible.

(43) EPA conducted a modeling effort to "determine the maximum concentrations of PTW material that would not result in exceedances of Ambient Water Quality Criteria (AWQC) in the sediment cap pore water after a period of 100 years" (p. 3-14). A description of the modeling effort is provided in Appendix D. The appendix describes the approach as a screening model for developing concentration estimates of PTW that can be reliably contained. The "screening model" designation suggests that there may be certain limitations of the model and perhaps that general assumptions were used, but its results are being used to make major site decisions. If this is an appropriate model to make FS-level decisions, that point needs to be clarified in the text. Will there be opportunities to refine the model predictions during remedial design (RD)? It is important that EPA's decisions and approaches provide enough information to convey that they were thoroughly examined and that they are technically defensible.

(44) FS Section 3 refers frequently to sand caps and layers of sand placed either post-dredging or to accomplish EMNR (e.g., p. 3-27). We believe this terminology introduces a bias for using pure sand as a capping material, which has been shown to be less effective than sandy material with higher organic content. There is potential benefit to be gained from changing this language to be more inclusive of silty/clayey sands. 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. Certainly very sandy materials have their advantages such as ease of spreading, but the current terminology introduces an unnecessary and potentially harmful bias in selecting source material. We suggest using a more inclusive term like

"predominantly sandy sediment" or "sandy material".

(45) In the presentation of deposition and erosion based on bathymetric surveys (Appendix C, p. 5), we do not understand why 2.5 cm/yr would be identified as depositional if 2.7 cm/yr was the minimum detectable sediment deposition rate for one of the study year comparisons. It seems as though the threshold for deposition should be values equal to or greater than 2.7 cm/yr (essentially the sediment deposition detection limit). This change has the potential for more areas to be classified as erosional and may influence the selected remedy. We request additional justification for this decision and/or a change to the analysis assumptions.

(46) The ratio of sediment contaminant subsurface-to-surface concentrations is one of two means of classifying an area as depositional. We believe that this criterion merits more discussion in Appendix C (e.g., on p. 6 of Appendix C). Degradation rates of contaminants are often different in subsurface sediment conditions as compared to surface sediment conditions. It is unclear how much this would affect the calculated ratio, and therefore it is unclear if the ratio really provides an accurate picture of deposition. We suggest providing a discussion of degradation rates of these chemicals in the surface and subsurface to either (1) show that the degradation rates are equivalent, or (2) provide information on the effect that the difference in these rates would have on the analysis. As currently written, no determination can be made on the appropriateness of using this ratio in the analysis.

(47) The proper identification and remediation of PTW, including NAPL, is of great importance to the Five Tribes. Section 3.2.1 of the FS describes the identification of NAPL areas (p. 3-2). We find this section and associated figures (Figures 3.2-1 and 3.2-2) to be short on support. Because NAPL delineation, especially adjacent to the Arkema site, has proven to be a contentious issue with the potentially responsible parties, we urge EPA to provide more robust support for their delineation. This support may include references to relevant memoranda and data reports within the text of this section or reference to an appendix that better explains these delineations.

(48) The FS (p. 4-7) references residual risk figures in Appendix H, but no figures are provided in this appendix. The Five Tribes requested these figures in our September 24, 2015, comments on Section 4 but have not yet received them. We believe that these figures may be important in our review of the effectiveness of each alternative.

(49) Potential impacts to water quality and contaminant releases to the system during construction need to be better estimated. The alternatives have a wide range of dredging volumes, and the larger alternatives, which will extend over the better part of two decades (using production rates at the extreme end of the range), could result in demonstrably meaningful system-wide changes in contaminant exposure. Such an analysis would be useful in weighing and balancing the various alternatives.

(50) There is a need for a more robust analysis of risks to workers and the community from the incrementally more aggressive alternatives. Accident rates can be predicted with much greater precision than other project-associated risks. The probability of traffic accidents, injuries, and deaths will increase from Alternative B to G; those risks should be discussed.

(51) 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. Several best management practices (BMPs) and "precautions and controls" are identified on p. 4-32 of the FS. 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 they 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 which measures have been demonstrated to reduce discharges and increase environmental protectiveness.

(52) In the FS (p. 4-41 and elsewhere), EPA asserts that fish tissue COC concentrations will increase during construction, but that they will remain elevated only during the construction windows. We agree that dredging and other sediment handling are likely to resuspend contaminated sediments, potentially increasing fish tissue COC concentrations. However, we are unsure whether fish tissue COC concentrations will decrease between construction periods each year, as many COCs, such as PCBs, are not readily metabolized. We suggest that EPA clarify this point and provide the technical basis for its assertion, if any. When evaluating alternatives, it is important to have a common understanding of the effects of construction on fish tissue concentrations.

(53) The information in the FS is not always clearly presented, and statements are not always well supported, as indicated in the examples above. Our comments to EPA on Sections 3 and 4 of the FS (dated September 11, 2015, and September 24, 2015, respectively) provide suggested clarifying changes to text, tables, and figures. They also note apparent discrepancies between the text, tables, and figures. The LWG has also identified numerous errors, both typographical and more substantive, in previous drafts and the current draft. It is important to present information as clearly and accurately as possible to maximize the utility of the FS in explaining the implications of each alternative to interested parties. Unclear or poorly supported statements or inaccuracies risk discrediting the substantial effort and expertise that EPA has put forward in drafting the FS and invites criticism from opponents. We request that NRRB/CSTAG encourage EPA to consider each of our suggestions to clarify the document, including our request that EPA do a thorough editorial review of the document and to carefully compare all figures and tables against the text and resolve any discrepancies.

V. COMMENTS ON THE TECHNOLOGY ASSIGNMENT APPROACH

(54) In general, the Five Tribes support EPA's technology assignment approach. The technology screen follows a two-step process. The first step uses a decision tree and multi-criteria matrix to assign a preferred technology within specific grid cells throughout the

site (Figures 3.3-14 and 3.3-26). The second step assigns technologies based on flowcharts for navigation channel/future maintenance dredge areas, shallow areas, and intermediate areas (Figure 3.6-1). LWG argues that this technology assignment approach is overly simplistic. While we have some concerns about and suggested improvements to the process, such a reproducible, clear approach is needed to assign technologies at the FS phase. We do not find this approach to be overly simplistic.

The following comments pertain to the multi-criteria matrix (Figure 3.3-14b):

(55) The Five Tribes wonder what biases the matrix introduces. For instance, is it appropriate to weight all factors equally? Also, the highest score that dredging could receive is greater than the highest scores that armored cap and EMNR/cap can receive. Does this introduce a bias toward dredging? Given the Five Tribes' preference for removal, we would not oppose a matrix that is biased toward dredging. However, because we have not worked with the underlying data or conducted a sensitivity analysis on the matrix, we do not fully understand the implications of using this matrix versus a slightly different approach. We request that EPA carefully consider these issues.

(56) In the presence of moderate to heavy debris, the matrix assigns a 0 to armored capping and a 1 to EMNR/cap. The logic behind this assignment is unclear. Since both technologies entail capping, it seems they should both receive the same score. We suggest assigning the same scores or providing rationale for the current assignment of values.

(57) 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. This score would correctly reflect that a depositional environment neither favors nor limits the technology.

(58) No area of the site is currently classified as "rock, cobble, or bedrock" (p. 3-10), yet this factor is included in the matrix. If EPA anticipates that this substrate may be encountered during RD sampling efforts and includes the factor for this reason, we support leaving it in the matrix, with a note explaining the reason for inclusion. However, if the substrate is not anticipated, we recommend removing this factor from the matrix for simplicity. EPA could instead explain in the text that this condition was considered, but not applied and why.

(59) An asterisked note under the matrix table reads, "For those grid cells assigned EMNR/Cap, if the grid cell is within a Sediment Management Area (SMA) then an engineered cap is assigned, if the grid cell is outside a SMA then EMNR is assigned." This note would lead the reader to believe that EMNR is widely applied to areas outside of SMAs. It is our understanding that this is not the case. It is our understanding that the only areas outside of SMAs that may receive EMNR are PTW areas (Figure 3.6-1). We suggest making it clear in this section (Section 3.3.2, Application of Technologies) that these areas will undergo another decision tree process to determine the final FS technology selection. This would ensure that the reader does not mistakenly assume that EMNR will be widely applied to areas outside the SMAs.

(60) Section 3 uses two criteria to indicate whether an area was erosive: wind- and vessel wake-generated waves and shear-stress on bottom sediments during high flow events (p. 3-8). Figure 3.3-14b shows that these conditions share some of the same scores.

However, the final score that is selected based on the matrix is unclear. It should be clearly stated in the text whether these conditions are evaluated independently and each contributes its own score to the total, or whether one (or both) criterion needs to be satisfied to be considered wind/wave zone or erosive. We are unsure of the effects of one approach versus the other on the alternatives. We request an approach that maximizes the importance of information indicating erosive conditions. That may require each criterion to receive its own score, or if either factor (instead of both factors) indicates erosion, it receives a designation of erosive.

(61) The deposition section states that areas were evaluated based on two lines of evidence: (1) difference in elevations between bathymetric surveys and (2) the ratio of surface to subsurface sediment concentrations (p. 3-8). Figure 3.3-14b 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. Given the importance of this site condition in the success of EMNR and capping (and assuming EPA can sufficiently justify the rationale for using the surface to subsurface ratio, per our earlier comment), we suggest 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.

(62) The FS describes three scoring outcomes from the matrix: a technology receives the highest score, technologies are tied, or an area does not receive a score (an outcome when the area does not achieve the threshold for any of the criteria) (p. 3-12). The implication of a technology receiving no score is unclear, and it is difficult to imagine the circumstance that would give rise to a no-score outcome. We suggest elaborating on these two points in the text of this section in order to more fully present the ramifications of the matrix.

(63) The FS states that in the event of a tie, the least intrusive remedy will be selected (p. 3-12). The Five Tribes are concerned about this decision rule. We would like to know how frequently a tie arises and what would be the overall result of selecting the most intrusive remedy instead of the least intrusive remedy. We suggest that EPA conduct a sensitivity analysis, quantitatively showing the frequency of ties and the overall effect that selecting the least intrusive remedy has on the technology assignments. For example, the quantity of area affected by ties and which technologies are typically encountered in the event of a tie would greatly assist in determining the appropriateness of this decision rule. We believe that it may be more appropriate to select the "most intrusive" remedy (i.e., dredging) in the event of a tie, given the Five Tribes' preference for removal of contaminated material.

(64) The matrix currently assigns a score of 1 to armored cap and EMNR/cap 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 apply to the flowcharts (Figure 3.6-1). In particular, the Five

Tribes are concerned about the technology assignments for PTW. Certain decision points either are absent or result in inappropriate technology assignments that could result in recontamination at the site.

(65) If sediment is designated PTW, the Five Tribes strongly urge EPA to actively remediate it in some way. In the current shallow water flowchart, if PTW is outside an SMA and can be reliably contained, then it is assigned MNR. Similarly, in the intermediate flowchart, if PTW is outside an SMA, can be reliably contained, and is not designated EMNR in the matrix selection process, it inexplicably receives an assignment of MNR. At a minimum, EMNR should be assigned to these areas. PTW is described in the FS as a reservoir for migration of contamination to ground water, surface water, or air, or that acts as a source for direct exposure. As such, the Five Tribes believe that these materials must be actively remediated.

(66) For shallow and intermediate areas, if PTW exists under a structure and within an SMA, then it is assigned a reactive armored cap regardless of whether the material can be reliably contained. The Five Tribes request that a decision point be added to the flowchart under these conditions that asks whether PTW can be reliably contained. If it cannot be reliably contained, a significantly augmented reactive cap should be assigned. Also, if there is PTW under a structure that is not reliably contained, then removal of the structure should receive extra consideration.

(67) The flowcharts contemplate scenarios where PTW is identified outside of SMAs. The Five Tribes are interested to know under what circumstances this occurs at the site, and how frequently. EPA should consider whether it is appropriate to define SMAs as areas exceeding RALs or areas containing PTW, not just as areas exceeding RALs.

(68) The shallow water flowchart indicates that if the RAL concentrations are not expected to be reached within 5 feet depth, the contaminated sediment will be dredged to 3 feet and replaced with an engineered cap (also described on p. 3-32). The depth criterion in this analysis is an important decision point. The Five Tribes would like to minimize capped areas to the extent practicable – in part, to limit the amount of contamination left in place, and in part to limit areas of the river with use restrictions in perpetuity. Figure 3.3-36 indicates that using the 5-foot criterion would leave substantial contamination in the river, especially for Alternatives E through G. 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. Perhaps an intermediate depth, such as 7 feet, would be nearly as effective at removing contamination as the 10-foot criterion. We encourage EPA to conduct a sensitivity analysis using various depths between 5 feet and 10 feet to determine the shallowest depth that is nearly as effective at removing contamination as the 10-foot criterion.

(69) According to the shallow and intermediate flowcharts, NAPL or PTW that is present in an SMA and not reliably contained will be dredged, and a significantly augmented cap with backfill will be used (also as described on p. 3-32). 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. We would like to see additional language in the FS describing the potential for lateral migration and how this

concern will be addressed during RD. The potential for lateral migration underscores the importance of removing PTW that cannot be reliably contained if at all possible.

VI. CONSIDERATION OF FLEXIBILITIES

One issue that is important to the Five Tribes and that we have worked with EPA to understand better is the extent to which the responsible parties will have flexibility in RD beyond what is specified in the ROD. In this section, we state our understanding of the flexibilities that will be allowed in RD and our positions on this issue.

(70) Of great importance to the Five Tribes is that we remain engaged throughout RD and be given opportunities to provide feedback, including instances where EPA is considering granting the LWG the opportunity to deviate from the ROD.

(71) 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 dredging 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 RD; a ROD amendment would be required. We support this lack of flexibility and believe it is important for all interested parties to understand what the ROD does and does not allow. Transparency is important.

(72) We understand that new data will be collected during RD, and the result of these new data may be that the SMAs decrease in area. We do not consider this to be a deviation from the ROD or a flexibility. We do, however, suggest that EPA carefully consider, and engage MOU partners on, whether the new data should replace the old data (i.e., as evidence of natural recovery) or merely be added to it (because the system is heterogeneous).

(73) We are supportive of allowing the responsible parties the opportunity to dredge in areas that were previously designated as capping or EMNR, as long as the dredging is to sufficient depth to remove all contamination. Similarly, we support granting flexibility to dredge deeper than the depths specified in the FS (e.g., the responsible parties may choose to exercise this option to avoid the maintenance costs of a cap).

(74) If the stipulations we provide above for CDFs are met, we support granting the responsible parties the <u>option</u> to use a CDF, rather than <u>requiring</u> them to use a CDF.

(75) As discussed above, we encourage EPA to require structure removal (including minor active structures) to allow for dredging, especially when mobile PTW is present. However, to the extent that EPA assumes in the FS that certain structures will not be removed, we support granting flexibility to remove those structures during construction.

(76) The LWG has expressed significant concern that EPA's technology assignment approach is not nuanced enough. For instance, the LWG seems concerned that RD 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). While we believe this situation to be rare, we support EPA adding language to the Proposed Plan to allow EPA to grant the responsible parties permission to use an alternative active remediation technology if the responsible parties present a strong case that dredging is not feasible. This exception could only be used for small areas, and the Five Tribes would like to be involved in the decision to grant an exception.

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