UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
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MEMORANDUM

SUBJECT: Contaminated Sediments Technical Advisory Group Recommendations – Lower Passaic River Study Area, OU4 of the Diamond Alkali Superfund Site

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This document provides EPA Region 2's responses to the memorandum, "CSTAG Recommendations on Operable Unit 4, the Lower Passaic River Study Area, 17 Mile Remedial Investigation/Feasibility Study, Interim Remedial Action – Draft Feasibility Study and Overall Cleanup Strategy" dated January 31, 2020. The January 31, 2020 memorandum provides the Contaminated Sediments Technical Advisory Group's (CSTAG) recommendations on the overall cleanup strategy development and remedial alternatives evaluation for the upper 9 miles of the 17 mile Lower Passaic River Study Area (LPRSA), as presented by the Region in the Site Information Package (SIP) submitted to CSTAG. The LPRSA is also identified as Operable Unit 4 (OU4) of the Diamond Alkali Superfund Site.

The draft interim remedy (IR) feasibility study (FS) Report was prepared by the Cooperating Parties Group (CPG) pursuant to the 2007 Administrative Order on Consent (AOC) between Region 2 and the CPG. The CPG is performing remedial investigation (RI)/FS activities for the LPRSA under the 2007 AOC. CSTAG's January 31, 2020 recommendations were provided following a November 2019 meeting during which Region 2 presented information relevant to the IR FS to CSTAG and members of the National Remedy Review Board (NRRB). Prior to the November 2019 CSTAG/NRRB meeting, Region 2 provided specific portions of the draft IR FS Report and the SIP to CSTAG for consideration. CSTAG provided this same supporting information, including the SIP, to the members of the NRRB in advance of the November 2019 CSTAG/NRRB meeting. The New Jersey Department of Environmental Protection (NJDEP), the Passaic River Community Advisory Group (CAG), and the CPG also provided a pre-meeting briefing and/or presented to CSTAG/NRRB during the November 2019 meeting.

CSTAG previously provided recommendations on April 25, 2018 to Region 2 regarding the IR proposal for the upper nine miles of the LPRSA. The April 25, 2018 CSTAG recommendations indicated overall support for an IR as part of an adaptive management process towards an

ultimate, risk-protective final remedy. Those recommendations followed a February 28 and March 1, 2018 CSTAG briefing by Region 2 and the CPG to convey the general concept of an IR to address sediment source areas in the upper 9-mile reach of OU4. Region 2 provided responses to CSTAG's April 2018 recommendations on May 29, 2018.

Region 2 greatly appreciates CSTAG's thorough review and thoughtful recommendations related to the proposed IR for OU4. Region 2's specific responses to CSTAG's January 31, 2020 recommendations are provided below. The Region's responses are, to every extent possible, more detailed than the responses that were provided in May 2018 as the IR FS is now nearing completion. However, detailed responses to some of CSTAG's current recommendations or portions of these recommendations are not currently possible because specific IR components are still being considered between Region 2, NJDEP, and the CPG. These components may not be fully developed until after pre-design data collection and the IR design are complete (i.e., following the IR Proposed Plan [PP] and IR Record of Decision [ROD]). The Region will consider CSTAG's recommendations throughout the process of selecting and implementing an IR and, as appropriate, final remedy selection and implementation.

Each of the January 31, 2020 CSTAG recommendations is presented below, followed by Region 2's response.

Recommendations

1. RAO and Remedial Goal Development

a) CSTAG's April 2018 review of the draft IR proposal recommended the use of a contaminant exposure reduction goal in the interim action, in the form of a percent reduction in the SWAC (surface-weighted average concentration). The Region developed a RAO containing a SWAC goal of "not more than 85 ppt" 2,3,7,8-TCDD in RM 8.3 to 15. The 85 ppt SWAC is an estimated >90% reduction from current conditions, and the intent of the IR is to rapidly address higher concentration sediments to reduce SWACs, which is expected to immediately reduce risks and prevent source migration. Use of an interim action to reduce site risks quickly is consistent with EPA's 1999 ROD Guidance[1] on interim remedies and the 2017 Directive on Remediating Contaminated Sediments (recommendation 1). CSTAG appreciates that the interim action is substantial and that it focuses on high concentration, upstream areas of the 17-mile site, and that it uses remedial approaches that are reasonably anticipated to be consistent with a future final, protective remedy. The goal is risk-related (the SWAC represents a primary contaminant exposure term) and is measurable, albeit with challenges as described in comments 2 and 3.

[1] OSWER Directive No. 9200.1-23P (July 1999), A Guide to Preparing Super-fund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents; Available at: https://www.epa.gov/sites/production/files/2015-02/documents/rod_guidance.pdf

Response: Region 2 appreciates and acknowledges CSTAG's comment. As a follow-on, Region 2 agrees that the SWAC reduction goal of the IR is risk-related in that a SWAC represents a primary contaminant exposure term, and that a SWAC is measurable. The Region is considering the challenges in calculating post-IR SWACs and comparing the calculated SWACs to SWAC goals and expects to mitigate them through a post-IR sediment sampling approach and a statistical evaluation methodology (see the Region's responses to current CSTAG Recommendation 3).

b) RAO 1 of the interim action is to control "*sediment sources*" and "*sediment source areas containing elevated concentrations*". Achieving stakeholder consensus on the definition of source sediments, for the purposes of this action, has proven challenging, likely because of the impact on RAL selection. In the site information package (p. 4), the Region refers to source sediments as "*areas with elevated contaminant concentrations that represent significant exposure to the local biota, that contribute contamination to the water column and throughout the LPR through erosion and deposition, and that inhibit recovery of the system.*" In their submittal (p. 4), the CPG refers to source sediments as "*low-recovery potential sediments*" identified as being subject to net erosion or cyclical erosion/deposition and with concentrations higher than those on depositing water column particulates. Both appear to vary from EPA's definitions of sources or source material. For example, in the NCP (40 CFR 300.5), source control actions prevent continued release of hazardous substances, pollutants or contaminants into the environment. In the 2005 Sediment Guidance (p. 2-20), sources are "*the release of contaminants from direct and indirect continuing sources to the water body under investigation*". EPA's 1991 Guide to Principal Threat and Low Level Threat Wastes[2] (p. 1) refers to source material as "*material that includes ... contaminants that act as a reservoir for migration of contamination to ground water, to surface water, to air, or acts as a source/or direct exposure.*" The latter description seems most closely aligned with an interim action intended to reduce SWACs (and therefore exposure and associated risks) as well as contaminant migration. CSTAG questions whether a site- and concentration-specific identification of "source" is necessary or helpful considering that RAO 1 describes material for remediation as those concentrations necessary to achieve the SWAC target. If the Region chooses to define source sediments for the purposes of the action, CSTAG recommends the decision documents explain how the approach to source is consistent with existing definitions and Guidance.

[2] OSWER Directive No. 9380.3-06FS (November 1991), A Guide to Principal Threat and Low Level Threat Wastes; Available at: https://semspub.epa.gov/work/05/382007.pdf

Response: Region 2 believes that an IR-specific definition of source sediments helps to better explain in the IR FS Report why certain sediments are being targeted for removal, and how the various IR alternatives would comparatively address source. During Region 2 and partner agency review of the draft IR FS Report, technical reviewers expressed varied understandings of why certain sediments were being targeted for removal, and the Region decided to include an IR-specific definition to help alleviate potential future misunderstandings of the rationale for the IR strategy and the IR alternatives. The Region is working with NJDEP and the CPG towards finalizing this definition, which will be integrated into the IR FS Report and subsequent IR-related documents (i.e., IR PP, IR ROD, and IR design).

Region 2 also recognizes that an IR-specific definition for source sediments should align with existing EPA guidance and those definitions of source to the extent appropriate. The Region's working draft definition of source sediments was revised subsequent to the November 2019 CSTAG/NRRB meeting. The current draft definition includes the concepts of high concentration, recovery potential, contaminant redistribution, and continuing release from ongoing sources, and also acknowledges the concept of direct exposure to biota as a component of source. The Region anticipates that the final definition of source sediments and an explanation of how the definition is consistent with the NCP and relevant guidance will be included in the final, EPA-approved IR FS Report and subsequent IR-related documents, including the IR PP and IR ROD.

c) RAO 2 of the interim action is to "*Control subsurface sediments (sediments deeper than 6 inches below the sediment bed) from becoming sources of 2,3,7,8-TCDD and total PCBs by remediating sediments between RM 8.3 and RM 15 that have a demonstrated potential for erosion to expose*

subsurface concentrations above the defined subsurface RALs established for 2,3,7,8-TCDD and total PCBs." In the site information package (p. 15), the Region uses "*twice the surface RALs*" to delineate the subsurface materials for remediation. The 2-times RAL was based on a "*probability of continued erosion*". CSTAG recommends that the Region develop a clearer explanation for how the "*probability of continued erosion*" influences the RAL of sediments with a "*demonstrated potential for erosion*", particularly since those concentrations would be remediated if they were exposed at the surface. The underlying goal of the subsurface RAO is to decrease likely future exposures and expedite natural recovery after the IR. However, the larger remedial footprint associated with applying RAO 2 also increases surety that the surface RAO 1 SWAC goal will be met, which could be considered during the selection of a preferred alternative.

As described, RAO 2 evaluates the RAL exceedances of sediments "*deeper than 6 inches below the sediment bed*" with "*a demonstrated potential for erosion*". The depths of erosion potential are unclear and CSTAG recommends the Region clarify this sampling and RAL evaluation strategy and document its basis.

Response: Region 2 expects the IR FS Report to be revised to include a clearer explanation of the derivation of the subsurface RALs. This explanation will include a description of how the "probability of continued erosion" influences the RAL of sediments with a "demonstrated potential for erosion." Region 2 recognizes that concentrations in excess of a surface RAL would be remediated if exposed at the surface, and concentrations above a surface RAL that might be exposed through erosion would influence SWACs. The clearer explanation will also further describe erosion depths and the sampling and RAL evaluation strategy.

Region 2 will work with NJDEP and the CPG to evaluate the impact on the resulting SWACs if concentrations exceeding surface RALs but not exceeding subsurface RALs were hypothetically exposed at the surface. The IR FS Report does contain a sensitivity analysis wherein the IR footprints are assessed using subsurface RALs equal to the surface RALs, for comparison to the IR footprints established using subsurface RALs set at twice the surface RALs. This sensitivity analysis provides a frame of reference for the concern expressed by CSTAG. However, the IR footprints in the IR FS Report are derived using existing data and conditional simulations of those data. Substantially more information will be available to support final footprint derivation after pre-design data have been collected.

The analysis performed to support subsurface RALs set at twice the surface RALs for purposes of deriving the IR footprints in the IR FS Report is included as Attachment 1 to Appendix B of the IR FS Report. The rationale for subsurface RALs higher than the surface RALs is the recognition that the likelihood that subsurface sediments would become exposed due to erosion is less than 100%. In summary, the analysis first identifies the areas over which erosion of 6 inches or more was observed in the upper 9-mile reach between 2008 and 2010 (using sequential multibeam bathymetric survey data), a time period that included a 25-year storm before the 2010 survey. The analysis then evaluates those particular areas of documented erosion to determine if further erosion of 6 inches or more occurred between 2010 and 2012 (again using sequential multibeam bathymetric survey data), a time period that included two high-flow events, including the 90-year storm Hurricane Irene in 2011. This analysis demonstrates that approximately 25% of the area that eroded 6 inches or more between 2008 and 2010 subsequently eroded again 6 inches or more between 2010 and 2012, despite the occurrence of the 90-year storm in 2011 that resulted in extreme flow conditions. The analysis embodies the hypothesis that past erosion can armor the bed against further erosion, and that current surface concentrations are likely to remain at the surface (or be buried through future deposition) and buried concentrations are more likely to remain buried than be exposed even with future erosion-inducing conditions. The 25% occurrence of additional erosion represents a 1 in 4 likelihood that erosion would expose sediments that are currently buried beneath the surface sediment layer. Rather than apply the 1 in 4 likelihood of reoccurrence of

erosion to set the subsurface RALs to 4 times the surface RALs to fulfill the intent of RAO 2, a ratio of 2 was set for the IR FS footprint development. This was intended to provide a conservative ratio, in recognition of the limited number of bathymetric surveys considered in the analysis (i.e. 2008, 2010, 2011, and 2012).

The pre-design sampling program, which will include surface and subsurface sediment sampling at a high spatial density and comprehensive multibeam bathymetry and LiDAR surveys taken at multiple times throughout the upper 9-mile reach, will be used to define the specific footprint associated with RAO 2 in the IR design. These data will be used in a manner consistent with the analysis presented in Attachment 1 to Appendix B of the IR FS Report to derive a subsurface RAL multiplier (relative to the surface RAL) for establishing the IR design footprint, and the Region has capped this multiplier at a maximum of 2. The analysis of continued erosion presented in the draft IR FS Report does not demonstrate that a multiplier less than 2 is needed; however, the subsurface RAL multiplier will be determined after pre-design data are available. In the IR design, any area determined to be erosional between bathymetric surveys (historical or more current) would be classified as erosional for purposes of applying the subsurface RALs, and any location in the erosional area with a subsurface concentration exceeding a subsurface RAL would be included in the remediation footprint. If necessary, the bathymetric analysis performed to identify erosional areas could be supported by numerical modeling analysis. Any area remediated would be dredged to a uniform dredge depth to support placement of a cap designed to prevent contaminant breakthrough and to be resistant to erosion (other than any area that might require a modified dredging/capping approach due to engineering constraints, such as around a bridge abutment, or any area for which dredging might be implemented to reach clean conditions that may not require capping [see current CSTAG Recommendation 4c and Region 2's response to that recommendation]).

Based on the IR footprints established in the IR FS Report according to the sequential application of RAO 1 followed by RAO 2, the addition of footprint area to address RAO 2 would lead to expected post-IR SWACs some amount lower than the alternative-specific target SWACs. Region 2 agrees that this would increase certainty of attaining the RAO 1 SWAC goals (for the 85 ppt, 75 ppt, or 65 ppt alternatives). However, Region 2 notes that even with subsurface RALs equal to surface RALs, IR footprints could be established where the expected post-IR SWACs would be at, but not lower than, the target SWACs, because both IR RAOs could be applied simultaneously to achieve specific SWAC targets. Overall, Region 2 does not endorse the selection of a more conservative alternative solely to increase the certainty that the RAO 1 SWAC goals would be attained. The Region intends to propose as the preferred alternative the alternative that would achieve the IR goals and most appropriately meet the intent of a source control IR based on the NCP criteria, as elaborated through the comparative evaluation in EPA's decision documents.

d) Based on the information provided to CSTAG, the Region's preferred approach involves the use of SWACs, with RALs developed to attain the SWACs. To ensure transparency, provide clarity, and help facilitate meaningful public participation, CSTAG recommends that, consistent with the NCP and existing EPA CERCLA guidance (e.g., EPA's 1999 ROD Guidance and 1988 RI/FS Guidance[3]), the decision documents clarify how the preferred alternative was identified and how the RALs were evaluated.

[3] OSWER Directive No. 9355.3-01 (October 1988), Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA; Available at: https://semspub.epa.gov/work/06/901141.pdf

Response: Region 2 will ensure that the IR PP and IR ROD provide a clear discussion of how the preferred alternative was identified and how the RALs were determined. At the time that EPA prepares the IR PP and IR ROD, the pre-design sampling and IR design will not yet have been performed; only the

IR FS evaluation will be available. Consequently, the IR PP and IR ROD will not include the final RALs, as these could change from the RALs described in the IR FS Report. The Region expects that the IR PP and IR ROD will discuss the methodology to be used for determining the final RALs in the IR design; and that the IR design will provide and discuss the final RALs.

2. SWAC Exposure Areas

a) The Region has indicated that the decision unit for this IR is RM 8.3 to 15. This is a large area to apply a SWAC calculation. The Data Quality Objectives Guidance (2006)[4] discusses the importance of appropriately matching the decision unit to the decision to be made or the area of exposure. Both RAOs address source areas of dioxins and PCBs within the river. Based on the maps of depositional and erosional areas, sediment grain size, contaminant concentrations, and proposed remedial footprints, contiguous in-river sediment sources are generally less than a mile in length. The IR is also expected to reduce exposures to the food web. While some receptors may transit throughout the site and beyond, others are likely exposed over smaller sections of river (indeed, the 2019/2020 biota sampling appears to divide the reach into two sampling areas with different target species). If SWACs are applied to areas much larger than discrete source or exposure areas, then the RAL/SWAC analysis may not delineate an IR footprint appropriate for targeting sources or reducing exposure and risk. In 2018, CSTAG advised (recommendation 4b) the Region to consider application of the SWAC across smaller areas of river. CSTAG reiterates this recommendation. Smaller decision units will permit better definition of source areas, exposures, and remedial footprints. These smaller decision units may be based on the size and location of source areas, habitat, salinity gradients, geomorphology, or other characteristics that are relevant to sources or exposures. For those receptors and decisions that are better matched to the entire upper 9 miles, the SWAC and upper confidence limit (UCL) from each smaller decision unit can be used to calculate a SWAC and UCL for the upper 9 miles.

Unlike a final action, an interim action isn't required to achieve final, protective levels for specified exposure pathways and areas. Rather the interim action "should not be inconsistent with, nor preclude implementation of, the expected final remedy" (NCP 40 CFR 300.430(a)(ii)(B). As a result, CSTAG acknowledges that a range of procedures and factors may be appropriate for determining the size and location of decision units and establishing the IR remediation areas. If a single decision unit is used, a stratified sample and analysis plan can still provide the benefits of smaller decision units. For example, if the upper 9-mile decision unit is divided (stratified) based on exposure or source area characteristics, the SWAC and UCL from these strata can be used to calculate the overall SWAC. In addition, identifying the number and location of strata that achieve or exceed SWAC goals may facilitate the alternatives analysis by differentiating alternative RALs or be useful in adaptive management by identifying areas for further evaluation.

[4] EPA/240/B-06/001 (February 2006), Guidance on Systematic Planning Using the Data Quality Objectives Process EPA QA/G-4; Available at: https: www.epa.gov/sites/production/files/2015-06/documents/g4-final.pdf

Response: Region 2 agrees that final, protective levels for specified exposure pathways and areas are required for a final action. The Region will consider smaller decision units (DUs) at the time of a final, risk-based remedy. However, sufficient information is not currently available to determine relationships between sediment and tissue concentrations, or to differentiate the upper 9-mile reach into exposure-based DUs for specific receptors. Therefore, the primary goal of the IR is to achieve significant SWAC reductions in the entirety of the upper 9-miles through a source sediment removal that is neither inconsistent with nor precludes the implementation of a final remedy. Following the IR, the Region expects that a probability-based, stratified sediment sampling program will be implemented to generate the necessary data to evaluate post-IR SWACs and make informed decisions regarding IR

success/completion. Region 2 also notes that establishing a footprint to attain target SWACs across the entire upper 9-mile reach would likely have a benefit compared to targeting SWAC attainment across smaller reaches, as higher RALs may be derived for particular smaller areas compared to synoptically targeting SWAC attainment across the 9 miles.

Regarding a final, risk-based remedy, the bioaccumulation model that will describe exposure and sediment/tissue relationships is currently undergoing final calibration and parameterization and is expected to be completed and peer reviewed before the IR design has been completed. Risk-based PRGs can be developed following this bioaccumulation model calibration, when the model is available for use. The risk-based PRGs will be used to evaluate recovery of the system following completion of the IR towards risk-protective conditions. This evaluation will be conducted within the overall adaptive management framework and will include constraining uncertainties in PRG inputs so final RGs can be identified and EPA can select the final remedy for OU4. The Region will consider smaller DUs based on the size and location of source areas, habitat, salinity gradients, geomorphology, or other characteristics relevant to sources or exposures, at the time of the final remedy selection.

b) In the site information package (p. 15), the Region explains "*The IR focuses on the stretch of the LPR from RM 8. 3 to RM 15 because existing sediment data suggest the source areas to be targeted by the IR are located in this stretch ... However, the [pre-design investigation] PDI will generate sediment data throughout the upper 9-mile reach, and if the sediment data collected during the PDI identify sediment source areas between RM 15 and Dundee Dam, these sediment source areas would also be addressed in the IR as necessary to achieve the RAOs.*" CSTAG supports applying the selected RALs to the stretch between RM 15 and the Dundee Dam, but recommends the approach should be restated. The clause "*as necessary to achieve the RAOs*" negates the need to remediate upstream of RM 15 because the RAOs are specific to achieving SWACs in RMs 8.3 to 15, not upstream to Dundee Dam.

Response: Region 2 agrees that there is a confounding issue between the current RAOs and the potential need to remediate sediment source areas above RM 15, if pre-design sampling indicates the presence of actionable sediment source areas above RM 15. The Region will engage in discussion with NJDEP and the CPG to resolve this issue in the IR FS, potentially through a decision rule to apply the RALs identified for the 9-mile reach between RM 8.3 and RM 15 to areas above RM 15 or through a new RAO. The IR FS Report will be revised accordingly.

3. IR Completion Strategy

a) The Region presented an evaluation framework for demonstrating completion of the IR based on several lines of evidence. Since RAO 1 is to achieve a post-IR SWAC, CSTAG recommends that the measured SWAC be used to evaluate RAO 1 achievement.

Response: Region 2 agrees that measured SWACs should be used to evaluate attainment of the SWAC goals specified in IR RAO 1. This evaluation will be performed through a statistical SWAC attainment determination framework that considers the inherent uncertainty in calculating a SWAC and an appropriate degree of acceptable statistical testing certainty, which will be determined collaboratively between the Region, NJDEP, and the CPG as part of the completion of the FS. The Region does take the position that a determination that the IR has not attained the RAO 1 SWAC goals but is still complete may be distinct from a determination that the IR has attained the RAO 1 SWAC goals. The Region has provided a description of the determination that the IR has been completed, without RAO 1 attainment, in the Region's response to current CSTAG Recommendation 3b.

b) CSTAG recognizes that IR RAO achievement may be distinct from a determination of remedy completion, which could be evaluated using multiple lines of evidence if SWAC-based remedial

goals are not met. The proposed weight of evidence (WOE) analysis of these additional lines of evidence (e.g., bathymetry, high spatial density sediment sampling, geostatistical analysis of sediment data) could be useful for understanding the cause of non-attainment and evaluating whether construction is complete or whether additional monitoring or further remedial action is warranted. However, it was unclear to CSTAG how the Region would weigh the lines of evidence and apply this analysis. CSTAG recommends that, if a WOE framework is used, the performance metrics, endpoints, standards, and weighting be developed and agreed upon by stakeholders prior to post-IR confirmation sampling.

Response: As noted above, Region 2 agrees that a determination that the IR has been completed may be distinct from a determination that the IR has attained RAO 1, and this distinct determination of IR completion could be supported by a WOE analysis. Because the IR is intended to achieve a substantial reduction in SWACs (with expected associated benefits of exposure/risk reduction and accelerated system recovery), the IR may be able to achieve the objective of addressing sources even if it has not attained the RAO 1 SWAC goals.

Region 2 is currently working with NJDEP and the CPG to finalize a framework to assess SWAC goal attainment (or non-attainment) through a probability-based (e.g., stratified) post-IR sediment sampling program and a statistical data evaluation methodology. As noted by CSTAG, if the SWAC goals are determined to not have been attained, multiple lines of evidence will be assessed to determine if the IR can still be declared complete. The data to be considered when evaluating if the IR is complete will include pre-IR data (e.g., pre-design sediment sampling data, pre-design bathymetry and LiDAR data, and the final IR removal footprint and RALs), IR data (e.g., physical and chemical surface water sampling to assess dredging releases, bathymetry to assess dredging and cap placement accuracy, sediment sampling to assess dredging releases and recontamination, and a construction certification process overseen by Region 2), and post-IR information (e.g., post-IR sediment sampling data, identification of concentrations remaining above RALs, and assessing the potential occurrence of residual, actionable source areas incorporating factors such as relative concentration and contiguousness of observed concentrations).

The IR construction performance monitoring program is still being finalized, as are other components of the overall IR completion determination framework. Each performance monitoring component will incorporate specific measurement endpoints and compliance/trigger levels, along with appropriate mitigation plans in the event of noncompliance. In addition, the overall weighing of the various lines of evidence that are part of the IR completion determination framework will be considered between Region 2, NJDEP, and the CPG. Region 2 will ensure that the framework for assessing SWAC goal attainment is clearly laid out in the IR ROD.

Appendix H of the IR FS Report contains the IR completion determination framework. This framework is also a part of the overall adaptive management approach for the Site, as there are known uncertainties in the framework, specific data collection activities planned to reduce those uncertainties and inform decisions, and potential adaptive responses based on the information collected. The IR completion determination framework will be developed with as much detail as possible in the IR FS. However, particular elements of the framework cannot be finalized until an IR has been selected and all pre-design data have been collected and evaluated. Region 2 will continue to seek consensus between the Region, NJDEP, and the CPG on the elements of the IR completion determination framework, including the performance metrics, endpoints, standards, and LOE weighing scheme. Following issuance of an IR ROD, the complete and detailed IR completion determination framework will be documented in the IR design.

c) The Region presented a well-conceived plan for an empirical evaluation of the attainment of SWAC-based remedial goals using an unbiased sampling design with sample size estimates derived from

considerations of SWAC certainty and the potential for false positives/negatives. Post-remediation sample data will be compared to the SWAC goal using a reverse null hypothesis test of equivalency. This statistical testing approach incentivizes robust sampling while recognizing and accommodating the uncertainties in SWAC estimates. The reverse null hypothesis tests the absence of a greater than allowable difference (the "Y-factor") from, in this case, a SWAC-based remedial goal. As presented to CSTAG, the Y-factor would generally be expected to range from 1.2 - 2, but the final value will be selected based on an analysis of the variance in the PDI data set. CSTAG recommends that the selected Y-factor should reflect the Region's tolerance of uncertainty in determining remedial success. In the decision documents, the Region should clearly describe the Y-factor, its statistical function, and their rationale for selecting a Y-factor value so that the definition of remedial success will be transparent to the public and other stakeholders.

Response: The IR FS will convey as much detail as possible related to the statistical testing approach, recognizing that the pre-design data are necessary to finalize the Y-factor. The Region anticipates that the IR PP and IR ROD will describe the reverse null hypothesis statistical approach and the Y-factor, and the function of the Y-factor and the rationale for selecting a Y-factor. The final value for the Y-factor will be documented in the IR design and applied during assessment of SWAC goal attainment using the post-IR sediment data.

Appendix H of the IR FS Report conveys the overall IR completion determination framework, including the reverse null hypothesis statistical approach/Y-factor methodology. The reverse null hypothesis statistical testing approach (i.e., Y-factor methodology) accounts for inherent uncertainty in the SWAC calculations from a data distribution representing an underlying population and allows for strong statistical affirmation that the IR was successful when the post-IR SWACs comply with the RAO 1 SWAC goals. Region 2 agrees that the final value for Y will be determined based on an analysis of variance in the pre-design sediment sampling data (which will include an initial round of sediment sampling at high spatial density and potentially additional follow-on sampling to better define variability in discrete areas). The Region intends for the final Y value to capture appropriate uncertainty tolerances in determining IR success (i.e., both from the perspective of falsely concluding that a successful IR was not successful and from the perspective of falsely concluding that an unsuccessful IR was successful).

d) As presented to CSTAG, post-remedy sampling to determine compliance with RAOs 1 and 2 will occur up to 2 years after the completion of IR construction. If these data indicate sediment concentrations remain above the RAL or discrete areas drive SWAC goal exceedances, the Region will not be in a position to remediate those areas without remobilizing equipment or initiating a new response action. CSTAG encourages the Region to conduct sampling before IR construction is completed. This process would inform remedial operations, support operational decisions on whether additional remediation would maximize the potential to reach the SWAC goals, and permit an earlier determination of remedy completion.

Response: Region 2 appreciates the recommendation to conduct confirmatory sampling before IR construction is complete. However, Region 2 is concerned that if confirmatory sampling began before completion of construction, tidal currents could transport contaminants to areas that had already been sampled, thereby introducing inaccuracies in the SWAC evaluation. Therefore, the Region believes that synoptic sediment sampling across the upper 9-mile reach is a more appropriate approach to derive post-IR sediment data and calculate post-IR SWACs as compared to a phased approach beginning during IR implementation. Synoptic data will allow a more thorough characterization of true post-IR conditions, including as influenced by tidal dynamics of the system and from the potential broad impact of redepositing dredge residuals, and will avoid confounding influences of construction impacts. As noted in the Region's response to current CSTAG Recommendation 3b, sediment performance data are being considered as part of the overall performance monitoring program, and these data could be used to inform

remedial operations and support operational decisions (e.g., to support modifications in the BMP program to reduce the generation and/or transport of dredge residuals).

Region 2 also notes that the first round of post-IR sediment sampling is expected to be achievable in a relatively short sampling timeframe (i.e., a single sampling season immediately after IR completion, or a portion thereof). The overall timeline for post-IR completion determination includes initial sediment sampling, sampling data analysis, sampling result validation, possible additional sampling to provide increased statistical rigor to the data evaluation (along with analysis and validation), and assessment of the data in the statistical testing and overall IR completion determination framework. Given the time associated with the sampling, analysis, validation, and data assessment processes, as well as the potential need for additional post-IR sampling to provide increased statistical rigor, the value of a phased sampling approach to accelerate decision-making would be diminished.

The Region expects that a thorough pre-design sampling program, the IR design itself, and the performance monitoring program implemented during the IR would maximize the likelihood of a successful IR and minimize the likelihood of any further in-water work being required for source control. However, if EPA determines that further response activities are needed as part of the IR, based on post-IR sampling, Region 2 expects to direct the parties performing the IR to take additional action. If EPA determines the IR is successful or complete, and that no additional response action is necessary for source control, the Region will identify any additional activities needed as part of the overall adaptative management approach to result in identification, implementation, and demonstration of a final, risk-protective remedy for the LPRSA.

4. Alternative Development

a) CSTAG recommends the Region not describe technology selection as a "*presumption*". Rather, alternative development should be described in a manner consistent with EPA's 1988 FS Guidance on the development and screening of alternatives. The Region should also describe how remedial technologies are appropriate for the applied environment and the site's current and future uses (consistent with the 2005 Sediment Guidance and the 2017 Directive on Remediating Contaminated Sediments, recommendation 2) and are not inconsistent with nor preclude implementation of the expected final remedy (40 CFR 300.430(a)(ii)(B)).

Response: Region 2 agrees with this recommendation. The Region's use of the word "presumption" was intended to convey that the potential IR was initially conceived and discussed among Region 2, NJDEP, the CPG, and CSTAG as a source control response action predicated on dredging and capping. The IR FS technology screening has been performed in accordance with EPA guidance. Furthermore, the remedial technologies identified for inclusion in remedial alternatives are appropriate for the applied environment and for the Site's current and anticipated future uses and are neither inconsistent with nor preclude a final, risk-protective remedy. Similarly, development and evaluation of alternatives in the IR FS has been performed in accordance with EPA guidance. The IR FS Report will clearly describe that technology screening and alternative development and evaluation were performed in accordance with EPA guidance and that retained technologies and the assembled alternatives are appropriate for the upper 9-mile reach and its current and anticipated future uses. The IR PP and IR ROD will convey similar information, including specifically for the preferred/selected alternative.

b) The application of the dredge/cap approach is premised on its consistency with the river mile 10.9 TCRA and presumably the success and effectiveness of that action. As noted by CSTAG in its 2018 recommendations, an objective of the TCRA was to evaluate the effectiveness of sediment capping methods. Because performance monitoring data were not available (or described), CSTAG recommended that the performance monitoring data be compiled and analyzed to develop lessons

learned so that an appropriate suite of alternatives could be developed and evaluated in the IR. In the 2019 site information package (p. 4), the Region again states that "*Dredging and capping at RM 10.9 were completed in 2014 and cap performance monitoring is ongoing*", but the outcome of these efforts and the potential effectiveness of the technology has yet to be documented (or presented). As such, CSTAG re-iterates its 2018 recommendation 5 to compile (or collect) remedy performance data on the RM 10.9 removal action to assess remedy performance and support the interim and final remedy evaluations.

Response: The RM 10.9 cap performance is still being monitored, pursuant to the RM 10.9 Removal Action Long-Term Cap Monitoring and Maintenance Plan. The second chemical monitoring event was conducted in fall 2019, and the Region expects these sampling results to be available in the coming months. Upon receipt of the data, the Region will evaluate all existing performance monitoring data and subsequently brief CSTAG on the Region's evaluation of cap performance. The Region will also be discussing its evaluation of cap performance with the CPG. Region 2 has previously compiled a list of potential improvements to the cap monitoring program based upon physical and chemical monitoring events at the RM 10.9 cap and submitted that list to the CPG for consideration. The Region will be doing the same after the evaluation of this most recent monitoring data set.

RM 10.9 monitoring program data that become available while the IR is being conceptualized, designed, and implemented will be incorporated where appropriate. The IR FS Report will clearly indicate that the RM 10.9 data are being and will continue to be used in this manner. Moreover, the RM 10.9 monitoring data will be used, as appropriate, in a similar manner to support decision-making pertaining to a future, risk-protective final remedy.

c) In 2018, CSTAG recommended "*A broader range of alternatives should be considered in the FS, ...including an alternative that features dredging to clean sediments where feasible (e.g., areas with relatively shallow depths of contamination)*." CSTAG appreciates that the Region included this suggestion in their description of alternatives ("*[sediment removal] could incorporate dredging to a clean depth in areas where this may be practical; this will be considered in the IR design once the PDI data are available*." [p. 15, site information package]), but it was unclear under what conditions "dredge to clean" would be implemented based on the sampling program and results. CSTAG recommends that the decision documents include a decision tree that articulates criteria for dredging to clean vs. dredging followed by capping, or at least document the principles for making those determinations based on collected data, including what constitutes "clean" in this context.

Response: Region 2 intends to work closely with NJDEP and the CPG to evaluate the potential applicability of "dredging to clean" to the extent possible in the IR FS Report. The Region has provided comments to the CPG to provide additional detail related to this concept in the IR FS Report. However, the Region notes that the information needed to fully evaluate conditions in the upper 9-mile reach and the potential applicability of dredging to a clean horizon (potentially then without the need to cap) will be collected during the pre-design sampling program. The pre-design sampling program and the IR design will not be complete until after the IR ROD.

While insufficient information will be available at the time of the IR PP and IR ROD to document specific decision criteria related to the possibility of dredging to clean, the Region will ensure that the IR PP and IR ROD convey the principles for making determinations regarding the application of dredge to clean. What constitutes "clean" is currently under discussion between the Region, NJDEP, and the CPG.

5. Adaptive Management

a) In EPA's 2017 Directive on Remediating Contaminated Sediment Guidance (recommendation 8) and other references on using adaptive management in remediation (e.g., NRC 2003[5]), the first step in developing an adaptive management plan is to establish a measurable objective of the management action. The current LPRSA adaptive management plan does not establish this type of objective. While CSTAG is concerned that a final remedial goal isn't included with the approach, it is recognized that the site's timing doesn't currently support remedial goal development, nor is the IR design contingent on the final remedial goal. According to the Region, "*risk-based sediment PRGs for the Upper 9 miles of the LPR will be derived in conjunction with the IR design*". As such, the remedial goal should be available prior to needing it in the post-IR phase when data from the monitoring program will be used to assess progress towards and attainment of the final remedy RAOs and associated remedial goals. CSTAG recommends the Region prioritize the development and communication of the media and associated contaminant levels used to signify attainment of final remedy RAOs so that the long-term objective is understood, and the IR's risk reduction can be placed in the context of a final remedial goal. Because remediation and assessment are planned to occur over decades, CSTAG also recommends that interim goals for fish tissue or fish meals be developed to communicate risk reduction expectations and progress.

[5] NRC (National Research Council, 2003), Environmental Cleanup at Navy Facilities. Adaptive Site Management. The National Academies Press. Washington DC; Available at: https://www.nap.edu/catalog/10599/environmentalcleanup-at-navy-facilities-adaptive-site-management

Response: Region 2 recognizes that it is important to put the remediation of the upper 9-mile reach into the context of final, risk-protective goals as soon as possible, so that risk reduction as relates to final remedy objectives can be evaluated and communicated to stakeholders. The adaptive management framework being developed as part of the IR FS is intended to accomplish this, and the Region intends to work with NJDEP and the CPG to prioritize the collection of the information needed to support the development and application of final remedy RAOs, including risk-protective levels of contamination.

Recognizing that the ultimate attainment of risk-protective conditions will occur on the scale of decades, the Region will also work with NJDEP and the CPG to consider the development of interim thresholds (e.g., interim fish tissue concentrations) that can be used to put the relative risk reduction for the LPRSA over time in context and to communicate risk reduction expectations and risk reduction achieved to stakeholders. Through comments to the CPG with requested revisions to the Adaptive Management Plan, the Region intends for these factors to be captured in as much detail as possible in the IR FS Report (and subsequently the IR PP and IR ROD).

Region 2 has provided comments to the CPG that request revisions to the adaptive management framework conveyed in the draft Adaptive Management Plan that was included as an appendix to the draft IR FS Report. One of the significant revisions requested is for the CPG to include the design, implementation, and demonstration of the IR itself as driving elements of adaptive management. This interim action is conceived of as a distinct management action being taken for ultimate purposes of mitigating risks, though the immediate goal of the action is to reduce concentrations. As presented by the Region, the IR will have a measurable objective (i.e., SWAC reduction) and its implementation and demonstration is also intended to inform subsequent adaptive responses (e.g., evaluation of system response to the IR, necessary changes to the long-term monitoring (LTM) program and/or PRGs, necessary revisions to the CSM and/or numerical models to comport with empirical data and provide for accurate predictions of recovery, and ultimate selection of a final remedy). Similarly, the Region has requested that the CPG more clearly incorporate the final remedy for the LPRSA as a component of the

adaptive management framework. The final response action will also be a distinct management action and will have a measurable objective (i.e., attainment of risk-protective final RGs) and will be informed by specific information gathered before, during, and after implementation of the IR for purposes of understanding recovery and selecting an appropriate final action that attains risk-protective conditions in a reasonable timeframe. In addition, the final action will also be subject to potential adaptive response (e.g., further action if risk-protective RGs are not met or are not met in a reasonable timeframe) based on pre-, during, and post-implementation information gathered to inform the action.

Region 2 notes that while the PRGs will be developed in conjunction with the IR design and finalized following IR completion, they will not be used to evaluate the performance of the IR itself. After the IR has been completed, risks at the LPRSA will be reassessed to understand impacts of the IR on overall risk. The PRGs will be used as a measure of risk-protective conditions, for comparison to empirical data generated through the LTM program, and to inform forecasts of reaching risk-protective conditions. However, because the IR may alter relationships between sediment and tissue concentrations, and because additional data and information will be gathered for the purpose of reducing uncertainty in inputs to the PRGs, the Region anticipates that PRGs may continue to be refined until such time as EPA has confidence in the selection of final RGs. At that point, the final RGs will be the measure of risk-protective conditions and will be embodied in the final remedy RAOs.

b) The foundation of an adaptive management plan is a monitoring program that is sufficient to identify the response and trends in parameters associated with progress toward and attainment of RAOs while providing a better understanding of the drivers of or impediments to attaining the objectives. The materials presented envision physical, chemical, and biological attributes in multiple sampling media, including sediment, biota, and water, and bathymetry measurements, with some parameters (water and biota) collected annually and others (sediment and bathymetry) periodically to support long-term monitoring and to diagnose why certain outcomes have or have not been achieved. CSTAG commends the robust and comprehensive monitoring plan developed to date and support the plan's objectives to evaluate contaminant exposure and risk to receptors over time and indicate drivers of the results. The evaluations will be supported by the 2019/2020 current (pre-remedy, baseline) conditions monitoring of sediment, biota, water column, and bathymetry and the post-remedy SWAC verification sampling. CSTAG recognizes the value of the baseline and SWAC verification program for improving the conceptual site model, deriving remedial goals, supporting remedial design, and providing a baseline for the long-term monitoring and adaptive management program.

Response: Region 2 appreciates CSTAG's recognition of the robust and comprehensive nature of the monitoring plan developed to date to support the overall adaptive management approach being developed as part of the IR FS. The plan, developed collaboratively with NJDEP and the CPG, includes the ongoing sampling of surface water, biota, and sediment to establish physical, chemical, and biological system attributes. The sampling program, which began in 2019 and is continuing in 2020 (and potentially 2021), the will assess conditions in the upper 9 mile reach over a range of flow regimes and at times when biotic activity is expected to be higher and will provide sediment concentration data in the surface and subsurface through a high spatial density sampling program. Further, during the IR, performance monitoring data would be collected to evaluate construction performance. Following the IR, sediment sampling would be performed to demonstrate the success/completion of the source control action, and an LTM program would be initiated to provide information necessary to test hypotheses about the system and to support adaptive responses towards the selection, implementation, and ultimate demonstration of a final remedy that attain risk-protective goals. The Region fully intends for this monitoring program to generate data that will be used to evaluate contaminant exposure and risk to receptors over time and provide a better understanding of the drivers of or impediments to attaining final remedy objectives. The Region will work to ensure that the specific sampling approach, methods, and frequencies will support these expectations.

c) The long-term monitoring will likely include annual monitoring of contaminants in fish/crab tissue and surface water, and periodic monitoring of sediment contaminant concentrations. CSTAG recommends that the Region consider the use of passive sampling in the water column as part of their long-term monitoring. Passive sampling measures the freely dissolved concentrations of COCs in the surface water, which for certain chemicals may be strongly correlated to tissue concentrations in benthic and pelagic organisms at multiple trophic levels. It also provides a time-weighted sample with lower detection limits than the proposed water sampling methods that could prove valuable in the long-term assessment of trends and in evaluating the feasibility of attaining the water quality ARAR.

Response: Region 2 recognizes that there may be benefit to using passive sampling to evaluate water column conditions, particularly as passive samplers are intended to measure freely-dissolved concentrations and provide a time-averaged result, and these attributes may better correlate to tissue concentrations and therefore assessment of risk and risk reduction. The use of passive sampling in the sampling program for the upper 9-mile reach is under discussion between EPA, NJDEP, and the CPG. The decision related to use of passive sampling as part of the upper 9-mile program will be documented in IR-related documents, including the IR FS Report, IR PP, IR ROD, and/or IR design documents.

d) The LPRSA is one of the first large, contaminated sediment sites to develop a more formalized adaptive management approach. The draft adaptive management plan reviewed by CSTAG established three "adaptive elements" related to developing remedial goals, evaluating the performance of numerical models, and evaluating attainment of remedial goals. This represents a much broader view of adaptive management than is embodied in the 2017 Directive on Remediating Contaminated Sediments (recommendation 8) that focuses on setting objectives, implementing actions, monitoring, and using the information to determine what actions are necessary, if any, to achieve the objectives. The "adaptive element" of developing PRGs in the RI/FS into remedial goals in the ROD is already a Superfund remedial process and, post-ROD, the five-year reviews routinely re-evaluate whether cleanup levels (and RAOs) remain valid. These procedures do not require adaptive management. However, data collected during the adaptive management program will likely support the five-year review determinations. Similarly, if the Region continues to rely on complex, linked numerical models at the site, their ongoing calibration and verification would be an expectation, not a process requiring adaptive management. These two "adaptive elements" add additional, unnecessary complexity and layers of process that obscure the primary intent of adaptive management in sediment remediation (assessing progress toward remedial goals and, identifying whether additional remedial actions are needed to achieve those goals). CSTAG re-iterates recommendations from the 2018 review, specifically that adaptive management should focus on comparing empirical, site-specific data to criteria related to the goal of protection of human health and the environment to determine the need for additional remedial actions. This recommendation does not negate the need for periodic evaluation of the validity of cleanup levels based on site-specific analyses or other factors. CSTAG emphasizes the importance of the five-year review for making those determinations. CSTAG recommends the Region enhance the rigor of those reviews by being clear about the inputs, evaluations, and criteria that would support the ongoing re-evaluations of the validity of the remedial goals.

Response: Region 2 agrees that adaptive management should focus on comparing empirical, site-specific data to criteria related to the goal of protection of human health and the environment to determine the need for additional remedial actions. The Region also recognizes the typical role of the five-year review in evaluating the validity of cleanup levels.

As noted in the Region's response to current CSTAG Recommendation 5a, the Region has requested that the CPG substantially revise the Adaptive Management Plan that is an appendix to the IR FS Report, and

the Region expects to begin discussions with the CPG and NJDEP on how these revisions will evolve into an updated Adaptive Management Plan. The proposed revisions to the plan are intended in part to better integrate the IR and the final remedy themselves, each of which will be characterized by measurable objectives and pre, during, and post completion data collection intended to reduce uncertainty and inform potential adaptive response. The Region's requested revisions to the Adaptive Management Plan specifically include to frame adaptive management around the following three primary adaptive elements: IR Design and Implementation; System Response; and System Recovery. Within the IR Design and Implementation adaptive element, the Region has requested that the revised Adaptive Management Plan be framed around hypotheses and related decision questions that pertain to: 1) adequately capturing sediment sources in the IR design; and 2) demonstrating attainment of the IR RAOs and success/ completion of the IR. Within the System Response adaptive element, the hypotheses and related decision questions would pertain to: 1) demonstrating adequate system response to the IR; and 2) demonstrating the comportment of model suite/CSM with empirical monitoring data and the ability of the models/CSM to support accurate projections. Within the System Recovery adaptive element, the hypotheses and related decision questions would pertain to: 1) constraining uncertainty in the inputs to PRGs such that final RGs can be selected; 2) selecting a final remedy to attain risk-protective conditions in a reasonable timeframe; and 3) attaining risk-protective conditions through the implementation of a final remedy. Each of these components to the Adaptive Management Plan is characterized by related objectives and would be assessed through data collection activities and subsequent diagnostic evaluations and adaptive responses, if and as necessary, all intended to reduce uncertainty and support confident application of management decisions.

Region 2 recognizes that there are components of this revised adaptive management approach for the upper 9-mile remediation program that might appear to be standard elements of a CERCLA remediation program. Specifically, the Region does not consider the currently ongoing initial calibration and parameterization of the bioaccumulation model to be an adaptive process, nor was the initial calibration of the approved sediment transport and contaminant fate and transport models (and the related organic carbon and hydrodynamic models) an adaptive process. Similarly, the Region does not consider the initial derivation of PRGs (which for the upper 9-mile remediation program will occur not in the IR FS, but in conjunction with the IR design) to be an adaptive process. However, the Region does recognize that there are uncertainties in the inputs to PRGs, some deriving from uncertainty within the bioaccumulation model and some deriving from uncertainty in the influence of an IR on system relationships. The Region also recognizes that while the models are considered sufficient for purposes of evaluating IR alternatives in the IR FS, there are uncertainties in the models that will be reduced through ongoing and future monitoring during the IR design phase and beyond.

The PRGs will establish an expression of those risk-protective conditions that would be the objective of a final remedy (until sufficient confidence exists to select final RGs, which would then be the ultimate risk-protective conditions required), and the models are a necessary tool to forecast conditions to understand what additional action may be needed in the future to achieve risk-protective conditions. (Empirical evidence, however, ultimately would be used to evaluate recovery.) The potential need to refine the PRGs based on generated data that may constrain uncertainty in the inputs, and the potential need to refine the models to provide a confident predictor of future conditions are therefore inherently linked to the intent of adaptive management to assess progress towards remediation goals and action that might be needed to achieve those goals. While appropriate for the upper 9-mile remediation program, Region 2 recognizes that this interpretation of adaptive management may not be appropriate for all sites.

e) The most important decision point in the adaptive management process will be determining if additional remediation is warranted after the IR and period of assessment to achieve RAOs and remedial goals. The decision tree on the attainment of remedial goals (fig 5-2) asks "*is recovery progressing toward protective levels in a reasonable timeframe*." The Region states that after a "post-

IR monitoring period on the order of 10 years" they "*will evaluate whether recovery trends support attainment of risk-based goals in a reasonable timeframe*". This language is ambiguous in meaning and timing. For example, the phrase "*is recovery progressing ... in a reasonable timeframe*" suggests that recovery rates, not risk-based goals are the metric. It's also unclear whether 10 years is the reasonable timeframe for attainment of risk-based goals, or 10 years is just when an assessment of an unstated, future reasonable timeframe for goal attainment will occur. CSTAG recommends that the Region's adaptive management plan unambiguously state when decisions will be made and on what basis. EPA's 2005 Sediment Guidance (p. 4-12) emphasizes that managers consider the "*extent and likelihood of human exposure to contaminants during the recovery period*", among other factors, in their determination of "reasonable". While the timeframe will be informed by long-term monitoring data and trends, stakeholder (including community) input and communication will be critical for this determination.

Response: Region 2 agrees with CSTAG that an adaptive management plan should unambiguously indicate when decisions will be made and on what basis. The Region recognizes that the definition of "reasonable timeframe" is ambiguous as currently presented in the draft Adaptive Management Plan submitted by the CPG as an appendix to the IR FS Report. This particular definition is the subject of ongoing discussion between Region 2, NJDEP, and the CPG.

In the System Recovery adaptive element, attaining risk-protective conditions (final RGs) and attaining these conditions in a reasonable timeframe are the critical measures. The System Response adaptive element will assess the impact of the IR on the system in terms of inducing an improved recovery trajectory. These elements are closely interrelated and combined will provide the basis on which EPA will propose a preferred alternative and select a final remedy, whether that be monitored natural recovery (MNR), some further action (e.g., additional dredging and/or capping), or a combination thereof. If the trends in recovery, derived using models that are demonstrated to comport well to actual conditions and observations (or using empirical data if the models cannot be brought into comportment), indicate that final RGs can be attained and can be attained in a reasonable timeframe, that might lead EPA to propose MNR as a final remedy. If the trends in recovery, derived using models that are demonstrated to comport well to actual conditions and observations (or using empirical data if the models cannot be brought into comportment), indicate that final RGs cannot be attained or cannot be attained in a reasonable timeframe, then EPA would likely propose further active remediation as part of the final remedy.

As conceived in the Adaptive Management Plan, 10 years is the expected period of LTM over which information would be gathered to inform identification of a preferred alternative and selection of a final remedy. The Region does not intend that this 10-year timeframe is used to define what a reasonable timeframe is in the context of selecting and implementing a final remedy and confirming the attainment of risk-protective conditions. The IR FS Report and subsequent IR-related documents will provide further clarity on the timeframes and their context within the overall adaptive management framework. Ultimately, the definition of "reasonable timeframe" will be informed by the NCP criteria, including stakeholder (including community) input and existing guidance. This definition may be finalized in the IR ROD; alternately the IR ROD may provide a decision process for establishing the definition and the definition documented during the IR design phase.