REGION 6
DALLAS, TX 75270

January 5, 2024

BY EMAIL

Mr. Charles W. Munce, P.E.
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Re: San Jacinto River Waste Pits Superfund Site; Notification of Serious Deficiency Pursuant to Paragraph 59 of Administrative Settlement Agreement and Order on Consent for Remedial Design, CERCLA Docket No. 06-02-18

Dear Mr. Munce:

This letter provides notice that the U.S. Environmental Protection Agency (EPA) has determined pursuant to paragraph 59 of the Administrative Settlement Agreement and Order on Consent for Remedial Design, CERCLA Docket No. 06-02-18 (Settlement), that Respondents McGinnes Industrial Maintenance Corporation and International Paper Company (together, Respondents) are seriously deficient in their performance of the Work they are required to perform under the Settlement.

The Settlement was agreed to by Respondents and has an effective date of April 11, 2018. The Work required by the Settlement includes submission of the North Impoundment Pre-Final (90%) Remedial Design deliverable (90% RD); Respondents completed their submission of the 90% RD in November 2022. The 90% RD as submitted by Respondents is seriously deficient for the reasons specified in the attached Grounds for Issuance of EPA Notification of Serious Deficiency.

Pursuant to the terms of the Settlement, Respondents have a 20-day opportunity to remedy the serious deficiencies in the 90% RD specified in this notice and its attachment, which together constitute a "Work Takeover Notice" as described in paragraph 59(a) of the Settlement. As stated in paragraph 59(a) of the Settlement, the EPA "will provide Respondents a period of 20 days within which to remedy the circumstances giving rise to EPA's issuance of such notice." In order to remedy the circumstances giving rise to this notice, Respondents must remedy each of the serious deficiencies specified in the attachment to this letter to the satisfaction of EPA.

The Settlement provides in paragraph 59(b) that "[i]f, after expiration of the 20-day notice period specified…Respondents have not remedied to EPA's satisfaction the circumstances giving rise to EPA's issuance of the relevant Work Takeover Notice, EPA may at any time thereafter assume the

performance of all or any portion(s) of the Work as EPA deems necessary." The Settlement further provides for an additional written notification by EPA "if EPA determines that implementation of a Work Takeover is warranted under this ¶ 59.b."

The EPA may agree to extend the 20-day period in the Settlement for Respondents to remedy the circumstances giving rise to this notice if Respondents, within the 20-day period prescribed by the Settlement, provide to the EPA a plan satisfactory to the EPA for: 1) remedying the circumstances giving rise to this notice, and specifically the serious deficiencies identified by the EPA in the attached Grounds for Issuance of EPA Notification of Serious Deficiency, in an expedited timeframe acceptable to the EPA; and 2) submitting a 100% Remedial Design compliant with the terms of the Settlement in a timeframe acceptable to the EPA. In order to be in compliance with the Settlement, design deliverables submitted by Respondents must be consistent with implementing the Record of Decision; complete; and suitable for procurement, as discussed in the attached Grounds for Issuance of EPA Notification of Serious Deficiency.

The EPA may still assume all or any portion of the Work as EPA deems necessary if: 1) within the 20-day period in the Settlement, Respondents do not either remedy to the satisfaction of the EPA the circumstances giving rise to this notice or, in the alternative, submit a plan satisfactory to the EPA to remedy the serious deficiencies identified in this notice and come into compliance with the Settlement; or 2) if Respondents have not remedied the circumstances giving rise to this notice to the satisfaction of the EPA by the completion of any agreed-upon extension of the 20-day period.

As stated in the Settlement, EPA retains all authority and reserves all rights to take any and all response actions authorized by law. EPA reserves all, and waives none, of its authority and rights under the Settlement, whether or not specifically set forth in this letter. This notice should not be construed as prohibiting, altering, or in any way limiting the ability of the EPA to seek any other remedies or sanctions available to the EPA as a result of the serious deficiencies in the 90% RD.

Please feel free to contact me to discuss this matter further or to arrange a meeting with the EPA for further discussion. Please be advised that any meetings between the EPA and Respondents will not affect the timeframes for submission of the plan described in this letter or in paragraph 59 of the Settlement.

Sincerely,

Ashley Howard
Remedial Project Manager
Superfund Emergency Management Division

Attachment

Grounds for Issuance of EPA Notification of Serious Deficiency Pursuant to Paragraph 59 of Administrative Settlement Agreement and Order on Consent for Remedial Design

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NOTIFICATION OF SERIOUS DEFICIENCY: Grounds for Issuance of EPA Notification of Serious Deficiency Pursuant to Paragraph 59 of Administrative Settlement Agreement and Order on Consent for Remedial Design, Docket No. 06-02-18 (Settlement)

San Jacinto River Waste Pits Superfund Site

Respondents McGinnes Industrial Maintenance Corporation and International Paper Company (together, Respondents) agreed to develop the San Jacinto River Waste Pits site (Site) Northern Impoundments Remedial Design (RD) pursuant to the Settlement referenced above. As specified in the Settlement, Respondents agreed to develop an RD consistent with the Site remedy selected by the Environmental Protection Agency (EPA) in a Record of Decision (ROD) dated October 11, 2017. Section 3.6 of the Settlement's Statement of Work (SOW) requires the Site 90% RD deliverable to include a "complete set of construction drawings and specifications" that are "suitable for procurement." The Settlement also requires the Work to be performed pursuant to EPA guidance, including guidance listed in Section 8.1 of the SOW.

The Settlement for performance of the Site RD was signed in April 2018. The RD for the Site Northern Impoundment has been delayed by multiple extensions totaling 725 days as requested by Respondents, and granted by the EPA, to meet Respondents' Settlement deadlines. The EPA and its partners attended multiple Technical Work Group (TWG) meetings to discuss technical issues related to the RD with Respondents, offering clarifications on issues related to the ROD and EPA policy to minimize the eventual review and approval process, as well as providing technical expertise.

Respondents submitted the two final components of the North Impoundment Pre-final (90%) Remedial Design deliverable (the 90% RD) in 2022 pursuant to the extension requests granted by the EPA. The 90% RD component submitted by Respondents on June 27, 2022, (the June 90% RD) included the design for most of the Northern Impoundment, excluding the Site's Northwest Corner. On November 8, 2022, Respondents submitted the design component addressing the Site's Northwest Corner (the NWC 90% RD).

Respondents' 90% RD deliverable, including the June 90% RD and the NWC 90% RD, is seriously deficient because:

- The 90% RD is not consistent with the ROD's requirements;
- The 90% RD does not present an implementable design of the remedy selected in the ROD. The 90% RD lacks adequate explanation, documentation, or support for evaluations of design options and for final design decisions, even when a selected design option creates additional implementability challenges or risks. In addition, the 90% RD does not adequately explore or evaluate potential design solutions to resolve technical difficulties;
- The 90% RD does not have complete plans, specifications, procedures or performance metrics for all critical aspects of the remedial action. Many of these critical decisions are left to the future remedial action contractor, so that the 90% RD constitutes an incomplete deliverable;
- Contingency plans and mitigation strategies are not uniformly developed in the 90% RD, and for several key design issues, there are no contingency plans or mitigation strategies presented in the 90% RD, nor are there metrics or specifications for the remedial contractor to develop those documents;
- The 90% RD presents conflicting, inconsistent information on important aspects of the RD within the deliverable;
- The 90% RD does not provide sufficient detail, overall, so that potential remedial action contractors could bid the project and undertake the work successfully. Key design calculations and details of critical

work are missing, and some parts of the design submittals are overly conceptual and not adequately developed for a 90% design deliverable;

- There is inadequate support and documentation for some design conclusions and key factual statements made in the 90% RD; and
- The 90% RD inappropriately labels certain design, engineering or construction issues as "technical uncertainties" where i) Respondents' own selected design approaches create or exacerbate implementabilty issues, and alternate design approaches and/or mitigation and protection strategies exist, consistent with the ROD, which are not adequately explored or developed by Respondents; and ii) Respondents leave the development of plans and procedures to address critical work issues to the future remedial contractor, creating additional uncertainty by leaving the issues unresolved in the 90% RD.

Because of these deficiencies, the 90% RD does not meet the requirements for the 90% RD deliverable pursuant to the Settlement: the 90% RD is not consistent with the ROD, as required by the Settlement including its SOW; it is not consistent with Respondents' obligation under the Settlement to perform the RD in order to implement the ROD; it does not provide a complete set of drawings and specifications to implement the ROD remedy, as required for the 90% RD in the Settlement SOW describing prefinal/90% design deliverables; it is not "suitable for procurement" as required by the Settlement SOW; and it is not consistent with EPA guidance for a 90% RD deliverable, including but not limited to requirements for biddability and constructability, completeness, adequate detail for critical work, and consistency. In the Summary provided below, the EPA discusses the specific requirements for the 90% RD pursuant to the ROD, the Settlement and the EPA's guidance, and how the 90% RD, because of the serious deficiencies identified above, fails to meet those requirements.

A 90% RD deliverable is typically considered near final, and it should require relatively minor comments from the EPA. The schedule included in the Settlement, and available to the public, provides that Respondents should make revisions and submit a 100% RD in thirty days. However, the 90% RD submitted by Respondents would require significant revisions to address these serious, fundamental deficiencies in the design. Despite the EPA's extensive efforts working with Respondents through the Technical Workgroup (TWG)[1] meetings, the 90% RD is not a design deliverable that the EPA would consider to be 90% complete or near final, and after review of the 90% RD, the EPA has determined that the 90% RD is seriously deficient pursuant to paragraph 59 of the Settlement.

The EPA's concerns with the 90% RD were generally outlined in the EPA letters to Respondents dated December 8, 2022, and September 8, 2023. In this Notification of Serious Deficiency, the EPA has provided the Summary below and also a list of specific design components involving critical aspects of the RD, with detailed discussions of the EPA's concerns regarding each component. These design components represent critical components for implementing the remedy, including the methods for achieving the ROD's cleanup level; identifying and addressing hydraulic heave concerns; and issues related to the structural integrity of the cofferdam wall Best Management Practice (BMP). Each of the listed design components illustrates one or more of the serious deficiencies identified above, and additional examples of the serious deficiencies are included in the Summary.

[1] The Technical Workgroups or TWGs were established pursuant to section 3.1 of the Settlement SOW to provide technical expertise to assist Respondents in the development and evaluation of RD plans and options, and included representatives of Respondents, the EPA, the U.S. Army Corps of Engineers, and the Texas Commission on Environmental Quality. Pursuant to section 3.1 (c) of the SOW, "EPA and TCEQ participation in the TWGs does not imply their approval of the TWGs' findings, discussions, proposals and conclusions."

The Summary and detailed discussion of specific design components below are not intended as an exclusive list of the issues and concerns with the 90% RD identified by the EPA and its review team. The focus of this Notification are serious deficiencies identified by the EPA as documenting that the 90% RD is not in compliance with the requirements of the Settlement, and not the provision of a complete set of technical comments.

SUMMARY OF SETTLEMENT REQUIREMENTS FOR THE 90% RD AND SERIOUS DEFICIENCIES

The 90% RD is not Consistent with the ROD Requirements as Required by the Settlement

The Settlement requires the RD to be consistent with the EPA's ROD for the Site. Key components of the ROD for the Site Northern Impoundment include excavation and removal of wastes above 30 ng/kg TEQ dioxin[2], and disposal of the waste off-site.[3] The ROD's Declaration does not stipulate the method of excavation and removal of the waste. The EPA subsequently clarified that excavation "in the dry" and mechanical dredging were both acceptable methods to excavate the waste.[4] In response to public comments, the ROD also added a requirement that the remedy utilize BMPs sufficient to prevent releases in excess of the Texas Surface Water Quality Standards ("TSWQS"). The EPA documented in the ROD that the selected remedy would utilize more robust BMPs than initially proposed, in response to public concerns.[5]

The design approaches for key elements of the 90% RD are not consistent with the ROD requirements, and the impacts on the RD are far reaching. For example, the 90% RD does not provide for removal of waste, regardless of depth, exceeding the cleanup level of 30 ng/kg TEQ as required by the ROD. Instead, Respondents include in the basis of their design the use of a surface weighted average concentration (SWAC) approach to addressing the Site cleanup level which would not provide for removal of waste exceeding 30 ng/kg TEQ as required by the ROD, regardless of depth. This incorrect design basis impacted major aspects of the project, including wall design, excavation depths, volumes of material to be excavated, equipment required, and project schedule, as well as many other design issues.

Respondents agreed in the Settlement to provide a design consistent with the EPA's selected ROD remedy, but for the Northwest Corner, Respondents provided the design for a remedial alternative which is not the EPA's selected remedy. The submitted NWC 90% RD included a design of Respondents' preferred remedial alternative, capping waste in place, instead of the remedial alternative selected in the ROD, excavation and off-site disposal. While the EPA had specifically denied Respondents' request to do a new feasibility study during the design, the NWC 90% RD also included Respondents' own evaluation of the alternatives, including their assessment of remedial objectives and protectiveness of human health and the environment, using some terminology from a CERCLA remedial alternatives analysis but contradicting the EPA's final remedial determinations as documented in the ROD.[6] Respondents' attempt to substitute their judgment for the EPA's final remedy selection, in an RD deliverable pursuant to an RD settlement agreement with the EPA, is contrary to CERCLA, the National Contingency Plan, the EPA's guidance and policy, and the Settlement.

Finally, the 90% RD is inconsistent with the ROD because it provides for discharge of the water trapped behind the BMP after BMP installation or later accumulated in the BMP during remediation as "river water."[7] The 90%

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[2] 30 ng/kg TEQ is 30 nanograms per kilogram 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalent or TEQ.
[3] ROD pp. 1-2; The Declaration, Section 1.4 Description of the Selected Remedy.
[4] August 3, 2022, EPA Memorandum to Site File Regarding a Non-Significant Post-Record of Decision Clarification and Change for the San Jacinto River Waste Pits Superfund Site.
[5] Section 2.14 of the ROD (Documentation of Significant Changes [From the Proposed Plan].
[6] Section 5.12.2.3 Remedial Approach Selection, p. 12 of the NWC 90% RD; Section 5.12.2.4 Evaluation Summary, pp. 15-16 of the NWC 90% RD.
[7] Section 5.8 Water Management, p. 67 of the in 90% RD.

RD does not provide discussion, plans or specifications regarding the identification and treatment of potentially contaminated pore water in the initially trapped water, or treatment of the potentially large volumes of intentionally added water, in violation of the ROD requirement to prevent discharges to the San Jacinto River exceeding the TSWQS.

The 90% RD Is Not Consistent with the Respondents' Obligation Under the Settlement to Develop an Implementable Design of the ROD Remedy

The Settlement requires Respondents to develop the RD for the purpose of implementing the ROD. Respondents had significant flexibility on how to design the ROD remedy, as long as the design deliverables met the requirements of the selected remedy. The ROD states several times that the final BMPs would be determined during the RD, noting "that the actual BMPs to be utilized will be determined during the Remedial Design phase after engineering assessment and evaluation."[8]

The 90% RD does not present an implementable design of the selected remedy. A primary issue preventing implementation of the 90% RD is Respondents' failure to adequately evaluate, identify and address concerns related to hydraulic heave, despite extensive TWG discussions and input from the U.S. Army Corps of Engineers (USACE). The 90% RD identifies the risk of hydraulic heave as a limiting factor on excavation of waste exceeding the cleanup level, but the assessment of which Northern Impoundment areas potentially are affected by hydraulic heave changed in the five months from the June 90% RD to the submission of the NWC 90% RD in November, which contained a new and different hydraulic heave analysis. The June 90% RD states that "[h]ydraulic heave has been evaluated and limitations on dry excavation elevations have been established."[9] The NWC 90% RD states, on the other hand, that the revised assumptions in the new heave analysis "will likely have implications on the risk of hydraulic heave in other parts of the Northern Impoundment."[10] The NWC 90% RD concludes that hydraulic heave risk in the remainder of the Northern Impoundment is still being evaluated and that the design will likely have additional areas impacted by heave which were not identified in either the June 90% RD or the NWC 90% RD. The implementability of the 90% RD is also affected by Respondents' selection of limiting design options for certain key design elements which do not represent actual limitations and requirements for the performance of the Work. For example, Respondents' decision to maximize the use of the "in the dry" excavation approach, as opposed to greater use of the dredging approach approved for excavation under the ROD, complicates design issues related to potential hydraulic heave. Excavation through the water column could address hydraulic heave concerns in areas potentially affected by heave, but Respondents only provided a design utilizing excavation through the water column for one Site area, the Northwest Corner. Respondents' selected design option creates additional implementability challenges or risks, without adequate explanation, documentation or support for the design evaluation or selection.

The 90% RD does not address or attempt to mitigate many of the "technical uncertainties" and risks identified by Respondents in the 90% RD. A Superfund RD is the technical analysis and procedures used to develop detailed plans and specifications for implementation of the selected remedial action.[11] Respondents' technical analysis in the 90% RD is often limited to identification of issues with the implementation of the selected remedy, without the development of the detailed plans and specifications which might have resolved or

[8] ROD, p. 95, Section 2.14 (Documentation of Significant Changes [From the Proposed Plan].
[9] Table 1 – Response to EPA Comments on the 30% Remedial Design, in June 90% RD, GHD Response to Item # 25 from the USACE on p. 13 of 17.
[10] Section 5.12.3.2 Hydraulic Heave Evaluation, p. 18 of the NWC 90% RD.
[11] Section III Definitions of the ASAOC, Definitions of RD and RA; Section VII of the ASAOC Performance of the Work; Section 1.1 Purpose of the SOW in the Settlement SOW; NCP definition of "Remedial Design" in 40 CFR Section 300.5.

addressed those issues. Mitigation, protective, and contingency measures exist to address hydraulic heave safety concerns, but other than providing a plan for dredging at the EPA's insistence with required safe water levels, Respondents did not evaluate or develop plans or specifications including those safety measures. The one additional protective measure suggested in the text of the NWC 90% RD report, the installation of piezometers prior to remedial activities, is not included in the specifications or other plans.

Respondents also identified a likelihood for external scour that could affect the structural integrity of the BMP, but did not develop specifications, plans and/or performance metrics to address that scour, leaving it to the discretion of the future remedial contractor. Respondents identified the potential for barges striking the BMP, a concern documented by recent barge incidents in the vicinity of the Site and the Interstate Highway (I)-10 bridge, but again did not develop specifications, plans and/or performance metrics to address the potential barge strikes, leaving it to the discretion of the future remedial contractor.[12] The omission of these specifications, plans and/or performance metrics results in a deficient 90% design deliverable.

Respondents label certain design approaches as problematic and "technical uncertainties" even where they are not specifically required by the ROD and were selected by Respondents. Respondents then fail to address these "technical uncertainties" with mitigation and contingency measures. The BMP design presented in the 90% RD, and its relation to potential flooding at the Site, illustrates many of the design deficiencies in the 90% RD. The top elevation of the BMP is not specified in the ROD, as it was left to further "engineering assessment and evaluation" during the RD. Respondents selected the proposed height of the BMP – which is +9 feet NAVD88[13] and was presented in a February 2020 TWG meeting - based in part on river modelling data which showed no exceedances of the +9 feet river stage during the proposed excavation season of November to April. Based on Respondents' presentation, the EPA agreed at the meeting that Respondents could move forward with that approach.[14] Respondents' modelling changed after the TWG presentation and after the June 90% RD to an updated model in the NWC 90% RD, which does show an historical exceedance during the proposed excavation months.[15]

The 90% RD identifies the potential overtopping of the BMP - the height of which they selected – during the proposed excavation season as a "technical uncertainty" creating fundamental questions about the implementability of the selected remedy. During non-excavation season, Respondents addressed concerns about how flooding and overtopping the BMP could affect the structural integrity of the BMP by intentional flooding of the BMP, as discussed in the TWGs and the 90% RD. However, the 90% RD report states that the decision whether to flood the BMP during the construction off-season has not been made and will be left to the remedial contractor. No performance metrics for flooding the BMP are included in the 90% RD; there is no plan, mechanism or procedures to accomplish intentional flooding if it is deemed necessary. If extreme river flooding does occur during the excavation season, Respondents designed the wall without floodgates or apparent alternate mechanisms to quickly flood the BMP, impacting the ability to intentionally flood the BMP in a controlled and timely fashion in response to potential flooding. Respondents' failure to provide plans and

[12] The Northern Impoundment is located immediately north of the I-10 bridge over the San Jacinto River; the bridge is the subject of the ongoing I-10 at San Jacinto River Bridge Reconstruction Project.

[13] North American Vertical Datum, Year 1988 (NAVD88**).**

[14] As stated in section 3.1 the SOW, the TWGs were "to develop proposals for consideration in preparing deliverables for EPA's review," but the EPA's actual review, comment, and approval process for deliverables is performed pursuant to section 5.5 of the SOW (Approval of Deliverables); as noted above, the EPA's and TCEQ's participation in the TWGs did not imply approval of the TWGs' findings, proposals and conclusions. Section 3.1 of the Settlement SOW.

[15] Section 5.2 Remedial Approach – Seasonal Excavation and Top of Wall Elevation, p. 41 of the June 90% RD; Section 5.3.1 Historic River Level Evaluation, p. 46 of the June 90% RD; Section 5.12.3.3.1 River Level Hindcasting, pp. 18-19, of the NWC 90% RD.

procedures for intentionally flooding the BMP, if the contractor decides to do so, also affect the ability to appropriately and timely sample and/or treat water within the BMP for discharge prior to each excavation season.

If extreme river flooding were to occur during excavation season, the June 90% RD specifications provide for the remedial contractor to develop contingency plans to prevent releases and address worker safety. However, in the 90% RD report, neither Respondents' discussion of the "technical uncertainty" of the BMP being overtopped during excavation season, nor anywhere else in the June 90% RD report, discusses these specifications. Respondents provided no documentation or discussion of how or to what extent this overtopping concern is addressed with the mitigation and protection plans to be provided by the future remedial contractor pursuant to the specifications.

The result is that the 90% RD contains the design of a thirty-foot wide double sheet pile wall stretching approximately 3,340 feet around the Site and into the San Jacinto River, driven approximately 40 feet into the alluvium and Beaumont Clay[16] - but the structural integrity of that otherwise impressive wall is threatened by scour, barge strikes, extreme flooding when the BMP is dewatered and other design issues, all of which could have been addressed in the 90% RD, but were not. Because of these serious deficiencies, the BMP wall as currently designed, despite its size, is not fit for its purpose of implementing the ROD remedy. The requirement of the Settlement is to perform the RD in order to implement the selected remedy, and the selection of design options which Respondents describe as "technical uncertainties" and create unaddressed implementability issues is not consistent with this requirement.

While the 90% RD is not implementable, Respondents have failed to document in their submittal that there are not acceptable solutions consistent with best engineering practices and the ROD to implement the selected remedy; Respondents also have not documented that they have adequately evaluated and selected methods consistent with the ROD to address constraints and uncertainties through mitigation and protective measures. For example, the 90% RD presents limited road access along the Texas Department of Transportation (TxDOT) right-of-way (ROW) to the Site as a "technical uncertainty" for remedy implementation, but the 90% RD fails to document adequate consideration of alternatives to exclusive reliance on trucks for all materials handling, despite wide use of barges and pipes to move waste material at other Superfund sediment remediation sites. Evaluation of alternate design approaches and mitigation and protective measures should be part of the engineering design process. Finally, the 90% RD is not an implementable design of the selected remedy because it lacks complete plans and specifications for critical components, as discussed further below.

The 90% RD Lacks Complete Plans and Specifications as Required by the Settlement, and Also Lacks Complete Plans, Procedures and Performance Metrics for Critical Work as Required by EPA Guidance and the Settlement

The 90% RD should, according to the Settlement, contain "[a] complete set of construction drawings and specifications that are...suitable for procurement."[17] Pursuant to EPA guidance, the 90% RD, or prefinal design, serves as a draft version of the complete RD, and should include all drawings, specifications, reports, and attachments necessary for the final design. When the 90% RD is submitted, all design work should be completed, and the remedial action contract documents finalized.[18]

[16] Appendix I BMP Structural Design Report – Northern Impoundment, pp. 1-2 and pp. 22-23 of the June 90% RD; Section 5.3.4 Excavation Extent and BMP Alignment, pp. 48-49 of the June 90% RD.
[17] Section 3.6(a) of the SOW.
[18] *See* EPA Remedial Design/Remedial Action Handbook (RD/RA Handbook), Section 4.7.6 Prefinal/Final Design, pp. 58-59.

The 90% RD lacks a complete set of specifications as required by the Settlement. The Table of Contents for the design specifications lists seven sections of specifications which were omitted by Respondents in the 90% RD, including the section of specifications dedicated to health and safety requirements.[19]

The 90% RD is not complete because it lacks sufficient supporting procedures, specifications and drawings for critical work affecting the overall design, including the structural integrity of the BMP cofferdam wall and the design's safe implementation.[20] Critical work includes work potentially affecting the overall design, determinations of mitigation methods to address risks, and safe implementation, and critical work should be evaluated and addressed in sufficient detail so that the reviewing parties can assess whether the issues are sufficiently resolved or mitigated.

The 90% RD uses an overly conceptual approach for a design that should be 90% complete, and either does not address critical work; addresses it in summary fashion without providing necessary detail or support; and/or leaves critical work issues for potential consideration and resolution by a future remedial contractor. As previously discussed, the 90% RD does not provide plans or specifications related to how, or even if, the BMP will be intentionally flooded during the non-excavation season. The 90% RD addresses in a summary fashion re-use of the rocks currently forming the TCRA cap[21] (described only as "reusable" in the specifications[22]), removal of the BMP (to be "disassembled in a similar but inverse sequence to how it was installed")[23], and Site restoration, without plans or specifications addressing concerns about the cap re-use or providing sufficient detail for the BMP removal and restoration. The 90% RD's failure to address critical work through complete and documented procedures, drawings and specifications unnecessarily creates uncertainties which could have been resolved or mitigated.

The 90% RD fails to address potential hazards which could affect the design as a whole and which could pose a risk of failure of the BMP, a key component of the selected remedy. Contingency plans and mitigation strategies are not uniformly developed. For example, a specific safety plan for real-time monitoring of hydraulic heave, as feared by Respondents, is not presented, but the draft Health and Safety Plan lists in detail important information regarding the types of insects, poisonous spiders (black widow and brown recluse), threatening dogs, rodents, snakes, scorpions and alligators in the vicinity of the Site.[24]

For several key design issues, there are no contingency plans or mitigation strategies presented at all in the 90% RD, nor are there metrics or specifications for the remedial contractor to develop those documents. As discussed above, the 90% RD does not provide a plan for, or specifications related to, protection of the BMP from barge impacts or for protection of the BMP from potential scour on the exterior of the BMP which could cause structural damage to the BMP. For some contingency plans for which specifications are provided, the 90% RD does not discuss or evaluate those plans. This serious deficiency makes it impossible for the EPA to determine whether these plans could address, in whole or in part, design issues identified by Respondents.

[19] *See* Appendix H, Design Specifications; the Table of Contents lists sections 01 30 00 Administrative Requirements; 01 33 00 Submittal Procedures; 01 35 00 Temporary Traffic Controls; 01 35 29 Health and Safety Requirements; 01 40 00 Quality Requirements; 01 50 00 Temporary Facilities and Controls; and 01 57 13 Temporary Soil Erosion and Sediment Controls. The sections themselves are omitted.

[20] RD/RA Handbook, Appendix C, pp. C-11 and C-12

[21] The temporary cap placed on the Northern Impoundment pursuant to the Time-Critical Removal Action (TCRA).

[22] Appendix H (Specifications), 3.7(A) of the June 90% RD.

[23] Section 5.10.1 Removal of the BMP, p. 75 of the June 90% RD.

[24] Appendix J, Attachment 1 Health and Safety Plan, Section 3.3, pp. 17-21 of the June 90% RD.

The 90% RD leaves for the future remedial contractor determinations about not only how, but also whether, to implement measures to address potential hazards which could affect the design:

> Regarding the potential for a barge strike impacting the BMP, "in lieu of the BMP absorbing the impact, protective appurtenances … **may be** provided to protect the BMP from potential vessel impact" (emphasis added);[25]
>
> Regarding the potential for external scour to affect the base of the BMP, "[a]s changes in the riverbed elevation will affect the design of the BMP, scour protection measures such as rock or rip-rap **may be** required around the outside perimeter of the wall" (emphasis added)[26]; and
>
> Regarding the potential need to intentionally flood the BMP during high-water events, "the Northern Impoundment **may be** intentionally flooded with river water to off-set the forces acting on the BMP and to prevent uncontrolled overtopping during the off-season in the event of a high-water event" (emphasis added).[27]

While leaving these potential hazards to be resolved by the remedial contractor, the 90% RD also does not include specifications which could have added requirements, performance metrics or criteria regarding how the contractor should consider and address these issues.[28] The specifications for a Superfund design should describe the technical requirements that the remedial contractor must meet to implement the selected remedy, as well as criteria for determining whether these requirements are met.[29] The 90% RD is seriously deficient because of Respondents' failure to provide complete plans, procedures, specifications and performance metrics as required by the Settlement and EPA Guidance.

The 90% RD is Not Suitable for Procurement as Required by the Settlement and EPA Guidance

The 90% RD is required to be suitable for procurement, or as discussed in EPA guidance, biddable. The 90% RD is not implementable and not suitable for procurement because of its lack of complete supporting procedures, specifications and drawings, as described above, including the lack of prescribed procedures for critical work affecting the overall design. In addition to completeness, when evaluating the biddability and constructability of Superfund design deliverables, reviewers also consider the design deliverable's consistency, with the need to avoid real and possible conflicts within the deliverable.[30] The 90% RD lacks consistency in the presentation of major issues within the deliverable, including identification of areas potentially affected by hydraulic heave; excavation depths; "technical uncertainties," and intentional BMP flooding, as well as inconsistent factual information including waste volumes and the water level Respondents contend is required to prevent hydraulic heave when excavating through the water column in the Northwest Corner. These inconsistences and contradictory information would interfere with the ability to bid and implement the project.

The 90% RD does not provide sufficient detail, explanation, documentation, and support for additional design decisions, and is generally overly conceptual and not adequately developed for a 90% design. For example, the 90% RD provisions for residuals management lack adequate detail and are overly conceptual for a 90% design deliverable. This affects the EPA's ability to review the document, but inadequate detail and documentation also affects the biddability and constructability of the RD.

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[25] Appendix I, Section 6.5 Barge Impact, p. 25 and Section 7.1 Barge Impact p.26 of the June 90% RD.
[26] Section 5.5.3.4 Scour, p. 53 of the June 90% RD.
[27] Section 5.2 Remedial Approach p. 42 of the June 90% RD.
[28] *See* Appendices G and G-2 of the 90% RD.
[29] RD/RA Handbook, Section 3.10.2 RD/RA Design Approach pp. 24-25
[30] RD/RA Handbook, Appendix C Biddability Review/General Overview, p. C-2.

The 90% RD also does not provide sufficient detail, overall, so that potential remedial action contractors could bid the project and undertake the work successfully. Key design calculations and details of critical work are missing. For example, supporting calculations for waste volume estimates are not provided and waste volume estimates are inconsistent within the 90% RD; accurate estimates of the volumes of the material to be excavated and disposed of or potentially re-used is critical information for any bidding parties.

There is also inadequate support, explanation and documentation for some key factual statements and design conclusions made in the 90% RD. For example, the 90% RD does not provide sufficient supporting information, evaluation, and documentation for its hydrodynamic modelling used in assessing potential scour and the remediation's effects on the surrounding floodplain and the I-10 bridge; calculation of design loads for the BMP; limitations on seasonal work; the adequacy of geotechnical information for the BMP; and the adequacy of Respondents' vibration analysis to ensure that construction of the BMP does not adversely affect the I-10 bridge.

The 90% RD's lack of procedures for critical work involving mitigation of risks and safety also affects the project's biddability and the ability of the reviewing party to evaluate bids. The 90% RD identifies critical work issues as unresolved risks, even where they are unresolved because Respondents failed to provide procedures for critical work, likely affecting interest on bidding on the project. In addition, any bids received may vary greatly depending on how and if the bidder addresses the open questions about how to address potential hazards to the BMP and the design as a whole, questions left unresolved in the 90% RD, making it difficult for the contracting party to compare bids.

Respondents' obligation under the Settlement was to provide complete plans and specifications to implement the selected remedy, but the 90% RD instead creates additional, unnecessary uncertainties for potential remedial contractors which affect biddability and constructability of the project. For example, Respondents have identified hydraulic heave as a major implementability concern, but their calculations rely on data extrapolated from borings and instrumentation instead of more targeted data. The NWC 90% RD recommends that piezometers be installed in the vicinity of excavations so that the "assumptions used in the hydraulic calculations would then be evaluated based on the actual piezometer data,"[31] acknowledging that additional information could have been collected regarding heave to address at least some uncertainty regarding this issue, but it was not collected.

The 90% RD lists "technical uncertainties" with remedy design and implementation that Respondents claim could render the selected remedial alternative in the ROD technically impracticable and not implementable. During the RD, the EPA has used Respondents' term "technical uncertainties" when discussing problems with the design identified by Respondents, but at least some of the problems characterized by Respondents as "technical uncertainties" are in fact engineering or construction issues, which however complex, may be capable of resolution as part of the design process. Certain design, engineering or construction issues are described as "technical uncertainties" where i) Respondents' own selected design approach creates or exacerbates issues, and alternate design approaches and/or mitigation and protection strategies exist consistent with the ROD which are not adequately explored or developed by Respondents; and ii) Respondents fail to provide adequate plans to address critical work issues, creating uncertainty by leaving the issues for resolution by the future remedial contractor. A designer must note uncertainties identified in the design process, but to the extent Respondents' design choices contribute to the "technical uncertainties" identified in the 90% RD, they do not provide a rationale for not designing the selected remedy.

[31] Section 5.12.3.2 Excavation Season and BMP Height, p. 18 of the NWC 90% RD.

The design process is not just identifying problems and risks but developing plans and procedures to address them; and if they cannot be addressed either partially or fully, to adequately evaluate and document that determination. The 90% RD fails to provide adequate documentation, support, evaluations, details, plans and information to implement the remedy and address critical work and contingency planning, and this serious deficiency impacts the design's biddability and constructability.

The EPA Review of the 90% RD

In a March 2022 letter, Respondents argued for an indefinite extension of the submittal of the 90% RD, in addition to the previous extensions requested and granted, in light of uncertainties they said they had identified in the design process.[32] In its response to Respondents' March 2022 letter, the EPA denied an additional extension and stated that Respondents must submit the 90% RD pursuant to the Settlement. The EPA also stated in its response that it expected that, "to the extent there are uncertainties about design issues…that are still unresolved in June 2022," or even the need for re-design in light of new information, it would be noted by Respondents.[33] The EPA's letter went on to say that "[t]o the extent appropriate, we will evaluate of the 90 percent design submittal in light of any valid issues, uncertainties, and additional information identified by Respondents and the EPA."[34] An EPA letter dated September 14, 2022, to Respondents' Project Coordinator rejected an additional extension for the NWC 90% RD, and added that the Northwest Corner deliverable would be deemed a failure to submit if "the submission is limited only to arguments regarding the impracticality, potential safety concerns and other alleged implementation issues with the selected remedy"; and/or if it "lacks the technical components of a 90% RD" as required in the SOW.[35]

In determining that the 90% RD is seriously deficient, the EPA has evaluated the 90% RD "in light of any valid issues, uncertainties, and additional information identified by Respondents and the EPA," as stated in the EPA's April 2022 letter. The EPA acknowledges that there are some uncertainties, such as TxDOT's plans for the I-10 bridge, which affect the design (although some of these uncertainties have subsequently been resolved). To the extent Respondents have noted issues and uncertainties, the 90% RD also doesn't provide the information, detail, documentation or support for the EPA to adequately evaluate them. Respondents' description of several critical design issues as "technical uncertainties" does not excuse Respondent's obligation under the Settlement to do the necessary technical and engineering analysis to address the identified uncertainties through evaluation of different design options, mitigation methods and contingency measures; to provide plans and procedures focused on addressing the uncertainties, with analysis of how well they succeed; and to document this evaluation and analysis. This letter identifies serious deficiencies where they have failed to do meet their continuing design obligation.

SPECIFIC DESIGN COMPONENTS WITH SERIOUS DEFICIENCIES

<u>Excavation Depths</u>. The 90% RD does not provide for removal of waste, regardless of depth, exceeding the cleanup level of 30 ng/kg TEQ dioxin as required by the ROD.

The selected remedy in the ROD, alternative 6N, is described in the ROD as follows: "This alternative involves the removal of all waste material that exceeds the cleanup level of 30 ng/kg TEQ regardless of depth in the northern waste pits."[36] There is no provision in the ROD for leaving wastes exceeding that level, either by site-wide areal

[32] March 24, 2022 letter from Respondents to the EPA Regional Administrator.
[33] April 15, 2022 Letter from the EPA Regional Administrator to Respondents.
[34] *Id.*
[35] September 14, 2022 Letter to Respondents' Project Coordinator from the EPA RPM.
[36] Section 2.9 Description of Alternatives, p. 69, of the ROD.

averaging or due to expense or technical difficulty. As discussed in Section 5.3.4 of the June 90% RD, Respondents' proposed excavation surface was developed utilizing a surface area-based average concentration site-wide (SWAC) approach with a not-to-exceed threshold value of 300 ng/kg TEQ; according to the June 90% RD, "[t]arget excavation depths/elevations were identified across the Northern Impoundment such that the resulting surface will meet the clean-up level of 30 ng/kg $TEQ_{DF,M}$ on a site-based average basis (emphasis added)."[37]

During the December 2020 TWG discussions, Respondents' contractor proposed using the SWAC approach rather than a point-by-point approach to achieve the goal of 30 ng/kg TEQ.[38] The EPA stated in this meeting, and several subsequent meetings, that SWAC would not be acceptable to the EPA and the community, as this approach is likely to leave concentrations exceeding the clean-up standard due to the high spatial variability in dioxin concentrations. The EPA was clear that the design should not use SWAC when determining the excavation contours and that all inventoried waste over the cleanup level, no matter the depth, should be excavated in the design. The EPA did request if there was a technical reason waste could not be removed, such as waste below the safety factor for hydraulic heave, Respondents should identify and provide an explanation for each area with that issue in the 90% RD. The EPA does not agree that the use of SWAC is a technical reason to not remove waste, and in many places, such as core SJSB096, the proposed excavation surface ignores the cleanup goal of 30 ng/kg TEQ even though it could be met without technical difficulty.[39]

Section 5.2 of the June 90% RD states that "A detailed risk analysis that supports the use of area-based average concentrations is included as Appendix E. A presentation regarding this approach was made during a TWG Meeting on November 16, 2021."[40] While Respondents did make this presentation to the TWG, the EPA did not agree with Respondents' alternative risk assessment or the risk-based SWAC approach. In its response at the November 2021 TWG, the EPA technical team repeatedly pointed to the ROD's requirement for "removal of all waste material that exceeds the clean-up level of 30 ng/kg regardless of depth," and clearly stated that a surface average leaving known waste over the cleanup value at depth would not satisfy this requirement. At this meeting, the EPA also emphasized that the purpose of the RD is to design a project that meets the requirements of the ROD, and submitting a 90% RD that does not meet the requirements of the ROD means the Respondents are out of compliance with the Settlement. The EPA continued to insist that the RD had to be in compliance with the selected remedy in its correspondence with Respondents.

Respondents' proposed excavation surface as described in Table 5-1 of the June 90% RD submission leaves contamination above the ROD cleanup level at approximately one third of sampled locations within the Northern Impoundment (excluding the Northwest Corner). In a small number of locations, the proposal to leave contamination in place may be due to Respondents' analysis of hydraulic heave risk (e.g., SJSB047- C1, SJSB088), whereas at approximately 90% of locations it's unclear why contamination above the cleanup level is proposed to remain within the impoundment at depth. For example, see samples SJSB033, SJSB048-C1, SJSB049, SJSB076, SJSB082 in Table 5-1.[41] In Site locations other than the Northwest Corner, in areas where dioxin levels exceed 30 ng/kg TEQ and hydraulic heave risk potentially limits the excavation depth, the 90% RD does not evaluate alternative approaches to meet the ROD-required cleanup level, such as removal performed through the water column (mechanical dredging).

[37] Section 5.3.4 Excavation Extent and BMP Alignment of the June 90% RD.
[38] Notes of December 15, 2020 TWG Meeting prepared by GHD.
[39] Table 5-1 Area-Based Average Concentration Calculations in the June 90% RD.
[40] Section 5.2 Excavation Approach p. 43 of the June 90% RD.
[41] Table 5-1 Area-Based Average Concentration Calculations of June 90% RD.

In the NWC 90% RD, Table 5-4 shows two locations (SJGB013, SJSB100) where the design proposes to leave contamination in place.[42]The contamination is shown to be above the elevation at which there is a risk of hydraulic heave; however, according to Figure C-48, this area will be excavated using the dredging alternative, in which hydraulic heave could be mitigated regardless.[43]If the area slopes into an area proposed to be excavated in the dry, Respondents could have expanded the dredged area to remove all the contamination. There is no explanation provided as to why these locations were not targeted.

Target excavation elevations should have been based on the existing dataset of inventoried waste, which includes a maximum excavation of -28 ft NAVD88, plus an additional 2-foot overcut if necessary after confirmation sampling because there may be additional waste at depth not identified in the pre-design sampling efforts. With regards to location of waste, Respondents concluded in the 90% RD that "[a]s the result of three pre-design investigations, there is an extensive dataset to give confidence in the horizontal and vertical delineation of the impacted area in the Northern Impoundment." Instead of basing the excavation surfaces on this "extensive dataset," the excavation surfaces identified in the 90% RD for removal, including cross-sections presented in the 90% RD, show excavation depths based on Respondents' SWAC approach.[44] The 90% RD is seriously deficient because the design was based on excavation depths that are inconsistent with the ROD.

The 90% RD claims to address this inconsistency with the ROD by stating that the excavation surfaces are only the initial step of the removal process, and that confirmation sampling will ensure that the cleanup level is met. The EPA's review of the procedures proposed by Respondents for post-excavation confirmation sampling indicates that known waste exceeding the cleanup levels at depths over 6 inches below the excavation surface will not be removed, and that the proposed confirmation sampling does not address this inconsistency with the ROD.[45]

In section 5.6.4 Post-Excavation Confirmation Sampling, the Respondents state that because the "excavation elevation contours are based on an area-based average concentration less than the clean-up level, as presented in Table 5-1, those elevations are only a starting point for the design."[46] To address the ROD cleanup level, "potential areas of over-excavation within each DU [decision unit](areas in which additional excavation is necessary if clean-up levels are not met) can be targeted, if necessary."[47] The Field Sampling Plan (FSP) in Appendix J claims that the objective of the confirmation sampling is to "provide post-excavation sampling procedures that will result in data demonstrating that the post-excavation surface concentrations meet the clean-up level across each seasonal cell, as well as, among and between all cells (i.e., across the excavated

[42] Table 5-4 Northwest Corner Dredge Removal Elevations in the NWC 90% RD.
[43] Figure C-48 in the NWC 90% RD.
[44] Table 5-1 Area-Based Average Concentration Calculations of June 90% RD. Note that Respondents identify the absence of a pre-defined excavation bottom elevation as a "technical uncertainty;" however, Respondents appear to have created uncertainty by basing the excavation contours on their proposed risk-based SWAC approach as opposed to the "extensive" sampling dataset for the Site. *See* Section 5.11.1.2 – Excavation Limits, p.79 of the June 90% RD.; Section 5.12.5.4 Post-Dredging Confirmation Sampling, p. 29 of the NWC 90% RD.
[45] While EPA was unable to reproduce Respondents' waste volume numbers, Respondents calculated that use of their SWAC-based approach results in approximately 44,000-46-000 fewer cubic yards being excavated. The EPA notes that it cannot evaluate the confirmation sampling plan as provided, as the primary objective is to demonstrate compliance only on the surface, which does not satisfy the ROD requirement for "removal of all waste material that exceeds the clean-up level of 30 ng/kg regardless of depth." Generally, EPA would expect the plan to include some targeted sampling in areas of high uncertainty, such as sidewalls and slopes, or along proposed berm boundaries. Also, the plan may need to consider action levels or procedures for extra/over excavation prior to work starting to ensure expedited excavation.
[46] Section 5.6.4 Post-Excavation Confirmation Sampling, p. 65 of the June 90% RD.
[47] Section 5.6.4 Post-Excavation Confirmation Sampling, p. 64 of the June 90% RD.

areas)."[48] However, the FSP also states the proposed confirmation sampling would occur at the proposed initial excavation bottom as described in Section 5.2 and Table 5.1. According to the FSP, confirmation samples of "surface soil would be collected from the top 4 to 6 inches of the excavation surface."[49]

The post-excavation confirmation sampling approach proposed by Respondents would not extend into affected depth interval(s) where material exceeding the clean-up level is more than 4 to 6 inches under the proposed bottom of excavation target surface, according to previous boring data. Therefore, this approach of using excavation surfaces determined by SWAC, followed by confirmation sampling at the excavated surface, is inconsistent with the 2017 ROD requirement for "removal of all waste material that exceeds the clean-up level of 30 ng/kg regardless of depth."

<u>Bulk Water Treatment</u>. The 90% RD does not provide for treatment of potentially contaminated pore water in the large volumes of water which will be within the cofferdam wall BMP after BMP installation, or provide for testing and/or treatment of potential bulk water used to intentionally flood the BMP between excavation seasons. This is inconsistent with the ROD requirement to prevent discharges to the San Jacinto River exceeding the TSWQS.

After installation of the BMP, large volumes of river water trapped behind the BMP would need to be returned to the San Jacinto River in order to excavate in the dry. At TWG meetings, the EPA and the Texas Commission on Environmental Quality (TCEQ) provided guidance on potential methods to achieve compliance with the Site applicable or relevant and appropriate requirement (ARAR) for water discharges to the river, which is the TSWQS. It was discussed that most of the initially trapped water would be river water and that compliance with the TSWQS might not require treatment of the river water as long as water lower in the water column and closer to the cap was treated to meet the TSWQS prior to discharge. The rationale is that the water lower in the water column could contain contaminated pore water from within the armored cap interface with the waste material and should meet the ROD's discharge standards. The exact procedures to meet the TSWQS were to be evaluated by Respondents and presented in the 90% RD for review.

In addition to the initial bulk discharge of water from the BMP, Respondents' contractor began discussing seasonal discharge of bulk water from within the BMP as early as the November 2020 meeting of the TWG.[50] A baseline assumption at this meeting and subsequent meetings is that the BMP would collect water during non-excavation season, and water present inside the BMP would need to be pumped back to the river prior to the start of excavation so that portions of the Site could be excavated in the dry. This water would be confined within the BMP for an extended amount of time. The EPA initially stated that bulk water trapped behind the BMP might need to be sampled and treated if necessary prior to discharge to the river. At the November 2020 meeting, Respondents' contractor mentioned potential measures that could be taken to help manage water as river water instead, including conducting intentional controlled flooding of the BMP between excavation seasons and/or installing pipes/gates to allow flow through the BMP during the non-excavation season.[51]At the December 15, 2020, TWG meeting, Respondents' contractor presented several conceptual drawings and cross-sections, including one depicting multiple flow through pipes and floodgates. Respondents' contractor also explained that, between seasons, an engineered synthetic cap would be used as necessary to prevent any contaminated material from entering the water column. The EPA and the TCEQ requested copies of the

[48] Appendix J, Attachment 3 - Field Sampling Plan, p. 1 of the June 90% RD.
[49] Appendix J, Attachment 3 -Field Sampling Plan, p. 4 of the June 90% RD.
[50] Notes of November 12, 2020 TWG Meeting prepared by GHD.
[51] *Id.*

conceptual drawings and cross-sections of the floodgates and the temporary slope cover presented in the meeting to support internal discussions.[52]

In the February 4, 2021, TWG meeting, the team further discussed bulk water discharge. At the February 2021 TWG meeting, the Respondent's contractor stated that plans to manage rises in river levels were still being developed. Respondents' contractor again mentioned that flood gates would be installed to allow free flow of river water through the impoundment, mimicking current river conditions, and the flood gates would be left open between seasons for structural benefit and to minimize the possibility of scour outside the BMP due to overtopping. Respondents' contractor, GHD, stated that the engineered cap placed over exposed excavation slopes where rock had been removed would be at least as protective as the current TCRA cap. GHD discussed dewatering best practices to address sediment discharge, such as utilizing a floating intake, pumping from the deepest parts of the impoundment, and utilizing multiple pumps.[53] After considering all three of these approaches, the EPA and the TCEQ provided guidance that the water at the top of the water column in the scenario discussed may be considered for discharge as river water without analytical sampling or treatment, with the exception of the last 2 feet of pooled water in the deep areas, which would need to be treated. This guidance was given after careful consideration of all of the methods discussed, and was dependent on the flood gates and capping during the non-excavation season. As always, the detailed approach required further development and was to be further evaluated as part of the design.

Despite the guidance provided in the TWG meetings, the June 90% RD states that there will be no treatment of water trapped behind the BMP either after BMP installation or prior to each excavation season. Section 5.2 of the June 90% RD provides that "[f]ollowing installation of the BMP, and at the beginning of each excavation season, river water trapped behind the BMP wall will be returned to the river."[54] Section 5.8 Water Management in 90% RD describes the following:

> Following installation of the BMP, river water behind the BMP will be returned to the river, untreated, prior to commencement of the first excavation season. At the conclusion of each excavation season, the exposed areas of the excavation will be covered, and the area within the BMP may be intentionally flooded with river water for the duration of the non-excavation season. This would both provide support for the BMP wall and would prevent scour, etc. that could be caused by overtopping during a storm event during the non-excavation season. At the start of the next excavation season, the river water trapped behind the BMP will be returned to the river, untreated.[55]

The 90% RD does not include floodgates in the BMP as previously discussed, therefore the guidance provided by the EPA and the TCEQ regarding consideration of some water as river water when de-watering the BMP is inapplicable. To the extent the remedial contractor did elect to intentionally flood the BMP during non-excavation season, sampling and treatment of this water should have been addressed, but Respondents did not address this change in the design. Other consequences of the failure to include floodgates are discussed below.

The 90% RD does not address potentially contaminated pore water lower in the water column above the TCRA cap and covered wastes, which requires treatment both for the initial and subsequent dewaterings. In addition, as discussed in TWG meetings, measures should be taken to minimize withdrawal of pore water from within the waste material and also to minimize fine sediment entrainment as the water within the BMP is pumped out

[52] Notes of December 15, 2020 TWG Meeting prepared by GHD.
[53] Notes of February 4, 2021 TWG Meeting prepared by GHD.
[54] Section 5.2 Remedial Approach – Water Management, p. 45 of the June 90% RD.
[55] Section 5.8 Water Management, p. 67 of the in 90% RD.

prior to the start of each excavation season. TPDES General Permit No. TXR150000, which is an ARAR, requires appropriate controls to be utilized to minimize the offsite transport of suspended sediments and other pollutants if it is necessary to pump or channel standing water from the Site, and that stormwater discharges from basins or impoundments utilize outlet structures that withdraw water from the surface.[56] While the Design Specifications address dewatering the BMP, the types of water described for treatment do not include pore water, and do not appear to address treatment of the large volumes of water from the initial dewatering and potential dewaterings at the beginning of the proposed excavation seasons.[57] The specifications and procedures for identification and treatment of potentially contaminated bulk water within the BMP should have been addressed in the June 90% RD, including the Design Specifications (Appendix H), in order to comply with the water treatment standards in the ROD, but were not.

Design of Remedy Not Selected in the ROD. The November NWC 90% RD included a design for a remedial alternative not selected in the ROD, capping waste in place, which is not consistent with the ROD.

As specified in the Settlement, Respondents agreed to develop the RD consistent with the Site remedy selected by the EPA in the ROD. Respondents' NWC 90% RD, however, included the evaluation and design of a remedial alternative not selected in the ROD, capping waste in place. The ROD considered a capping alternative and rejected it in favor of removal and off-site disposal. Respondents' submittal of the design of a remedial alternative other than the EPA-selected remedial alternative is not in compliance with either the ROD or the Settlement.

The EPA has been consistent that the RD must be consistent with the ROD; that a capping alternative is not consistent with the ROD; that the EPA did not agree to Respondents conducting a focused feasibility study to re-evaluate the ROD remedy; and that Respondents should provide the design of the remedy already selected by the EPA. The EPA specifically rejected Respondents' proposed consideration of a capping alternative as not being consistent with the ROD when Respondents presented this as an alternative being evaluated to address hydraulic heave in the December 14, 2021, TWG meeting.[58] In an August 18, 2022, request for an extension to submit the NWC 90% RD, Respondents proposed performing a remedial alternatives analysis evaluating alternative approaches to meet the remedial action objectives (RAOs) in the ROD while also categorizing the risk associated with each alternative, after which they would perform a detailed design of their selected alternative.[59] The EPA approved the extension request in the EPA's letter dated August 31, 2022, but the EPA stated that Respondents' proposal for a new remedial alternatives analysis was contrary to the April 15, 2022, letter from the EPA Regional Administrator to Respondents regarding the Site; the EPA also stated that it would not consider any potential remedy modifications until after the 90% RD was submitted and the EPA had an opportunity to review the submittal.[60]

In January 12, 2022, and September 14, 2022, letters to Respondents, the EPA clarified that "there are two acceptable methodologies for removal of waste at the Site - removal of waste in a de-watered state and removal of waste through the water column by mechanical dredging within a Best Management Practice (BMP) cofferdam wall."[61] The major components of the ROD remedy did not include a requirement as to the method of excavation, and in August 2022, the EPA documented a non-significant clarification and change that removal

[56] TPDES General Permit No. TXR150000 Part IV, Section F on page 45.
[57] *See* Appendix H, Design Specifications, Section 46 07 01 Water Treatment System (WTS) of the June 90% RD.
[58] *See* September 14, 2022 Letter to Respondents' Project Coordinator from the EPA RPM.
[59] August 18, 2022, Letter from Respondents' Project Coordinator to the EPA RPM.
[60] August 31, 2022, Letter from the Acting Director, Superfund Emergency Management Division to Respondents.
[61] EPA Approval Northern Impoundment Prefinal Design Partial Schedule Extension Letter, dated January 12, 2022, and the EPA Letter to Respondents dated September 14, 2022, p. 2.

through the water column with a physical, non-permeable BMP in place is consistent with the ROD, in addition to excavation in the dry.[62] As stated in the September 14 letter, the EPA required a detailed 90% RD for the Northwest Corner "to evaluate whether one or a combination of both approved excavation methods [excavation in the dry or mechanical dredging] can be successful in remediating contamination in the Northwest Corner pursuant to the ROD and mitigate potential hydraulic heave risk."[63]

In the NWC 90% RD, Respondents provided their own remedy evaluation discussion in support of their preferred capping alternative, ignoring the remedy evaluation in the EPA's ROD and, without the EPA's agreement, compared their capping remedial alternative with the EPA-selected remedy.[64] Respondents then provided a detailed capping design in the 90% RD despite this alternative not being the ROD-selected remedy. Of the new text in the NWC 90% RD report, approximately one-third is devoted to the discussion and design of a capping remedy not selected in the ROD. Respondents noted elsewhere in the document that the "limited time for the preparation of this 90% RD – Northwest Corner Component" prevented them from evaluating how their changes to the hydraulic heave analysis affect the rest of the Site,[65] yet still found time to prepare a design inappropriately included with the 90% RD.

As stated in the EPA's September 8, 2023, letter to Respondents, the EPA has been given the authority pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, as amended (CERCLA), 42 U.S.C. § 9604, to select remedial actions for Superfund sites consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. Remedy selection must be conducted as part of an evaluation process detailed in the NCP, 40 CFR § 300.430(e) and (f), as well as EPA policy and guidance, and specifically after evaluation of nine criteria specified in the NCP.[66] Evaluation and comparison of remedial alternatives is conducted as part of a CERCLA feasibility study and, if potentially responsible private parties conduct a feasibility study, it must be subject to EPA oversight under an administrative order, pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604. The EPA denied Respondents' repeated requests to perform an additional feasibility study as part of the RD, because the EPA needed the opportunity to review and evaluate the 90% RD for the ROD remedy before addressing Respondents' claims that it may not be implementable. In the NWC 90% RD, however, Respondents attempted to re-evaluate the selected remedy and designed an alternative not selected by EPA in the ROD, and for that reason the 90% RD is seriously deficient.[67]

<u>Hydraulic Heave</u>. The 90% RD contains two contradictory hydraulic heave analyses. The 90% RD is not implementable, not complete, and not suitable for procurement or biddable because of the inconsistent heave analyses; the underlying concerns with the validity of the analyses; and Respondents' failure to address mitigation measures used for areas with hydraulic heave concerns.

Respondents failed to provide a consistent, supported identification of areas of the Site which they claim have potential hydraulic heave risk, and identified hydraulic heave as a "technical uncertainty" without sufficiently

[62] August 3, 2022, EPA Memorandum to Site File Regarding a Non-Significant Post-Record of Decision Clarification and Change for the San Jacinto River Waste Pits Superfund Site.
[63] September 14, 2022 Letter to Respondents' Project Coordinator from the EPA RPM.
[64] Section 5.12.2.3 Remedial Approach Selection, pp. 12-15, of the NWC 90% RD.
[65] Section 5.12.1 Background, p. 10 of the NWC 90% RD.
[66] 40 CFR 300.430(e)(9)(iii).
[67] When the EPA provided the NWC 90% RD to its partners for review, it was with the instruction that all of the discussion and design for the capping remedy in the submittal was not to be reviewed or considered. No comment was provided on the capping remedy. That part of the 90% RD/Northwest Corner Component devoted to analysis and design of a capping alternative is not part of the EPA's record for the Site remediation. The EPA has documented the presence of the capping design in the 90% RD only pursuant to its enforcement responsibilities as part of the September 8, 2023, letter and this Work Takeover Notice.

addressing potential mitigation measures. Respondents presented two conflicting hydraulic heave analyses as part of the 90% RD; the first in the June 90% RD and then a second in the November NWC 90% RD, less than five months later. The heave analysis in the NWC 90% RD adopted a different methodology to calculate factors for the hydraulic heave evaluation, and it is presented by Respondents as potentially invalidating unknown portions of the June 90% RD addressing most of the Site. The NWC 90% RD alludes to a forthcoming heave evaluation using revised methodology for the majority of the Site,[68] but Respondents have not provided this new analysis for review.

Respondents first identified hydraulic heave to the EPA as a potential issue in a November 2021 TWG.[69] The geotechnical data to compose the stratigraphy of the Site, which shows the supposed sand lens with heave potential, had been available since 2019.[70] Respondents initially identified hydraulic heave as a concern primarily for the Northwest Corner. Based on revised depths of waste from the 2021 Supplemental Design Investigation, Respondents identified areas with potential heave across the Site. Respondents provided a Hydraulic Heave Analysis Report on December 9, 2021, which was included in Appendix B of the June 90% RD.

Although the potential for heave was presented to the EPA as a concern in November 2021, the EPA previously had commented that heave should be investigated in its comments on the 30% RD[71] in 2020, when parts of the Site were proposed to be dredged.[72] In the March 2021 TWG, the USACE asked if the design team had sufficient soil density data to evaluate hydraulic heave. Respondents' contractor indicated that the design team had sufficient density data to evaluate hydraulic heave.[73] Respondents' contractor, GHD, continued to state that they had sufficient data in multiple subsequent meetings as heave was discussed.

The June 90% RD relies on the initial hydraulic heave analysis to define what Respondents consider as safe excavation limits for the Site. The June 90% RD states that "[h]ydraulic heave has been evaluated and limitations on dry excavation elevations have been established.[74] According to the June 90% RD, "[s]afe excavation depth limits were established across the Northern Impoundment to ensure the charged sand layers beneath proposed excavations would not lead to bottom instability."[75]These statements are contradicted by the NWC 90% RD.

The new hydraulic heave analysis in the NWC 90% RD states that a revised calculated uplift pore pressure (water head) would likely impact risk of hydraulic heave not only in the Northwest Corner, but the rest of the Northern Impoundment. A primary difference in the second, November hydraulic heave analysis is the use of new boundary conditions, not new Site data, and in particular a different way of calculating uplift pore pressure as part of the hydraulic heave analysis.[76] Respondents also updated their hindcasting model for calculating historic river levels at the Site after submission of the June 90% RD, but the difference between the +1.5 ft NAVD88 design river level in the June 90% RD and the +5 ft NAVD88 design river level in the NWC 90% RD is not due to

[68] Section 5.12.3.2 Hydraulic Heave Evaluation, p. 18 of the NWC 90% RD.
[69] Notes of November 2021 TWG Meeting prepared by GHD.
[70] Appendix B Attachment E Table 3.1 Hydraulic Heave Analysis Report in the June 90% RD.
[71] Preliminary 30% Remedial Design – Northern Impoundment (30% RD) submitted by Respondents pursuant to the Settlement.
[72] Table 1 – Response to EPA Comments on the 30% Remedial Design, in June 90% RD, GHD Response to Item # 25 from the USACE on p. 13 of 17. The EPA Comments on the 30% RD were provided to Respondents on July 16, 2020.
[73] Notes of March 2021 TWG Meeting prepared by GHD.
[74] Table 1 – Response to EPA Comments on the 30% Remedial Design, in June 90% RD, GHD Response to Item # 25 from the USACE on p. 13 of 17
[75] Appendix B Geotechnical Engineering Report, Section 8 Additional Considerations, pp. 10-11 of Appendix B, June 90% RD.
[76] Appendix B – Geotechnical Engineering Report, Hydraulic Heave Analysis, Section 5.2.3 Uplift Pore Pressures, of the June 90% RD; Sections 2.13 Design Parameters and 2.1.4 Heave Analysis of Appendix B-1, pp. 6-7, and Sections 5.12.3.1 Piezometric Pressure Evaluation and 5.12.3.2 Hydraulic Heave Evaluation, pp. 16-18, of the NWC 90% RD

the updated hindcasting model, but is the difference between the average river level assumed in the first heave analysis and a reasonable maximum river level assumed for the second.[77]

The NWC 90% RD states that this "change [in the assumed design river level and associated piezometric head pressures] will likely have implications on the risk of hydraulic heave in other parts of the Northern Impoundment."[78] This would appear to potentially invalidate large sections of the June 90% RD. This makes the excavation contours in the June 90% RD effectively meaningless until 1) the validity of one or both hydraulic heave analyses are clarified and 2) determination of the effect, if any, of the final heave evaluation on the validity of the June 90% RD excavation contours. Identification of potential hydraulic heave sensitivity areas is also necessary because they may require a different excavation approach, such as mechanical dredging behind the BMP, in order to remove all inventoried contamination, no matter the depth, in compliance with the ROD.

The 90% RD concludes that "the potential implications of this change in design river level on the hydraulic heave risk in the remainder of the Northern Impoundment are still being evaluated. Preliminary results indicate that there could be several additional areas in other portions of the Northern Impoundment that are at risk of hydraulic heave."[79]The 90% RD does not present an implementable remedy because of the serious deficiency of inconsistent and incomplete heave analyses, and resulting potential changes and uncertainty regarding excavation contours, and it is not suitable for procurement.

While the focus of this Notice is the presence of two competing heave analyses in the 90% RD, the EPA does have unresolved concerns about the underlying support for both of the hydraulic heave analyses. The initial heave report, first submitted in December 2021 and resubmitted in the June 90% RD, together with its supporting data, were reviewed by the USACE, and technical meetings were held with Respondents' contractor to discuss the review. The USACE expressed concerns about Respondents' representations of Site stratigraphy, specifically the extrapolation of data to make assumptions across the Site. Particularly, there were questions about the depth of the Beaumont clay, whether the sand lenses were continuous and/or hydraulically connected, and whether Site data shows conditions capable of generating flow volumes of concern. The basic assumption for Respondents' heave analysis was all sands were pervious and able to transmit groundwater flow across the Site. However, the conclusion of the USACE review was that groundwater conditions in the Beaumont sand were poorly characterized by Respondents' exploration program and may not behave as an aquifer capable of producing heave conditions. Assuming the sands did behave as an aquifer, the USACE mentioned several engineering solutions or mitigation measures to consider, such as removing the waste through the water column, installing deeper sheetpiles to isolate and cutoff the Beaumont sand in the impacted area from the larger aquifer, extensive grouting in the Beaumont sands to reduce the potential for hydraulic heave in areas identified by their heave analysis, among others. When reviewing the initial hydraulic heave analysis report in early 2022, the USACE recommended that additional cross-sections should be produced, as well as a top of Beaumont surface map, and a Beaumont thickness map, for consideration in the analysis. Respondents produced this information in response to the USACE, but the June 90% RD did not include a revised hydraulic heave analysis report with the additional information. It is the USACE's conclusion that the lack of geologic cross-sections across the Site in the initial Site investigation program led to the conservative assumption that

[77] Appendix B – Geotechnical Engineering Report, Hydraulic Heave Analysis, Section 3.3 Hydraulic Conditions, of the June 90% RD; Sections 2.13 Design Parameters and 2.1.4 Heave Analysis, p. 5-7 of Appendix B-1 of the NWC 90% RD, Section 5.12.3.2 Hydraulic Heave Evaluation, p. 17 of the NWC 90% RD.
[78] Section 5.12.3.2 Hydraulic Heave Evaluation, p. 18 of the NWC 90% RD.
[79] Section 5.12.1 Background, p. 10 of the NWC 90% RD.

any sand was capable of moving fluid under full aquifer conditions. The hydraulic properties for this assumption were never tested and verified.

As part of the discussions with the USACE, several methods of mitigation or further investigation were discussed, but Respondents did not evaluate these to attempt to reduce the uncertainty. Due to these outstanding issues, the EPA does not concur with either hydraulic heave analysis provided by Respondents.

However, since the EPA had previously approved excavating through the water column within a cofferdam BMP wall before the 30% RD was submitted, and because the continuing weight of the water in the dredging scenario would likely address the heave concerns, the EPA focused on that excavation methodology as a solution for excavation in areas with potential hydraulic heave risk moving forward. The EPA requested a 90% RD be submitted with areas of heave sensitivity being excavated by dredging.[80]

Respondents provided a design for mechanical dredging of the Northwest Corner, but the design provided includes inconsistent and unsupported information. For the Northwest Corner, what is described as safe water levels to prevent heave during dredging differ within the document: the water level necessary to offset the heave potential when dredging is stated as a minimum water elevation of -9 ft NAVD88 in the NWC 90% RD report;[81] but also states in the Northwest Corner specifications that it is necessary to maintain a water level during dredging that does not go below -10.9 ft NAVD88.[82] The EL -10.1 ft NAVD88 level is the calculated safe water level for the Extreme Case (flood level of +9 feet NAVD88) in the Hydraulic Heave Evaluation/Geotechnical Engineering Report Addendum, while the Reasonable Maximum Case is calculated as EL - 10.9 ft NAVD88.[83] These safe water levels were calculated in the Northwest Corner heave analysis using a "dampening effect" calculation which is not adequately explained or supported, to infer piezometer data collected from one part of the Site to other locations on-site.[84]

The NWC 90% RD does discuss a need for additional piezometer data: "[p]rior to remedial activities in the Northern Impoundment, it is recommended that piezometers be installed in both the Beaumont Sand and the upper sand lens in the vicinity of the excavation to monitor actual piezometric pressure head in the strata before and during remedial activities. The assumptions used in the hydraulic calculations would then be evaluated based on the actual piezometer data."[85] However, there are no specifications or plans in the 90% RD related to installation of piezometers to implement this recommendation.

The EPA initially commented on the Supplemental Design Investigation workplan in April 2021 that additional piezometers should be installed as part of that investigation. GHD assured EPA and the USACE that additional piezometer data was not needed. Once the potential hydraulic heave issue was presented in November 2021, the EPA again suggested in TWG discussions that additional piezometers be installed, given the concern and potential impact to the project, and GHD continued to insist that it was not necessary. Now, in the 90% RD, it is suggested that additional piezometer data be collected to evaluate the assumptions of the heave calculations as part of the remedial action, even though this additional information on hydraulic heave could again change the

[80] September 14, 2022 Letter to Respondents' Project Coordinator from the EPA RPM; August 3, 2022, EPA Memorandum to Site File Regarding a Non-Significant Post-Record of Decision Clarification and Change for the San Jacinto River Waste Pits Superfund Site.
[81] Section 5.12.5.2.4 Dredging Procedures, pp. 27-28 of the NWC 90% RD.
[82] Section 3.3(B) in Appendix H-2 Design Specifications Northwest Corner Mechanical Dredging, SECTION 35 24 00 Dredging.
[83] Appendix B-1 Northwest Corner Hydraulic Heave Evaluation/Geotechnical Engineering Report Addendum, Hydraulic Heave Analysis Northwest Corner p. 6 of the NWC 90% RD.
[84] Section 5.12.3.1 Piezometric Pressure Evaluation, pp. 16-17 of the NWC 90% RD.
[85] Section 5.12.3.2 Hydraulic Heave Evaluation p. 18 of the NWC 90% RD.

design. If collecting this data would have informed this important issue, instead of using estimated data Respondents should have considered installing piezometers in critical locations at some point between November 2021 and now.

Whether and to what extent hydraulic heave concerns are defined for the Site, Respondents did not include any hydraulic heave mitigation measures (other than dredging in a part of the Northwest Corner with safe water levels), or contingency plans or emergency plans to address hydraulic heave concerns, in the 90% RD. If heave is a potential concern, it is the EPA's expectation that Respondents will provide for adequate controls, best management practices and protective measures and plans. As discussed above, dredging within a cofferdam BMP wall is an acceptable method to remove waste under the ROD and would likely address heave concerns. In addition, the EPA also had previously recommended measures such as installation of piezometers along the inside periphery of the BMP wall to monitor head pressure at the top of the Beaumont sand and to serve as warning system for hydraulic heave issues (i.e., if the head approaches the weight of clay and water overlying the piezometer). Additional measures discussed with Respondents' contractor to prevent hydraulic heave include injecting grout into sand lenses and/or dewatering sand lenses. However, the Specifications for both the June 90% RD and the NWC 90% RD do not contain provisions for mitigation measures and/or safety procedures related to heave other than maintaining safe water elevations during dredging.

While not sufficiently documented by Respondents, the EPA recognizes the possibility of hydraulic heave; however, the EPA also recognizes that there are effective mitigation and protection measures to address hydraulic heave, as well as additional testing which could confirm the presence of hydraulic heave conditions at the Site, or not. These were not adequately evaluated by Respondents as part of the 90% RD. Based on the information provided to the EPA to date, Site excavation and removal of waste required by the ROD could likely be implemented, especially if conducted by means of mechanical dredging, as long as Respondents provide for adequate controls, BMPs and protective measures. Respondents failed to evaluate these solutions in their identification of hydraulic heave as a "technical uncertainty."

<u>BMP Elevation</u>. Respondents' June and November 90% RD submittals document a likelihood that their selected BMP height could be overtopped by flooding during the excavation season and describe overtopping as a "technical uncertainty" for the implementation of the RD. The 90% RD fails to adequately address the potential safety and structural issues raised by the BMP's top elevation, either through re-design or adequately evaluated mitigation, protection and safety measures in the event of overtopping. Because of these issues with Respondents' selected top elevation of the BMP, the 90% RD is not complete and not suitable for procurement.

Respondents selected the top elevation of the BMP to be +9 feet NAVD88**.** The basis of this design element is that Respondents proposed that excavation activities would only occur during historically low river stage months, and historical San Jacinto River elevations at the Site during this proposed excavation season, as modeled by Respondents, would be used to determine the top elevation of the BMP.[86]

Respondents discussed in the June 90% RD submittal, as well as in TWG meetings and the 30% RD, that, based on their Site modeling, there had been no flood event at the Site exceeding +9 feet NAVD88 in the months from November to April in any year since 1994.[87] Respondents' support for this conclusion was historical data from the upstream Sheldon gage and a hindcasting model comparing Sheldon gage data to only 6 month's data from

[86] Section 5.3.2 Excavation Season and BMP Height, p. 47 of the June 90% RD; Section 5.3.1 Historic River Level Evaluation, p. 46, June 90% RD; 5.12.3.3.1 River Level Hindcasting, p. 18 of the NWC 90% RD.
[87] Section 5.3.2 Excavation Season and BMP Height, p. 47 of the June 90% RD.

a transducer installed at the Site in 2019.[88] Respondents updated their hindcast model after submitting the June 90% RD, so that the model included an additional two years of transducer data through December 2021.[89] This data would have been available to be incorporated into Respondents' model before submitting the June 90% RD in 2022. While the June 90% RD stated that there were no historic exceedances of the +9 ft NAVD88 river stage during the proposed excavation season from 1994 to present, the NWC 90% RD, relying on the updated model, states that the +9 ft NAVD88 river stage has been exceeded during the proposed excavation season.[90]

Respondents previously identified concerns with their proposed top elevation in the May 28, 2020, 30% RD. In the 30% RD, Respondents identified overtopping as an uncertainty and challenge with design and implementation.[91] At that time, it was anticipated that the BMP would be at least partially flooded year-round to conduct mechanical dredging.

Having identified an "uncertainty" and "challenge" associated with the BMP top elevation in the 30% RD, Respondents then had over two years before submission of the June 90% RD to address the issue of potential overtopping, either by 1) increasing the top elevation of the wall during their extensive redesign from the cantilever wall described in the 30% RD to the double sheet pile wall described in the June 90% RD, or 2) by providing adequate safety and mitigation procedures in the event an overtopping event occurred during excavation season.

In the 90% RD, however, Respondents present their selected BMP elevation and the possibility of overtopping the BMP during excavation season as a "technical uncertainty" for implementation of the RD because "[e]ven using this top elevation for the BMP, there is an inherent risk of a flooding event during excavation which could cause overtopping of the BMP and result in a release of waste material into the river and/or potentially put worker safety at risk."[92] Respondents also describe a risk of scour within the BMP from overtopping events.[93] Respondents point to the "dynamics of the weather and associated river levels" creating "an inherent risk of releases to the river, and there is no guarantee that future river levels during the excavation season will not exceed historical levels."[94] No potential mitigation measures for overtopping are identified in this discussion, although mitigation and protection measures exist which could address overtopping, as discussed below; Respondents' focus is on the description of overtopping as an unresolved risk and uncertainty.

Respondents presented the risk of overtopping the top elevation for the BMP as a "technical uncertainty" in the 90% RD that "could render the remedial alternative outlined in the ROD technically impracticable and not implementable."[95] However, the +9 ft NAVD88 BMP top elevation is not required by the ROD; it was selected by

[88] Respondents' history of water surface elevations at the Northern Impoundment was calculated using a hindcasting model, because historical routine water level readings have not been collected at the Site. The hindcasting model was based on historical water level data upriver at the Sheldon gage, and the correlation of a fixed set Sheldon gage inputs to data from a transducer installed at the Site in July 2019. The hindcasting model presented in the June 90% RD relied on 6 months of Site transducer data. Section 5.3.1 Historic River Level Evaluation, pp. 46-47 of the June 90% RD; Section 5.12.3.3.1 River Level Hindcasting, p. 18 of the NWC 90% RD.

[89] Section 5.12.3.3.1 River Level Hindcasting, p. 18 NWC 90% RD.

[90] Section 5.12.3.3.2 Design River Level, p. 19 of the NWC 90% RD.

[91] Section 5.9.1 Uncertainties and Challenges Associated with Design and Implementation, pp. 66-73 of the 30% RD; Section 5.9.1.2 BMP - Risk of Overtopping and Release During Excavation, pp. 68-69.

[92] Section 5.11.2 Risk of Overtopping and Release During Excavation, p. 81 of the June 90% RD.

[93] Table 1 – Response to EPA Comments on the 30% Remedial Design, in June 90% RD, Item # 6 from the USACE on p. 10 of 17.

[94] Section 5.11.2 Risk of Overtopping and Release During Excavation, p. 81 of the June 90% RD.

[95] Section 5.11 Uncertainties Associated with Design and Implementation, p. 76 June 90% RD.

Respondents. The ROD requires a BMP to prevent releases to the river, but specifically states that the actual BMP to be used will be determined during the RD after engineering assessment and evaluation.

Respondents made a presentation on the adequacy of a top elevation of +9 ft NAVD88 in a February 2020 TWG meeting, based on their data through 2019 and their modelling at the time, showing no high-water events exceeding an elevation of +9 ft NAVD88 during the proposed excavation season.[96] The TWG members, based on the Respondents' presentation, agreed that with the proposed excavation season, a top BMP elevation of +9 ft NAVD88 would have been sufficient for all events in the hydrographic record dating back to 1996 and the October 1994 flood event.[97] However, once Respondents determined that they had not adequately considered factors that might lead to overtopping during excavation season, as described in the 90% RD, and this presents a "technical uncertainty" or safety risk affecting implementation of the ROD, Respondents should have adjusted the design accordingly.

If the Respondents' final selected top elevation presents a concern because of overtopping, it is the EPA's expectation that Respondents would develop adequate controls, best management practices, and protective measures to address adverse weather or flooding events, which are possible during any month. The June 90% RD does contain specifications and conceptual plans that might help address the consequences of BMP overtopping during the excavation season, although they are not discussed in relation to their ability to address potential overtopping events (See Appendix H Design Specifications, which provides for submission of a Flood Contingency Plan with measures for emergency backfill of work areas and removing stock-piles material, equipment and personnel from flood areas,[98] a Hurricane and Severe Storm Plan,[99] specifications for dewatering the BMP including stormwater,[100] provisions for riprap on the interior of the BMP to address scour;[101] and provision for the water treatment system to be capable of treating stormwater).[102] Appendix J contains a draft Emergency Response Plan addressing severe weather events. None of these plans or specifications are evaluated or even referenced in the description of overtopping the BMP as a "technical uncertainty" in the June 90% RD.

The EPA cannot evaluate the extent that these specifications and outlined plans could address or mitigate the potential for overtopping upon review of the 90% RD, because there is no detailed evaluation of how overtopping during excavation might affect the design or the interior of the BMP, or any analysis of how, of if, these plans and specifications address overtopping issues. For instance, there are no supporting calculations provided for the location and potential severity of scour inside the wall to evaluate whether the riprap described in the specifications is sufficient if overtopping occurs. The NWC 90% RD presents no additional mitigation measures for overtopping in areas being dredged in the Northwest Corner, despite describing even more severe consequences from the risk of flooding and overtopping during excavation season for the areas being dredged.

Over two years after first identifying concerns with overtopping of the BMP, Respondents presented the top elevation of the BMP and overtopping as a "technical uncertainty." Failure to adequately address any potential safety and structural issues raised by the BMP's top elevation, either through re-design or documented

[96] Section 5.3.2 Excavation Season and BMP Height, p. 47 of the June 90% RD.
[97] Section 5.3.2 Excavation Season and BMP Height, p. 47 of the June 90% RD
[98] Appendix H Design Specifications, Temporary Environmental Controls Section 01 57 19, Section 1.3 Submittals, C. Flood Contingency Plan, in the June 90% RD.
[99] Appendix H Design Specifications, Temporary Environmental Controls Section 01 57 19, Section 1.3 Submittals.
[100] Appendix H Design Specifications, Section 31 23 19 Dewatering of the June 90% RD.
[101] Appendix H Design Specifications, Section 31 37 00 Rip Rap of the June 90% RD.
[102] Appendix H Design Specifications, Section 46 07 01 Water Treatment System of the June 90% RD.

evaluation of mitigation, protection and safety measures in the event of overtopping, demonstrates that the 90% RD is not complete and not suitable for procurement.

Inadequate Consideration of Trucking Alternatives. **The 90% RD presents limited road access along the TxDOT right-of-way (ROW) to the Site as a "technical uncertainty" for remedy implementation, but the 90% RD does not document adequate consideration of alternatives to using trucks for all materials handling. The 90% RD is not suitable for procurement because Respondents selected a design option identified by Respondents as a "technical uncertainty" potentially limiting or preventing implementation without sufficient evaluation of methods successfully used at other Superfund and sediment remediation sites for materials handling.**

The 90% RD is reliant on continuing access to the Northern Impoundments via the I-10 frontage road ROW and an on-site logistical support area. Respondents list limited land access to the Northern Impoundment through the TxDOT ROW and potential conflicts with the I-10 bridge improvement project as a "potential impediment to implementation" of the design.[103] The 90% RD generally discusses that there is inadequate land at the Northern Impoundment for operations, truck staging and turnaround, and material laydown.[104] The 90% RD also expresses specific concerns regarding the future construction of the I-10 bridge improvement project because of competing needs for use of the ROW; congestion and simultaneous operations with TxDOT, with potential increased safety risks; and because "trucks used to haul the excavated waste must have unrestricted access into the BMP via the ROW, which will include the construction of a ramp up and over the BMP" as well as the need to widen the access road.[105]

However, the 90% RD does not provide details as to how these multiple access issues can be addressed and leaves resolution to the remedial contractor, stating that "[t]he exact nature and extents of these access roads will be determined by the RC as part of its initial work plan submittals."[106] Respondents define this issue as a "technical uncertainty" that can impact implementation of the design, yet fail to clearly explore solutions or define parameters that will mitigate potential issues arising from the TxDOT bridge project, limited road access, and limited usable land for work on the Northern Impoundment.

Given the limitations of Respondents' selected design element (sole reliance on trucks for materials handling), the 90% RD should have thoroughly reviewed potential alternatives or modifications to address these issues or allow their potential impact on the project to be reduced. Such potential concepts could include alternative methods for handling excavation and transport of contaminated sediments from the work area. At other sediment remediation projects, such as the Hudson River dredging, it has been necessary to transport excavated sediments by barge to an off-site support area for processing. Utilization of barges with a conveyor belt system for loading and transport, would greatly relieve traffic congestion and impacts on greenhouse gas emissions. A barge-mounted treatment system could also help address the concerns identified by Respondents. Given that the 90% RD identifies concerns with the access road as an "uncertainty," this alternative should have been more thoroughly evaluated.

A similar comment was made previously on the 30% RD, suggesting detailed consideration of an alternate barging approach, but this was not adequately addressed in the 90% RD. The response provided by Respondents to this comment indicated that use of barges was discounted at the preliminary design phase because of "complicated logistics, scarcity of offloading terminals and risk of loss of material or release during transit," as

[103] Section 5.2 Remedial Approach, pp. 39-40 of the June 90% RD.
[104] *Id.*
[105] *Id.*; Section 5.11.1.1 Excavation Limits, p. 77 of the June 90% RD.
[106] Section 5.4.2 Northern Impoundment Preparation and Layout p. 50 in the June 90% RD

well as marine congestion from the I-10 bridge replacement.[107] However, many of these same considerations also apply to the sole use of trucks at the Site.

While barge transport has challenges, the estimated 13,200 truck trips which would be required during the remedial action, with their traffic impacts on surrounding areas, requires a more thorough evaluation of alternate modes of transportation. For instance, a study of vessel congestion could have been conducted, with calculations of the cycle times of the project and adjustments made to the number of scows required to keep operations from having downtime, as well considering as the potential locations of a transloading facility. This type of study would have determined if use of barge transport for at least some Site operations would be viable.

Other alternatives could also have been investigated. For a non-time critical removal on the Lower Passaic at the Diamond Alkali Superfund site, contaminated sediments were dredged within a sheet pile cofferdam in order to isolate the work area from the surrounding river, and transported through a hydraulic pipeline to a separate site approximately .25 miles downstream for processing. Other alternatives used at sediment remediation sites could have been explored, for example moving dredged sediments by pump and pipeline, with either inline stabilization or setting up a solidification/stabilization area using barges; stabilized sediments could be direct loaded into trucks, barges, or stored at another location until ready for transport.

In their description of limited road access to the Site as a "technical uncertainty," Respondents identify potential problems arising from the Site location, but the 90% RD does not attempt to identify and evaluate alternate approaches used at other sediment remediation projects, nor does it provide critical information necessary for a future remedial contractor.

<u>Intentional BMP Flooding</u>. The 90% RD does not decide whether the BMP will be intentionally flooded during the non-excavation season, despite its potential impact on the structural integrity of the wall in high-water events, and appears to leave this issue for resolution by the remedial contractor without a plan, performance metrics, or procedures to accomplish intentional flooding if it is deemed necessary. Respondents designed the wall without floodgates or alternate mechanisms to flood the BMP, impacting the ability to flood the BMP in a timely fashion in response to potential river flooding and also the ability to appropriately and timely treat water within the BMP for discharge prior to each excavation season. The 90% RD is seriously deficient because it is not complete due to this lack of procedures for critical work and is also not an implementable design of the selected remedy.

In TWG meetings and in the 90% RD, information was presented by Respondents indicating that the BMP would be intentionally flooded outside the proposed excavation season. The June 90% RD, however, states both that 1) the BMP may be flooded during non-excavation season and 2) that Respondents anticipate flooding the BMP during non-excavation season. The 90% RD also states that intentional flooding of the BMP during the non-excavation season supports the structural integrity of the BMP in high-water events. This is a critical design issue which is not decided in the June 90% RD. If it were later decided to flood the BMP, the June 90% RD does not provide a procedure or mechanism for adding large volumes of water the BMP in a reasonable timeframe, as the BMP floodgates initially discussed by Respondents were not part of the final design. The 90% RD also provides no evaluation of how and to what extent the BMP would be flooded if that decision were made.

Section 5.8 Water Management provides the following description regarding the possibility of intentionally flooding the BMP: "At the conclusion of each excavation season, the exposed areas of the excavation will be covered, and the area within the BMP may be intentionally flooded with river water for the duration of the non-

[107] Table 1 Response to EPA Comments on 30% Remedial Design, Comments from the Harris County Technical Review Team, Comment 4, p. 14 of 17, in the June 90% RD.

excavation season. This would both provide support for the BMP wall and would prevent scour, etc. that could be caused by overtopping during a storm event during the non-excavation season."[108] Section 5.2 Remedial Approach, Seasonal Excavation, Top of Wall Elevation further states, "[f]ollowing capping of the exposed slope, the Northern Impoundment may be intentionally flooded with river water to off-set the forces acting on the BMP and to prevent uncontrolled overtopping during the off-season in the event of a high-water event."[109]

Other sections of the 90% RD indicate a stronger position that the BMP will likely be flooded. The excavation methodology described includes "flooding the impoundment with river water for the duration of the off-season."[110] Although the Site is in a special flood hazard area (Zone AE) in the FEMA flood map, Respondents did not consider FEMA flood loads in the evaluation of design loads for the BMP, reasoning that because "the excavation is planned to be completed seasonally (November to April) outside the period during which there is a greater risk of flooding events and it is anticipated that the structure will be flooded with river water during the non-excavation season, FEMA flood loads were not considered for the design of the BMP."[111]

As discussed above, floodgates in the BMP were proposed in TWG meetings to accomplish the flooding of the BMP. In the November 2020 TWG GHD presented potential measures that could be taken to help manage water after initial BMP installation and between excavation seasons, including conducting intentional controlled flooding of the BMP and/or installing pipes/gates to allow flow through the BMP during the non-excavation season.[112]This concept was discussed in several TWG meetings, and conceptual drawings and cross-sections of the floodgates presented in the December 2020 meeting were evaluated.[113] In the February 2021 TWG meeting, the EPA asked what the plan would be if the river began to rise quickly and if the impoundment in that situation would be intentionally re-flooded. Respondents' contractor stated that plans to manage rises in river levels were still being developed but that the flood gates would be left open between seasons for structural benefit and to minimize the possibility of scour due to overtopping.[114]

Respondents' June 90% RD did not include the floodgates, nor a discussion to why they had not been included, nor an alternative to address the concerns identified. The June 90% RD presents intentional flooding of the BMP as a method to protect the structural integrity of the BMP because: 1) water will provide support for the BMP wall and off-set the forces acting on the BMP during a flood event; and 2) it would prevent uncontrolled overtopping during the off-season in the event of a high-water event and prevent the scour that could be caused by overtopping during a storm event.[115] In addition, Respondents also presented data in the NWC 90% RD indicating a nine-foot flood could happen during excavation season, when the BMP would be dewatered. If a high-water event were to occur during excavation season, the ability to quickly flood the BMP (after emergency backfilling) in anticipation of the event could be critical to prevent scour and off-set flood loads not calculated for the dewatered BMP.

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[108] Section 5.8 Water Management, p. 67 of the June 90% RD.
[109] Section 5.2 Remedial Approach – Seasonal Excavation and Top of Wall Elevation, p. 42 of the June 90% RD.
[110] Section 5.2 Remedial Approach – Excavation Methodology, p. 44 of the June 90% RD; see also Section 5.6.2.1 Cell Dewatering, p. 63.
[111] Section 5.5.3.3. River Flooding of the June 90% RD.
[112] Notes of November 12, 2020 TWG Meeting prepared by GHD.
[113] Notes of December 15, 2020 TWG Meeting prepared by GHD.
[114] Notes of February 4, 2021 TWG Meeting prepared by GHD.
[115] Section 5.2 Remedial Approach – Excavation Methodology, p. 44 of the June 90% RD; Section 5.2 Remedial Approach – Seasonal Excavation and Top of Wall Elevation, p. 42. A USACE manual on construction of cellular structures in rivers acknowledges potential serious structural damage to a cofferdam by overtopping and states that "[b]efore overtopping occurs, the cofferdam should therefore be filled with water in a controlled manner by providing floodgates or sluiceways." Section 2-2(c), Flooding Facilities, p. 2-2, USACE EM 1110-2-2503, 19 September 1989.

No alternate method for adding large volumes of water to the BMP in a controlled manner was provided or discussed in the 90% RD, despite the large volume of water likely required. A review of the June 90% RD, including the Design Specifications (Appendix H) and the Emergency Response Plan, does not indicate any procedures or performance metrics for intentionally flooding the BMP. The Specifications address Dewatering at length, but do not specify a mechanism to pump large volumes of water into the BMP.

If there is a potential for Respondents or the eventual remedial contractor to decide to intentionally flood the BMP, the 90% RD should have evaluated not only the method to intentionally the BMP, but also should have calculated the amount of water to be added (i.e., full or partial flooding). This would include the target levels of water necessary for structural support and stability to address potential high-water events; whether the target level needed to be adjusted in different circumstances; and whether partial flooding was sufficient in order to reduce the volume of water requiring disposition at the start of the next excavation season. All of these decisions would affect the design, but there is no discussion of them in the June 90% RD.

Respondents' decision to remove the planned floodgates impacts the ability of the BMP to withstand floods during both the non-excavation season and potentially the proposed excavation season; the ability to dewater the BMP yearly after hurricane season in a timely fashion; and also bulk water treatment options as river water, discussed above. Given these overtopping concerns, the absence of a mechanism and carefully evaluated procedures to intentionally flood the BMP in a timely, controlled manner is a serious deficiency in the 90% RD.

Barge Protection. **The 90% RD does not provide a plan for, or specifications or performance metrics related to, protection of the BMP from barge impacts, even though acknowledging the potential for damage to the BMP from barge strikes and describing potential barge strikes as a "technical uncertainty" in the implementation of the RD. The 90% RD leaves resolution of barge protection concerns to the remedial contractor, making the 90% RD not complete because of the lack of procedures for critical work.**

The 90% RD describes a high potential that barges will strike the BMP over the course of the project.[116] The EPA commented on the 30% RD that "[u]pstream protection of the barrier wall from impact loading due to potential barge strikes and other objects in the river was not included in the considered design loading" and that Respondents should "add appropriate barrier protection system."[117] As part of the 90% RD, Respondents performed an analysis to evaluate the potential barge impact loads on the BMP and concluded that a barge strike, as modelled, could cause localized damage to the BMP, including deformation of the wall and soil shear strains, requiring repairs and a work stoppage.[118] While Respondents state that their modeling does not indicate a global failure of the BMP from the modeled barge impacts, the effects of damage from a barge strike, even as modeled, could locally affect the BMP, reducing its effectiveness and potentially putting resistance to water levels at risk. Respondents' analysis also did not model a barge impact in extreme conditions. Despite the risk of damage, Respondents conclude both that additional protective measures are "not required," yet also that "[t]he risk of barge strikes remains an uncertainty in the RD and a risk with respect to the safe implementation of the RA."[119]

The potential for a barge strike to damage the BMP could have been addressed, for example by requiring a staggered h-pile/mooring dolphin protection system around the BMP to minimize any potential for a barge impact. Appendix I of the 90% RD discusses similar barge protection measures only as a possibility for further consideration by the remedial contractor in the future: "in lieu of the BMP absorbing the impact, protective

[116] Section 5.5.7 – Barge Impacts, pp 61-62, and Section 5.11.2 BMP – Barge Impact Analysis, p. 82 of the June 90% RD.
[117] Table 1, comment 24 from the Harris County Technical Review Team, p. 17 of 17 of the June 90% RD.
[118] Section 5.5.7 – Barge Impacts, pp 61-62, and Section 5.11.2 BMP – Barge Impact Analysis, p. 82 of the June 90% RD.
[119] Section 5.11.2 BMP – Barge Impact Analysis, pp. 82-83 of the June 90% RD.

appurtenances, such as rubber fenders on the exterior face of the BMP and/or sacrificial monopile dolphins (large diameter steel pipe piles) located away from the BMP, may be provided to protect the BMP from potential vessel impact."[120] Neither the Design Specifications in Appendix H nor the Design Drawings in Appendix G include barge protection measures; provide performance metrics to address potential barge impacts; or discuss the potential need for future plans for barge protection. The specifications appear to include only general directions the remedial contractor to: "[p]rotect installed work;" "provide temporary and removal protection for installed products;" and "[c]ontrol activity in the immediate work area to prevent damage."[121]

Respondents' conclusion that, based on their modelling, barge protection measures are "not required" but "may be provided" in the future, without including additional information in the specifications or drawings, is not supported by the facts presented: 1) as noted, barges struck the I-10 bridge in September 2019 in flooding associated with Tropical Storm Imelda after breaking free, striking the bridge pier columns, and seriously damaged the I-10 bridge;[122] 2) also due to flooding associated with Tropical Storm Imelda, one barge struck the northeast side of the TCRA cap and was grounded on the cap; 3) while not noted by Respondents, there was a second incident in February 2019 where a barge struck a pier of the I-10 bridge due to loss of engine control in the towing vessel; 4) Respondents' barge impact analysis did not model extreme conditions, for instance using 95th percentile velocities for San Jacinto River flow in the modelling input;[123] 5) while possibly not causing "global failure," a barge strike could cause significant damage, even as modelled; and 6) the selected alignment of the BMP in the 90% RD is cited as increasing "risk of barge strikes that could cause BMP failure."[124]

It is not sufficient to leave this issue to a future remedial contractor. Barge protection measures such as rubber fenders placed on the BMP itself or dolphins installed near and around the BMP would both effect the BMP design, but no further discussion, analysis, specifications or drawings are provided in the 90% RD. For instance, any fenders placed on the BMP should be evaluated for their weight, effectiveness and any potential impact on the structural integrity of the BMP; similarly, the method of placement and location of dolphins or h-piles around the BMP should have been considered as part of the design process for effectiveness, the prevention of releases from sediment, and the effects on BMP of specific potential locations for the dolphins, including possible interference with marine-side equipment used in the remediation and river traffic.

Preventing potential damage to the BMP from barge impacts is a critical issue affecting safety, potential liability issues, and the structural integrity of the BMP, and should not have been left for resolution by the remedial contractor. Barge protection required additional discussion and analysis of potential preventative or mitigation measures, with inclusion in the design specifications and drawings as appropriate. Respondents identified potential barge impacts in the 90% RD as a "technical uncertainty" and "a risk with respect to the safe implementation of the RA," but the 90% RD provides no emergency response plans or protocols in the event of a barge strike, as well as failing to provide plans, specifications and drawings for barge protection measures.

[120] Appendix I, Section 7.1, p. 25 June 90% RD.
[121] Appendix H Design Specifications, 01 70 00 Execution and Closeout Requirements, Section 1.9 Protection, paragraph B and paragraph C.
[122] Section 5.11.2 BMP – Barge Impact Analysis, p. 82 of the June 90% RD.
[123] Section 5.5.3.6 Barge Impact, p. 55 of the June 90% RD.
[124] Section 5.11.2 BMP -Barge Impact Analysis, p. 82 of the June 90% RD.

Scour on the BMP Exterior. **The 90% RD does not provide a plan for, or specifications or performance metrics related to, protection of the BMP from potential scour on the exterior of the BMP, while acknowledging the potential for structural damage to the BMP from scour. The 90% RD leaves resolution of external scour concerns to the remedial contractor, making the 90% RD not complete because of the lack of procedures for critical work.**

Scour and riverbed erosion in areas adjacent to the Northern Impoundment after significant flood events were documented in the ROD, including extensive scour from the 1994 San Jacinto River flooding and river bed scour approximately 8-feet deep identified in 2016 adjacent to the TCRA cap.[125] After Tropical Storm Imelda, Respondents' bathymetry survey also revealed areas in the river channel adjacent to the TCRA cap "where riverbed elevations had decreased," requiring maintenance by placing additional rock in three areas to provide additional slope stabilization and scour protection.[126]

As described in the June 90% RD, Respondents evaluated the potential for scour using their hydrodynamic model and concluded that there is potential for scour and/or sediment deposition along the outside perimeter of the BMP, with increased sheer stress noted on the north side and southwest corner of the BMP.[127] The 90% RD states that scour protection measures may be required in the future: "As changes in the riverbed elevation will affect the design of the BMP, scour protection measures such as rock rip-rap may be required around the outside perimeter of the wall."[128]

The Design Drawings in Appendix G do not show any riprap or scour protection along the exterior of the BMP. The only references to riprap in Appendix H, Design Specifications are riprap for the raised bench on the interior of the BMP.[129] There is no clarification as to whether any scour protection will be applied to exterior of the BMP to address the findings of Respondents' modelling, and if so, whether the scour protection will be applied to the whole length of BMP or just at the sections with high potential of scour risk; there is also no information as to the size or quantity of the rock for any potential exterior riprap.[130] Scour on the exterior wall is a critical issue for the structural integrity of the BMP and should have been addressed in the 90% RD specifications and drawings in order for them to be complete and implementable.

BMP Removal/Site Restoration. The 90% RD is seriously deficient because it lacks complete plans, procedures, specifications and/or performance metrics for removal of the BMP and restoration of the Site upon completion of the project.

As noted in the Summary, the design of the BMP presented in the 90% RD is a double sheet pile wall; approximately 3,340 feet in length; driven approximately 40 feet into the alluvium and Beaumont Clay; with sheet piles approximately 50-60 feet in length, placed thirty feet apart and connected with tie-rod anchors, and granular fill between the walls.[131]With the exception of the southern side of the impoundment, after Site

[125] 2017 ROD, Section 2.2.5, Administrative Settlement Agreement and Order on Consent for Removal Action – Northern Waste Pits Cap, pp. 12-14, and Section 2.5.1, Physical Characteristics Surface Water Hydrology, pp. 18-19.
[126] May 12, 2020 Memorandum to Gary Baumgarten, EPA from Anchor QEA Regarding San Jacinto River Waste Pits TCRA Armored Cap; Post-Tropical Storm Imelda Channel Maintenance Completion Report.
[127] Section 5.5.3.4 Scour of the June 90% RD.
[128] Section 5.5.3.4 Scour, p. 53 of the June 90% RD; Appendix I, Section 3.4 Scour, p. 9 of the June 90% RD.
[129] Appendix H Design Specifications, Section 31 3700 RipRap, p. 1 June 90% RD.
[130] *See* Section 5.5.3.4 Scour, p. 53, and Appendix I, Section 3.4 Scour, p. 9 of the June 90% RD.
[131] Appendix I BMP Structural Design Report – Northern Impoundment, pp. 1-2 and Appendix I, Section 6.2 Analysis Sections, pp. 22-23, of the June 90% RD.

excavation activities the excavation area where, by Respondents' calculations, approximately 188,000 – 234,000 cubic yards of material will be removed, will not be backfilled.[132]

The 90% RD states that the BMP would be removed upon completion of remediation, but without sufficient evaluation and provision of complete or adequate procedures or performance metrics:

> The BMP will be disassembled in a similar but inverse sequence to how it was installed …. If a pile cannot be removed, additional measures for removal such as cutting or driving the pile below the mudline will be considered. Discussions may ensue with stakeholders or interested parties regarding potential end use involving leaving all or portions of the BMP in place.[133]

Removal and disposal of the BMP are addressed summarily in the specifications.[134] Given the potential scope of operations to remove the BMP, the plans, procedures and specifications are not complete; leave critical work to be determined by the remedial contractor; and create uncertainty affecting biddability.

Additionally, there are several stakeholders that have requirements related to the removal of the BMP and end-state of the Site, including but not limited to TxDOT, the owners of pipelines at the Site, and the Port of Houston Authority, which has previously stated that the BMP will need to be removed from the river. The EPA has emphasized throughout the design process that the end-state of the Site after completion of remediation must be protective of nearby structures, including the I-10 bridge and its protective structures. The 90% RD provides insufficient supporting information and detail about BMP removal and restoration of the Site, and how they will protect these nearby structures.

The EPA's review of the specifications found only general requirements related to the end-state and restoration of the Site upon completion of removal activities.[135] Respondents' Hydrodynamic Report did consider shear stresses and velocities in the end-state condition in relation to the I-10 bridge;[136]the only design drawing included in the June 90% RD to specifically address restoration is Drawing C-22, showing the proposed restoration of the Site, depicting creation of a soil embankment on southern side and installation of erosion and scour protection in an attempt to address the concerns raised by the Hydrodynamic Model.[137] While revised drawings later produced by Respondents in response to a request by TxDOT provided more information about the slope of the embankment, Respondents did not provide adequate support or details, either in the 90% RD or after, demonstrating how the proposed sloping would remain stable after removal of the BMP and protective of the bridge and its protection structures in the long-term. The details regarding the end-state of the Superfund project are important because they must be considered by TxDOT when designing and coordinating the TxDOT project, as pointed out by TxDOT in the August 2023 meeting.

The 90% RD also does not document that the Respondents have taken into account specific effects of the end-state of the project on the stability of other adjacent properties, shore stability, pipelines or nearby fleeting operations. The 90% RD should have provided information regarding these concerns, as well as details of coordination with the stakeholders and how their requirements are being met.

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[132] Appendix F Hydrodynamic Modelling Report, Section 1.1, p. 1 of the June 90% RD.
[133] Section 5.10.1 Removal of the BMP, pp. 75-76 of the June 90% RD.
[134] See Appendix H Design Specifications, Section 01 70 00 Execution and Closeout Requirements, 1.7 Final Decontamination and 1.8 Removal and Disposal.
[135] Appendix H Specifications, Section 01.70.00 Execution and Closeout Requirements, Part 1 General, 1.4(A) Restoration.
[136] Appendix F Hydrodynamic Report, Section 5.3, pp. 30-31 of the June 90% RD
[137] Appendix G, Design Drawings, Drawing C-22 of the June 90% RD; Section 5.6 Excavation Area Restoration and Section 5.10 Site Restoration, pp. 75-76 of the June 90% RD.

<u>"Technical Uncertainties."</u> Respondents have labeled certain design, engineering or construction issues as "technical uncertainties" where i) Respondents' own selected design approach creates or exacerbates issues, and alternate design approaches and/or mitigation and protection strategies exist consistent with best engineering practices and consistent with the ROD which are not adequately explored or developed by Respondents; and ii) Respondents fail to provide plans or specifications to address critical work issues affecting the structural integrity of the BMP, creating uncertainty by leaving the issues for resolution by the future remedial contractor. The use of the term "technical uncertainty" for issues not addressed by Respondents makes the 90% RD not complete and not suitable for procurement.

Throughout the RD process, Respondents have identified challenges and constraints related to the design and remedy implementation as "technical uncertainties." Section 5.11.1 of the June 90% RD lists "technical uncertainties" that Respondents claim "could render the remedial alternative outlined in the ROD technically impracticable and not implementable."[138] As discussed above and as stated in the EPA's December 8, 2022, and September 8, 2023, letters to Respondents, several of these "technical uncertainties" demonstrate Respondents' failure to adequately explore or evaluate design and mitigation approaches consistent with the ROD in order to address identified technical problems, even where this involves repeatedly casting doubt on the implementability of Respondents' own design choices. Several issues identified by Respondents as "technical uncertainties" in the 90% RD problems are the result of Respondents' failure to select procedures or protective measures which the 90% RD itself indicates are necessary for implementing critical work.[139]

The EPA's RD guidance provides that parties implementing the design should identify uncertainties and constraints in their design deliverables.[140] However, the engineering design process should not stop with identifying the uncertainties and constraints. The party undertaking the design should then thoroughly evaluate methods to address the uncertainties and constraints consistent with the requirements of the design.

A letter from the Respondents' contractor, dated December 22, 2021, illustrates Respondents' design approach. The EPA had suggested mitigation measures to address hydraulic heave concerns (a listed "technical uncertainty") at a TWG meeting on December 14, 2021. These measures included injecting grout into sand lenses and/or dewatering sand lenses. The December letter states that "GHD intends to evaluate these suggestions," but based on an "initial review," "GHD does not feel that any of these approaches would sufficiently eliminate the risk of hydraulic heave." Respondents' contractor then recommended conducting a focused feasibility study of other remedial alternatives to address the heave issue.[141] Respondents rejected potential solutions or mitigation measures consistent with the ROD remedy without a full evaluation, instead focusing on a change in the selected remedy.

The EPA stated in letters dated April 15 and September 14, 2022, that Respondents should note uncertainties about design issues in the 90% RD.[142] However, neither letter authorized the presentation of "technical uncertainties" in the place of the technical evaluations, supporting documentation, and complete plans, specifications and drawings required in a 90% RD deliverable.

The result of Respondents' design choices for several "technical uncertainties" is to either limit future remedial contractors to a flawed design approach, or to leave critical issues for resolution by the future remedial

[138] Section 5.11 Uncertainties Associated with Design and Implementation, p. 76 of the June 90% RD.
[139] *See* Letter to Respondents from the Acting Division Director, Superfund Emergency Management Division, dated December 8, 2022, and Letter from EPA RPM to Respondents' Project Coordinator dated September 8, 2023.
[140] RD/RA Handbook, Appendix C, p. C-2 and C-12.
[141] Letter to EPA from Respondents' contractor, GHD, dated December 22, 2021.
[142] Letter from the EPA Regional Administrator to Respondents dated April 15, 2022, and September 14, 2022 Letter to Respondents' Project Coordinator from the EPA RPM.

contractor, making the 90% RD not suitable for procurement.[143] Respondents' method of designating and presenting "technical uncertainties" overstates Respondents' focus on the risk of the project in a manner that could influence potential remedial contractors' perception of the project. Respondents' use of this term for potentially resolvable issues, or issues for which proven mitigation methods exist, infers greater unknowns and remedial contractor risk than necessary, which would likely have resulted in fewer and/or higher bids for remedial construction.

"Technical uncertainties" in the 90% RD are impediments to implementation, whether appropriately called "technical" and/or "uncertain."[144] Even non-technical issues involving third parties or external factors which do have recognized uncertainty, such as securing appropriate property needed for logistical support, interfacing with future TxDOT plans, and community impacts and reactions, could have been addressed in the 90% RD with potential strategies, specified requirements and/or contingency planning. For example, the 90% RD should have presented general access requirements with TxDOT as part of the specifications for use by the remedial contractor. Access is not strictly limited to the actual obtaining of access to use a property, but also should provide the bidding contractors with an understanding of what requirements they may face and how the design accounts for these requirements in its overall design and specifications. By listing these issues as "technical uncertainties" Respondents focused instead on the potential risks that these issues might not be resolved, without providing details or adequate consideration of how these issues may be addressed.[145]

Respondents' discussion of "technical uncertainties" includes the effect of BMP construction on the ExxonMobil pipeline at the Site. The text of the June 90% RD report states that "[i]t is also unknown whether the BMP's southern wall can be constructed as designed given the presence in that area of both pipelines and bridge structures (existing or planned)."[146] Under the Technical Uncertainties section, Respondents state that the "proposed location and alignment of the BMP…will need to be reviewed by ExxonMobil Pipeline, which owns pipelines in the vicinity of the ROW, and other stakeholders to ensure that the proposed BMP wall's construction would not pose any concerns with respect to pipelines or other utilities."[147] As part of the design process, Respondents should have coordinated with all stakeholders whose infrastructure could be impacted by the BMP construction, which could in turn impact the design. According the 90% RD, Respondents spent significant time and money designing the BMP without prior coordination with ExxonMobil regarding any potential effects on its pipeline that might require changes in the design.

Respondents have repeatedly attempted to link uncertainties and challenges identified in the RD to their claims that the ROD remedy may be "technically impracticable and not implementable." In a March 24, 2022, letter from Respondents to the Regional Administrator for Region 6, Respondents set forth their claims that the

[143] *See* discussion about "technical uncertainties" in the EPA Letter to Respondents dated September 8, 2023.
[144] An example of a less-than-uncertain identified "technical uncertainty" is the EPA's decision on approval of Respondents' SWAC-based excavation surfaces, which the EPA has stated repeatedly is not consistent with the ROD or the Settlement (listed as a "technical uncertainty" in Section 5.11.1.2 - Acceptance of the Design Excavation Surface, p. 80 of the June 90% RD).
[145] While they post-date submission of the 90% RD, the EPA notes that some aspects of the "technical uncertainties" identified by Respondents have been resolved. TxDOT has presented its proposed bridge realignment, and the proposed realignment is south of the current TxDOT right-of-way. Also, water treatment is listed as a technical uncertainty in Section 5.11.2.1 - Translation of Laboratory Testing to Field Implementation, p. 82 of the June 90% RD. Subsequent to submission of the 90% RD, the efficacy of the water treatment method in meeting the discharge standards has been proven during its use for the Southern Impoundment remedial action.
[146] Section 5.2 Remedial Approach, p. 40 of the June 90% RD.
[147] Technical Uncertainties, Section 5.11.1.1 Use of the TxDOT ROW, p. 78 of the June 90% RD.

remedy should be re-evaluated and modified prior to submission of the 90% RD.[148] The EPA responded in an April 15, 2022, letter that the EPA required the technical detail which should be provided by a 90% design deliverable to evaluate this claim,[149]but, as discussed, the 90% RD for many issues lacks critical technical detail to evaluate these claims.

In the 90% RD, Respondents have failed to document that the ROD is not implementable; Respondents have documented only that the 90% RD is not an implementable design of the ROD remedy. Respondents selected design options not specified by the ROD but which create additional implementability issues (e.g., the top of wall elevation); Respondents' claims that there are not acceptable design approaches consistent with the ROD are often unsupported by sufficient evaluation or documentation, as well as the existence of remedial approaches consistent with the ROD pointed out by the EPA. Respondents claim as "uncertainties" challenges and constraints which could have been addressed or mitigated as part of the design process, but which Respondents failed to adequately address with procedures, plans and specifications (e.g., hydraulic heave, scour, and barge impacts).

Respondents' use of the term "technical uncertainty" for issues it did not make adequate attempts to address represents a serious deficiency in the 90% RD.

<u>Insufficient Supporting Information and Overall Lack of Detail</u>. The 90% RD does not provide sufficient detail, explanation, documentation, and support for some design decisions, conclusions and factual statements, and is generally overly conceptual and not adequately developed for a 90% design. This affects the EPA's ability to review the document, but inadequate supporting information also affects the biddability and constructability of the RD.

<u>Vibration Analysis</u>

Respondents' remedial design contractor performed a vibration study on the original single wall design of the BMP presented in the 30% RD which found that vibration from construction of the proposed BMP had the potential to cause slope failure of sediments in the Northern Impoundment and the potential to impact adjacent structures, including the TxDOT I-10 bridge.[150] The 90% RD did not include a revised vibration study although the design for the BMP had been significantly changed to the double sheet-pile cofferdam wall proposed in the 90% RD;[151] the 90% RD states only that a new vibration study was not required because the new design of the wall is "terminated in the Beaumont Clay layer instead of driving into the stiffer sand layers, thereby, reducing the potential for vibrations significantly."[152] Given the importance of this issue, additional support and explanation should have been provided for this conclusion, especially because: 1) the design of the 90% RD moved the BMP closer to I-10 than the previous design;[153] 2) Respondents indicate that they may not have obtained structural information on the foundation of the current I-10 bridge;[154] and 3) vibrations may impact pipelines, which has not been evaluated.

[148] March 24, 2022 letter from Respondents to the Regional Administrator for Region 6.
[149] April 15, 2022, letter from the EPA Regional Administrator to Respondents.
[150] Section 5.2.3 Geotechnical Conditions p 36-37 in the 30% RD.
[151] Section 5.1 Remedial Design Background, p. 38 of the June 90% RD.
[152] Section 5.5.9 Pile Drivability and Vibration Analysis, p. 62 of the June 90% RD.
[153] Section 5.2 Remedial Approach, p. 41 of the June 90% RD; Section 5.3.4 Excavation Extent and BMP Alignment, pp. 48-49 of the June 90% RD; Section 5.5.9 Pile Drivability and Vibration Analysis, p. 62 of the June 90% RD.
[154] Appendix B Geotechnical Engineering Report, Section 8 Additional Considerations, p. 11 of the June 90% RD; and Appendix I BMP Structural Design Report, Section 7.3 Foundation Substructure of I-10 Bridge, p. 27 of the 90% RD.

Respondents' summary conclusion in the 90% RD that the revised depth of the BMP will not generate vibrations impacting adjacent structures is not sufficient. Either a vibration analysis should have been completed as part of the 90% RD on the revised BMP to ensure the stability of the bridge and inform any monitoring that would need to be done during construction, or at a minimum, additional information should have been provided in the 90% RD to explain Respondents' conclusion that vibrations are no longer an issue.

Waste Volume Estimates

Estimated volumes of waste material requiring excavation and disposal are critical factual information required for bidding. The EPA requires detailed waste volume calculations for its review of the 90% RD, especially given inconsistencies within the document.

Respondents have provided inconsistent waste volume totals for the Northern Impoundment in March 2022 correspondence and within the 90% RD itself. Respondents' estimation of the total excavated waste material for areas in the Northern Impoundment excluding the Northwest Corner, based on use of a SWAC approach for excavation contours, is 177,000 cubic yards, as stated in their March 2022 letter and in Appendix E of the June 90% RD.[155] According to Appendix E, these volume estimates are based on "abundant analytical data" collected at the Site.[156]

Without any explanation, the body of the 90% RD report uses a different estimated volume for the waste material requiring excavation in the Northern Impoundment. According to the June 90% RD, based on the SWAC-based excavation limits proposed by Respondents, the approximate volume of waste material in the Northern Impoundment (excluding the Northwest Corner) is estimated at 168,000 cubic yards – not the 177,000 cubic yards cited in Appendix E of the same document.[157]

Respondents have not provided sufficient technical detail to support their estimated waste volumes. The only breakdown that appears to be provided for Respondents' 168,000 cubic yard total estimate is Drawing C-19, which shows four totals for each of four quadrants of the Site to be excavated.[158] Drawing C-19 was modified to include the Northwest Corner in the NWC 90% RD, which estimated the Northwest Corner to have 19,796 cubic yards requiring excavation. No calculations for the total volumes in each of the five areas are provided. It is also unclear what exactly was included in Respondents' totals. The areas for excavation in Drawing C-19 appear to include the historic berm on the Site. A comment provided by the EPA review team is that it appears that the unimpacted material in the historic central and southern berm - which Respondents say will be excavated for potential reuse and which the 90% RD estimates as approximately 25,000 cubic yards of material - is included in Respondents' total waste volume estimate, although the total of 168,000 cubic yards is described in the 90% RD as "waste material."[159]

Respondents also claim that excavation going sampling point by sampling point (as opposed to using Respondents' proposed SWAC excavation contours) would result in excavation of an estimated 46,000 cubic

[155] March 24, 2022 letter from Respondents to the EPA Regional Administrator, Appendix B Summary of Significant New Site-Specific Information, Section 3.1, p. 3 and Section 3.12, p. 4; Appendix E Use of Area Based Average Concentration to Meet Clean-Up Level, Section 2.4.1 Excavation Strategy, pp. 6 – 7 of June 2022 90% Design Submittal.
[156] Appendix E Use of Area Based Average Concentration to Meet Clean-Up Level, Section 3, p. 9 of the June 90% RD.
[157] Section 5.3.4 Excavation Extent and BMP Alignment, p. 59 of the June 90% RD; Section 5.6.2.4 Excavation Season Production Rates, p. 64 of the June 90% RD; Section 5.7.2 Loading, Transportation, and Disposal, p. 66 of the June 90% RD. Compare with Appendix E, Use of Area Based Average Concentration to Meet Clean-Up Level, Section 2.4.1 Excavation Strategy, pp. 6 – 7 of June 2022 90% Design Submittal.
[158] Appendix G, Drawing C-19, of the June 90% RD.
[159] Section 5.2 Remedial Approach, p. 45 of the June 90% RD; see Appendix G, Drawing C-19.

yards of material[160](as opposed to the 44,000 cubic yards estimated by Respondents in March 2022[161]). Again, no support is provided for this estimate. The EPA review team was unable to reproduce Respondents' estimate that excavating to the full depth of the remedial target levels would generate an additional 46,000 cubic yards, with the possibility that Respondents' estimate is significantly too high.

Because the 90% RD does not provide the technical detail and documentation required to support the amounts of volume claimed by Respondents, the EPA is unable to determine which, if any, of the volumes stated in the 90% RD are correct. No supporting calculations to show how any of these volume numbers were estimated are provided (other than impacted waste totals for five areas of the Site provided in Drawing C-19). The volume of material to be excavated, and the volume of material to be treated and disposed of, is critical information for the biddability of the project. The lack of documented and consistent waste material volumes, and their relation to other volumes of material to be excavated and reused, also impair the ability of a potential remedial contractor to bid on the project, and might likely discourage potential bidders for the remediation.

Residuals Management

During a March 2022 TWG meeting, the EPA and its technical team proposed several potential approaches for residuals management in order to address Respondents' concerns regarding residuals in areas where waste will be removed through the water column. The EPA summarized these approaches in a September 28, 2022, letter. This letter states that "[w]hen evaluating the mechanical dredging approach, EPA has directed Respondents to propose a method that will reduce residuals to the greatest amount practicable and present that in the Northern Impoundment 90% RD. … The 90% RD should include the potential options considered for the Residuals Management Plan in full detail, with all potential advantages and disadvantages." The letter also notes that "[t]he small, contained, and controlled dredge environment under discussion suggests that residuals prevention and management can be readily and successfully implemented."[162]

As noted in the EPA Memorandum to Site File Regarding a Non-Significant Post-Record of Decision Clarification and Change for the San Jacinto River Waste Pits Superfund Site:

> Residuals management is a BMP that will be necessary if mechanical dredging is performed, but any potential releases of residuals during mechanical dredging will not result in releases to the San Jacinto River exceeding the TSWQS during remediation because the dredging will be conducted within the cofferdam/wall BMP. A robust residuals management plan can achieve the Site's cleanup level in the Northwest Corner, as will be determined by the final confirmation sampling plan, especially as it is a relatively small area of the Northern Impoundments; mechanical dredging would be conducted within the cofferdam/wall BMP without the impact of river currents; a variety of potential residual management technologies exist, and have been suggested, that can be used alone or in various combinations; and EPA's confidence that the depth of the waste in that area has been adequately determined.[163]

The 90% RD did not provide sufficient detail regarding residuals management approaches for the EPA's review, nor the full evaluation discussed in the EPA's September 28, 2022 letter. In summary, the 90% RD:

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[160] Section 5.11.1.2, p. 81 of the June 90% RD; Appendix J, Field Sampling Plan.
[161] March 24, 2022 letter from Respondents to the EPA Regional Administrator, Appendix B Summary of Significant New Site-Specific Information, Section 3.1, p. 3 and Section 3.12, p. 4.
[162] Letter from the EPA RPM to Respondents' Project Coordinator dated September 28, 2022.
[163] August 3, 2022, EPA Memorandum to Site File Regarding a Non-Significant Post-Record of Decision Clarification and Change for the San Jacinto River Waste Pits Superfund Site.

- Did not provide a full evaluation of the residuals created during dredging operations in the Northwest Corner to determine what needs to be in place to meet the criteria.
- Left details critical to the success of this approach to the remedial contractor to determine, including, but not limited to:
    - An additional treatability study, and/or review of a current treatability study, evaluating flocculants, polymers, coagulants and/or other additives or mixtures of additives to decrease suspended solids. This study would include how the additives could be sufficiently mixed in the water column, which the 90% RD states could prove difficult when being implemented over a larger area.
    - Additional BMPs that may be implemented across the Northwest Corner where necessary to limit the spread of contact water and potential residuals.
    - Details regarding how residuals in contact water would be handled in a storm event, or overtopping event (see more detail below).
- Did not document evaluation of all approaches in the EPA's September 28, 2022, residuals management approaches summary letter.
- Did not include contact water generated during dredging when designing the water treatment system (WTS). The NWC 90% RD did not update specs for the WTS to include this contact water.

Overtopping in Dredge Area

The NWC 90% RD claims that "[u]nder a dredging scenario, there are no controls that could be implemented to prevent a release if uncontrolled overtopping of the BMP occurred."[164] Respondents do not support this conclusion, and do not document that mitigation strategies were evaluated such as, but not limited to:

- Having an interior wall separating the dredging operation from the rest of the Site.
- Dropping the suspended sediments out of the water column to consolidate them on the bottom. This may provide a protective water layer to help prevent the scouring effect inside the BMP during an overtopping event without the risk of impacted sediments being removed from the cofferdam area.
- Evaluation of flocculants, polymers, coagulants and/or other additives or mixtures of additives that could be used in an emergency situation, and procedures for their use.

While a specification exists for the remedial contractor to develop a "Chemical Additives Dosing Plan" for dredging, detailed performance metrics for this plan are not included, and no specifications were provided in the 90% RD to show how to drop the suspended sediments out of the water column in the event of flooding/overtopping.[165] The 90% RD also does not support Respondents' assertion that an overtopping event for areas being dredged would have more severe consequences, because releases from overtopping could be lessened due to water depth within the BMP, and the water may provide a buffer from the potential turbid effects of the impacted sediments.

Design Loads

Respondents' June 90% RD states that "[b]ased on the Federal Emergency Management Agency (FEMA) Flood Map (effective on January 16, 2017), the Northern Impoundment is designated as a special flood hazard area referred to as Zone AE. Since the excavation is planned to be completed seasonally (November to April) outside the period during which there is a greater risk of flooding events and it is anticipated that the structure will be

[164] Section 5.12.2.2, p. 10 of the NWC 90% RD.
[165] Appendix H-2 Design Specifications – Northwest Corner Mechanical Dredging, Section 35 24 00 Dredging, Submittal Procedures, 1.8 (F) of the NWC 90% RD.

flooded with river water during the non-excavation season, FEMA flood loads were not considered for the design of the BMP." [166]

The stated reason in the 90% RD for not considering FEMA flood loads is that the BMP would be intentionally filled with river water during hurricane season, although as noted above, there is no decision presented in the 90% RD on if or how the BMP will be intentionally filled between excavation seasons. In the NWC 90% RD, Respondents also presented historical data indicating the potential for flooding at the Site during excavation season, when the BMP would be dewatered. Despite their concerns about flooding during excavation season in the discussion on "technical uncertainties," Respondents did not consider FEMA flood loads during excavation season even though bulk water apparently could not be quickly added to the BMP if flooding did occur. Respondents do not provide any rationale as to why their load calculations are sufficient given this information.[167]

TCRA Cap and Historic Berm Reuse

Remediation at the Site will require removing the temporary RCRA cap. Section 5.2 Re-use of TCRA Armored Cap and Historic Berm Material proposes the reuse of all cap rock material and some historic berm material at the Site, during or after the remedial action.[168] Additional information should have been added in this section to explain how the boundaries of the historical berm and the cap rock reuse area were derived; this would have informed the EPA's review of the sampling procedures for the berm material. For example, because it has not been established that the historic berm material within the proposed boundary is completely free of contamination exceeding the cleanup level, and it may be used on-site for cover and other purposes, the proposed one sample per 1,000 cubic yards may not be sufficient.

Respondents performed a treatability study of the armored cap material in 2019 which indicated no dioxins or furans in their elutriate,[169] leading Respondents to designate all the cap rock as available for reuse.[170] The EPA is concerned that it will be difficult to remove the rock without destroying the underlying geotextile, potentially exposing the rock to contamination. The 90% RD should have provided additional details on how the armored cap rock will be removed in a way that minimizes risk of inclusion of any underlying waste material, for example, by requiring field staff to verify that the geotextile and/or geomembrane is present and not damaged as cap rock is removed.

Additional representative sampling of stockpiled cap rock may need to be conducted prior to reuse to demonstrate that it does not have contaminated sediment or soil adhered to it and has not become contaminated by the process of removing the cap rock from the top of the geotextile or geomembrane, or contaminated by other means. Any stockpiled cap rock that is found to be contaminated with waste material above the cleanup level should be sent for disposal rather than reused at the Site. The 90% RD also does not

[166] Section 5.5.3.3. River Flooding, p. 52 of the June 90% RD.
[167] *See* Appendix I, the BMP Structural Design Report – Northern Impoundment. In addition, the 90% RD also does not explain why the loading calculations used a density of 62.4-pound per cubic feet for river water, because this is the density of fresh water; in section 5.5.5.4 Corrosion Protection & Maintenance, it states that the Northern Impoundments is located in brackish water. The EPA review team noted that the common unit weight of water for design of similar structures is 64 pcf to account for temperature and salinity variation.
[168] Section 5.2 Re-use of TCRA Armored Cap and Historic Berm Material P45, of the June 90% RD.
[169] Section 3.5 2019 Armored Cap Material Treatability Testing, p. 30 of the June 90% RD.
[170] Appendix H Design Specifications, Section 31 23 16 Excavation – Excavating Impacted Materials, 3.7(A) of the June 90% RD.

provide details as to how the cap rock and historic berm material will be stockpiled while waiting for sampling results in a manner that keeps it separate from both contaminated and uncontaminated materials nearby.

Sufficiency of Geotechnical Information for Revised Wall Alignment

As the project has progressed, the proposed BMP location has been revised. The previous sampling events considered an alignment different than what was submitted in the 90% RD. From the information provided, it appears that no sampled borings have been drilled/sampled at the current BMP alignment; the only data provided at the current BMP location is based on CPT's. Considering the impact should the BMP wall fail, Respondents should explain why the geotechnical data presented in the 90% RD is sufficient for the BMP final design.

Seasonal Excavation

The EPA, stakeholders and the community are interested in an expedited and efficient Site remediation. The 90% RD states that after procurement and construction of the BMP (construction estimated to take one year), there would be a minimum of five years of waste removal to be performed during a limited excavation season lasting from November to the end of April. Respondents state that the estimated five-year excavation schedule is based on using their SWAC-based excavation approach and is dependent on their ability to meet the estimated volume and excavation rates supporting a five-year schedule.[171]

With the concerns highlighted in the 90% RD, including but not limited to barge strikes and I-10 construction schedule conflicts over a multi-year period, greater efforts should have been taken to evaluate what specific work could be completed outside of the seasonal excavation season and to maximize that work, as well as conducting a potential re-evaluation of the proposed limits of the seasonal excavation itself. Community members expressed their concern about the prolonged proposed remediation schedule in comments on the 90% RD:

> The coalition and THEA do not agree with the seasonal excavation schedule. It is our understanding that this concept was created by the RPs following concerns expressed by the community regarding safety measures for excavation during hurricane season. The concerns were not to encourage excavation over less than half of the year, rather the concerns were to bring forth dialogue of best management practices to be utilized for excavation during hurricane season. **The possible risks associated with excavating year-round do not overshadow the risks associated with working through twice as many hurricane seasons.**[172]

The community reiterated this same sentiment at the November 3, 2022, Community Awareness Committee meeting as well as the December 5, 2022, community meeting.

Respondents presented the EPA with information supporting the limitation of excavation to the months of November to April in a February 19, 2020, TWG meeting as a "risk management measure" given evaluation of historical data.[173] The information and concerns presented in the 90% RD indicate that the commitment to a seasonal excavation season from November to April should have been re-considered because of its effects on implementation of the project. The EPA continues to be concerned about safety and releases, but as repeatedly stated by Respondents in the 90% RD, extreme floods in the Houston area are possible at any time of year,

[171] Section 5.2 Remedial Approach – Preliminary RA Schedule pp.45-46 of the June 90% RD.

[172] Letter from Texas Health and Environmental Alliance (THEA) to Ashley Howard, EPA Region 6, on October 28,2022, Re: THEA's comments on behalf of the San Jacinto River Coalition regarding the San Jacinto River Waste Pits Superfund Site Pre-Final 90% Remedial Design.

[173] Section 5.2 Remedial Approach- Seasonal Excavation, and Top of Wall Elevation, pp 41-42 of the June 90% RD.

which is also documented in Respondents' revised hindcasting in the NWC 90% RD [174]. This possibility of flooding during the proposed excavation season undermines Respondents' stated rationale for the limited work season as it reduces, but does not eliminate, the potential for flood events to overtop the BMP; it instead emphasizes the need for better developed controls, best management practices, and protective measures to address issues from high water and severe weather events.

Emergency and contingency procedures for high water events should exist throughout the year, whether it is in or out of the excavation season. Appendix H of the 90% RD Specifications requires the submission of a Flood Contingency Plan and a Hurricane and Severe Storm plan.[175] It is the EPA's expectation that these and other contingency plans will have adequate controls, best management practices, and protective measures to address adverse events, but the 90% RD does not contain an evaluation of the sufficiency of the contingency plans mentioned in the specifications. Additionally, in the NWC 90% RD, the potential effects and contingency measures for overtopping in an area being excavated through the water column would be different than those for areas being excavated in the dry, but these changes are not addressed.

Other than its review of river stage data and overtopping concerns, the 90% RD does not contain any evaluation of potential risks and other implementation issues involved in a limited construction season and an extended remediation. For instance, seasonal work involves repeated demobilization and remobilization, with the potential for new issues and problems as equipment is reinstalled and reconnected after a prior demobilization. As seen during the Southern Impoundment remediation, work efficiency increased as the excavation and disposal work progressed; these efficiencies would be disrupted by seasonal demobilization. The proposed schedule of a minimum of five years could be further extended due to these and other issues. A cessation of work from early May to early November also is not consistent with EPA's Superfund work in the Houston area. In fact, Respondents have already proven that significant construction work can be successful past the month of April as Respondents' contractors continued TCRA construction activities at the Northern Impoundment through May and June of 2011, completing construction on July 12, 2011, and demobilizing by July 28, 2011.

Although a seasonal approach for the excavation schedule had been previously discussed in TWGs, specifically when considering open excavation areas, the 90% RD expanded the work to be performed in the excavation season to include significant work that is not excavation. Respondents proposed using the limited six-month excavation season not just for excavation but also for dewatering the BMP before excavation, removing the TCRA cap, and at the end of the season, re-capping the excavated areas and potentially re-flooding the BMP.[176]This would further delay Site remediation. The 90% RD did not evaluate or provide sufficient information whether any or all of these activities could occur outside of the excavation season.

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[174] The EPA also notes that, while the 90% RD states that "excluding the months of May to October would substantially reduce the number of high water events that could be expected" (Section 5.3.2 Excavation Season and BMP Height, p. 47 of the June 90% RD), only one hindcasted maximum river stage event exceeded 9 feet in the months of May through July at the Site, although May, June and July are outside the proposed excavation season (Table 4-1, Historic High-Water Events, San Jacinto River Waste Pits – Southern Impoundment, in the High-Water Preparedness Plan, for the San Jacinto River Waste Pits –Southern Impoundment, dated April 21, 2023).

[175] Appendix H of the 90% RD Specifications, Section 01 57 19 Temporary Environmental Controls, 1.3(C) Submittals. The specifications for the Flood Contingency Plan state it will "Include all necessary data related to actions to be taken in case of river elevation equals or exceeds 10 feet above NAVD88 at the San Jacinto River Gage in Sheldon, Texas." The ten-foot river elevation trigger threshold should have been explained, given the many critical actions that may need to be taken if a severe storm or flood were to occur during excavation season. As noted, these critical actions have not been adequately identified in the 90% RD.

[176] Section 5.6.2.1 Cell Dewatering, p. 63 of the June 90% RD; see also Section 5.8 Water Management, p. 67 of the June 90% RD. Respondents

The 90% RD should have thoroughly evaluated the seasonal work approaches' risks, limitations and effects on implementation, and documented the many considerations, including all of the pros and cons, of this approach. This could have led to re-consideration of the potential for excavation behind the BMP, both in the dry and through the water column, to be extended into some or all of the hurricane season, as long as appropriate plans are in place and precautions are taken.

Hydrodynamic Model

The USACE reviewed the hydrodynamic model and associated Hydrodynamic Modelling Report, which is Appendix F of the June 90% RD. The USACE found that the 90% RD lacked sufficient technical detail and information to support the assumptions used in the hydrodynamic model, therefore creating questions about its limitations and the use of its conclusions in the 90% RD.

Respondents' hydrodynamic model was used to evaluate critical issues related to the design, including the potential for river flow to create scour around the BMP;[177] barge impact velocities in load calculations;[178] the BMP's potential effects on the surrounding floodplain;[179] conditions, including shear stresses, after remedial excavation is completed;[180]and the BMP's effects, during and after remediation, on the TxDOT I-10 bridge.[181]The model evaluated the river flow velocities for conditions at 2-year, 10-year and 100-year storms, both with and without the BMP present.[182]

One overall concern from the USACE was that the effect of wind waves during simulated flood events on bed shear stresses, as well as on potential overtopping of the cofferdam, are not simulated in the modeling study. The result is that Respondents' model only simulates current-induced bed shear stresses, and, although winds in high energy storm events can generate significant waves, the model does not address wind-induced bed stresses which also have the potential for sediment erosion. The USACE required more information about why the effect of wind waves were not included in the modeling study in order to evaluate the validity of the model, and concluded that the impact of this limitation of Respondents' hydrodynamic model should have been addressed in the 90% RD.

The USACE also questioned how the three scenarios that were simulated (i.e., high flow events with return periods of 2, 10 and 100 years) were chosen.[183] While the modeling report states that these scenarios included both high river flows and surge conditions, the USACE questioned whether storm surges actually were simulated along with the high river flows. This is a critical issue because of the potential impact of storm surge in a high energy storm, including tropical storms, as opposed to a high rainfall event.

Respondents' hydrodynamic model, and the 90% RD report, also failed to explain or discuss why the 95th percentile shear stresses were higher for both the Site's existing conditions and with the BMP cofferdam for the 2-year storm than they were for the 10-year and 100-year storms.[184] More information is necessary because the modelling results seem counter-intuitive, as they show a decline in shear stresses and flow velocities as one goes from a 2-year storm to a 100-year storm. The increased flow of the more infrequent storms would be expected to be higher, resulting in more shear stresses. The EPA would also note that, in the past, sediment erosion in the

[177] Appendix F, Section 4.2.1, pp 21-22 and Section 5.2, p.30; Section 5.5.3.4 Scour, p. 53 of the June 90% RD.
[178] Section 5.5.3.6 Barge Impact, p. 55 of the June 90% RD.
[179] Appendix F, Section 3.3.1, p. 11 and Section 5.1, p. 30 of the June 90% RD.
[180] Appendix F, Section 4.2.2, pp. 25-29 and Section 5.3, pp. 30-31 of the June 90% RD.
[181] Appendix F, Section 4.2.3, p. 29 and Appendix B to Appendix F of the June 90% RD.
[182] Appendix F, Section 3.3, pp. 11-12 of the June 90% RD.
[183] Appendix F, Section 4.1, p. 12 of the June 90% RD.
[184] Appendix F, Section 4.2.1, Table 8, pp. 21-22 of the June 90% RD.

Site area has been associated with extreme flood events, which would argue for greater (not less) flow and shear stresses for more infrequent 10-year and 100-year storms as opposed to a 2-year storm, especially if they are higher energy storms. The USACE also commented that an explanation should have been provided as to why the results are presented using 95th percentile values.

The USACE also believed additional technical information should have been provided to explain why only a qualitative-based sedimentation study was conducted. While the modelling report has a section entitled Sedimentation Study, a complete sedimentation study was not performed.[185] As stated in Appendix F, "the model-simulated bed shear stress was used to qualitatively assess sediment mobility."[186] While the hydrodynamic model will indicate whether erosion is likely to occur in an area, a complete sedimentation study would provide more information about how much and how deep the erosion might be expected to be. Respondents' use of only a qualitative sedimentation study introduces additional uncertainty, and a technical justification should have been provided for not performing a complete sedimentation study.

TxDOT also asked Respondents to use the hydrodynamic modeling to evaluate the effects of the BMP structure on the velocity and shear stress of the river on the current system protecting the bridge piers. The model grid used by Respondents appeared potentially too coarse to the USACE to accurately evaluate the impact of the BMP on the shear stresses around the bridge.[187]

The methodology and assumptions used in Respondents' hydrodynamic model should have been explained with sufficient technical information and detail for both the reviewers' evaluation of the model, and also to provide additional information for the design and support for the model's conclusions. The issues identified by the USACE could have a significant impact on the design, particularly because they affect the model's conclusions on maximum scour associated with the project, but Respondents failed to provide the necessary information, detail and explanation which would allow any final determinations on the adequacy of the modeling.

[185] Appendix F, Section 4.2, pp. 20-21 of the June 90% RD.
[186] Appendix F, Section 4.2, p. 21 of the June 90% RD.
[187] Section 5.11.2 BMP -BMP Alignment, p. 82 of the June 90% RD.