San Jacinto River Waste Pits Superfund Site

Comments
of
International Paper Company
and
McGinnes Industrial Maintenance Corporation
on
U.S. Environmental Protection Agency Region
6
Proposed Remedial Action Plan

January 12, 2017

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Acronyms

Administrative Record	administrative record in support of the Proposed Plan
AhR	aryl hydrocarbon receptor
AM	Action Memorandum
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirement
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
BMP	Best Management Practice
BSAF	biota-sediment accumulation factor
CAD	confined aquatic disposal
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cfs	cubic feet per second
CO	carbon monoxide
COC	chemical of concern
CWA	Clean Water Act
CWA Guidelines	CWA Section 404(b)(1) Guidelines, in 40 C.F.R. Part 230
District	Harris-Galveston Subsidence District
EA	EA Engineering, Science, and Technology, Inc.
ELCR	excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ERDC	Engineer Research and Development Center
FOIA	Freedom of Information Act
FS	Feasibility Study
HI	hazard index

I-10	Interstate 10
IP	International Paper Company
ITRC	Interstate Technology & Regulatory Council
MIMC	McGinnes Industrial Maintenance Corporation
MNR	monitored natural recovery
NCP	National Contingency Plan
ng/kg	nanograms per kilogram
NO_x	nitrogen oxides
NRRB	National Remedy Review Board
NTCRA	non-time critical removal action
O&M	operation and maintenance
OMM	operations, monitoring, and maintenance
PCB	polychlorinated biphenyl
PCL	protective concentration level
PentaCDF	2,3,4,7,8-pentachlorodibenzofuran
pg/L	picograms per liter
PM	particulate matter
PRG	Preliminary Remediation Goal
Proposed Plan	Proposed Remedial Action Plan for the San Jacinto River Waste Pits Superfund Site
PSCR	Preliminary Site Characterization Report
PTW	Principal Threat Waste
RAO	Remedial Action Objective
RAM	Remedial Alternatives Memorandum
Removal Guide	Superfund Removal Guide for Preparing Action Memos
RfD	reference dose
RI	Remedial Investigation
ROD	Record of Decision
SAP	Sampling and Analysis Plan

SARA	Superfund Amendments and Reauthorization Act
Sediment Guidance	EPA Contaminated Sediment Remediation Guidance
Site	San Jacinto River Waste Pits Superfund site
TBC	to be considered
TCDD	2,3,7,8-tetrachlorodibenzo-*p*-dioxin
TCDF	2,3,7,8-tetrachlorodibenzofuran
TCEQ	Texas Commission on Environmental Quality
TCRA	time critical removal action
TEF	toxicity equivalency factor
TEQ	toxicity equivalent
TMV	toxicity, mobility, or volume
TPW	total present worth
TSWQS	Texas Surface Water Quality Standards
UAO	unilateral administrative order
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

I. INTRODUCTION

The U.S. Environmental Protection Agency (EPA) Region 6 issued its Proposed Remedial Action Plan (Proposed Plan) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) for the San Jacinto River Waste Pits Superfund Site (Site) on September 28, 2016. The Proposed Plan announced Region 6's selection of Alternative 6N for the impoundments at the Site located north of Interstate 10 (I-10) (Northern Impoundments) and Alternative 4S for an impoundment located on a peninsula south of I-10 (Southern Impoundment).

These comments (Comments) are submitted on behalf of two Respondents at the Site, International Paper Company (IP) and McGinnes Industrial Maintenance Corporation (MIMC), and are divided in two parts: those regarding the proposed remedy for the Northern Impoundments (in Sections III to VI), followed by those regarding the proposed remedy for the Southern Impoundment (in Sections VII to X).

In support of their Comments, Respondents are providing a series of appendices. The appendices include reports prepared by four subject matter experts that address Region 6's Proposed Plan[1] and Final Interim Feasibility Study (FS)[2]. The four reports, which are incorporated in these Comments by reference, were prepared by the following:

- Michael Palermo, Ph.D., P.E. Dr. Palermo has more than 40 years of experience in dredged material management and contaminated sediment remediation. He was employed with the U.S. Army Corps of Engineers (USACE) for 36 years, including as a Research Civil Engineer and Director of USACE's Center for Contaminated Sediments at the Engineer Research and Development Center (ERDC), where he managed and conducted both research and applied studies for the USACE, EPA, Department of Justice, National Oceanic and Atmospheric Administration, U.S. Navy, and others. He has a Ph.D. in Environmental and Water Resources Engineering from Vanderbilt University and is a Registered Professional Engineer. He serves as Associate Editor for the Journal of Dredging Engineering, a peer-review publication of Western Dredging Association. He has authored or coauthored well over 200 publications in the area of dredging and dredged

[1] Environmental Protection Agency Announces Proposed Plan. San Jacinto River Waste Pits Site, Harris County Texas. September 2016. (AR 100001061) (Proposed Plan).
[2] Final Interim Feasibility Study, San Jacinto River Waster Pits Superfund Site, September 2016. (AR 10001060). (Final Interim FS).

material technology and remediation of contaminated sediments, including key EPA guidance with respect to capping and remedial approaches for contaminated sediment sites. Dr. Palermo's report (Palermo Report; Appendix A) addresses the long-term effectiveness, short-term effectiveness and implementability of removal vs. containment alternatives for the Northern Impoundments.

- Danny Reible, Ph.D., P.E. Dr. Reible, a professor at Texas Tech University, has a Ph.D. in Chemical Engineering from the California Institute of Technology and is widely recognized as an expert on the assessment, design, and implementation of capping. Dr. Reible has approximately 30 years of experience working with contaminated sediments and particularly management via *in situ* remedial approaches. In 2005, Dr. Reible was elected to the National Academy of Engineering for "developing widely used approaches for managing contaminated sediments." He is a coauthor, along with Dr. Palermo, of EPA's 1998 standard guidance for capping contaminated sediments and in 2004, led the first demonstration of amended or active capping in the field. He has also coauthored a number of National Research Council reports on the management of contaminated sediments. Dr. Reible has peer reviewed many facets of capping projects, including the design, construction, and post-construction monitoring phases for government agencies and private parties. Dr. Reible's report (Reible Report; Appendix B) addresses maintenance of the current cap and the long-term effectiveness and permanence of the Alternative 3aN enhanced cap relative to hypothetical future storm events and river channel changes.

- Ancil Taylor and Craig Vogt. Mr. Taylor has decades of experience in marine construction and dredging projects. Mr. Vogt is the former Deputy Director of EPA's Ocean and Coastal Protection Division and environmental engineer whose responsibilities included regulatory and non-regulatory programs for ocean and coastal water protection with a focus upon dredged material regulations and management. Messrs. Taylor and Vogt's report (Taylor Report; Appendix C) addresses issues with the implementation of Alternative 6N that have not been fully considered by Region 6 and the magnitude of the releases of dioxin and furan-impacted sediments that will occur during implementation of Alternative 6N.

- F. Douglas Shields, Ph.D., P.E., E.WRE. Dr. Shields, a Ph.D. in hydraulic engineering, has 40 years of experience in water resources and environmental engineering, including work conducting geomorphic

assessments of river channels. He worked for ERDC for 12 years and for an additional 22 years as a Research Hydraulic Engineer at the National Sedimentation Laboratory in Oxford, Mississippi. Dr. Shields' research focuses on responses of fluvial systems to human influences and development of environmental design criteria for all types of channel stabilization and modification projects. He has authored or coauthored more than 300 technical publications covering a wide range of water resources issues, including stream bank erosion and geomorphic assessment. Dr. Shields' report (Shields Report; Appendix D) evaluates Region 6's claims regarding the potential for changes in the course of the San Jacinto River.

Appendices E to K contain certain technical reports and other documents referenced in the Comments. Certain of the appendices contain Site-related documents that Region 6 did not include in the administrative record in support of the Proposed Plan (Administrative Record) but that are relevant to the selection of remedies for the Northern Impoundments and the Southern Impoundment.[3]

II. REQUEST TO REOPEN OR EXTEND COMMENT PERIOD

Region 6 has denied Respondents' request for an extension of the January 12, 2017 comment deadline.[4] In doing so, however, Region 6 stated that it was prepared to consider "significant information" that could not have been submitted during the comment period and that by declining to extend the public comment period, "did not intend to exclude any significant new information … with a significant bearing on the remedy selection process."[5]

The extension request was based, in part, on the fact that key information developed during the remedy selection process and relied upon by Region 6 in developing its preferred alternatives has not been made available to Respondents.[6] Region 6 declined to provide modeling files from USACE's modeling work for

[3] *See* Appendices E to H.

[4] The original comment deadline was November 28, 2016. MIMC submitted a request for an extension of the comment period to February 26, 2017, by letter dated October 28, 2016. It is Respondents' understanding that others also requested an extension. Region 6 granted an extension to January 12, 2017. On December 20, 2016, MIMC submitted a request to Region 6 in which it asked Region 6 to reconsider its original request for an extension of the comment deadline to February 26, 2017. International Paper joined in MIMC's request. Region 6 denied that request in a letter dated January 6, 2017. The October 28, 2016, December 20, 2016, and January 6, 2017, letters are provided as part of Appendix E.

[5] Letter from G. Miller of Region 6 to MIMC dated January 6, 2017 (Appendix E-17).

[6] Documents regarding Respondents' efforts to obtain that information are contained in Appendix E.

Region 6, and Respondents therefore had to seek those files from USACE through a Freedom of Information Act (FOIA) process.[7] What has been produced to date is incomplete, as Region 6 has recognized in urging USACE to promptly make additional files available to Respondents.[8]

An extension was required so that Respondents could provide comments based on a full record. Respondents are submitting these Comments subject to a full reservation of their rights to supplement them. Once the additional modeling files and other requested information are received in full, Respondents will analyze them and provide additional comments as appropriate.

Given the linchpin role that the modeling effort played in Region 6's remedy decision (having been referenced numerous times in the Final Interim FS and Proposed Plan), Region 6 should wait until Respondents have had an opportunity to provide those supplemental comments before addressing these or other comments on its Proposed Plan. To do otherwise would violate Respondents' due process rights, and would render any selected remedy to be arbitrary and capricious and not based on a complete record.

[7] Counsel for MIMC originally requested all information regarding the work performed by USACE on Region 6's behalf pursuant to a FOIA request to Region 6 dated March 25, 2015. This request was "closed" by Region 6 without providing any modeling results on October 6, 2015. On July 15, 2016, counsel for MIMC submitted two additional FOIA requests to Region 6 requesting all information regarding the USACE's work for EPA. These two requests were combined by Region 6 into FOIA Request #EPA-R6-2016-008572. On September 26, 2016, Region 6 informed MIMC's counsel that this request had been "closed" although no modeling information had been provided. Counsel for MIMC submitted a FOIA request to USACE requesting information regarding the USACE's work for Region 6 relative to the Site on September 12, 2016. Appendix E contains the above-referenced requests and responses.

[8] *See* Email from G. Miller of Region 6 dated January 5, 2017 to Earl Hayter and others of the USACE (Appendix E-16). By way of background, USACE produced modeling files to MIMC counsel on November 29, 2016, via electronic delivery from Ms. Susan Johnston of USACE. When an attempt was made to reproduce the USACE's modeling using those files, it was determined that they were incomplete. A request was made to USACE for the additional files on December 13, 2016. USACE agreed to provide the additional files, but because of the year-end schedule of the USACE personnel involved, informed MIMC that the additional files would not be made available until early 2017. See emails dated December 19, 2016 between MIMC counsel and Daniel Egger of USACE (Appendix E-11 and E-12). In order to preserve its rights, MIMC filed an appeal of USACE's response to the FOIA request on December 22, 2016 (Appendix E-15). Respondents have not received the needed modeling information, or other information responsive to its FOIA request to USACE, as of this date.

PART ONE: NORTHERN IMPOUNDMENTS

III. EXECUTIVE SUMMARY—NORTHERN IMPOUNDMENTS

Region 6's preferred alternative for the Northern Impoundments is Alternative 6N, the "full removal" of dioxin-impacted waste currently contained under an engineered armored cap constructed as part of a time-critical removal action (TCRA). Region 6 selected that alternative over Alternative 3aN, which was developed based on specifications developed by USACE at Region 6's direction. Alternative 3aN would enhance the existing cap by adding a thick layer of armor rock to the cap and taking other steps to strengthen it. USACE describes Alternative 3aN as being protective even under the hypothetical 500-year ultra-extreme storm event that Region 6 uses. It should be noted, however, that the Respondents believe this type of storm event is an inappropriate design standard for any remedy, and the use of it is inconsistent with EPA guidance.

A. Region 6 systematically ignores or minimizes the releases from removal.

In identifying Alternative 6N as its preferred alternative, Region 6 systematically ignores the risks and real-world obstacles associated with removing an armored cap and the waste currently contained beneath it. Region 6 largely dismisses the conclusions of the independent assessment of remedial alternatives it asked USACE to perform. To justify its decision, Region 6 minimizes the magnitude of the releases that will inevitably result from implementation of Alternative 6N; it also downplays the risk of catastrophic releases if measures taken to control releases during construction either are ineffective (as experience suggests they may be) or are overwhelmed during storm events (in which case USACE concluded that the releases could be 400,000 to two million times greater than those associated with the enhanced armored cap).

B. Region 6 ignores evidence of the Alternative 3aN enhanced cap's effectiveness and has no credible basis for rejecting it.

Region 6 takes a different approach in evaluating Alternative 3aN. It focuses on perceived risks of failure over a 500-year time horizon and involves hypothetical ultra-extreme future events, a standard of certainty it does not apply to Alternative 6N. Most tellingly, Region 6 concludes that Alternative 3aN might fail in the face of ultra-extreme events, (1) relying on modeling it asked USACE to

perform of the current cap or one of the other containment remedies, **but clearly not the Alternative 3aN enhanced cap**, and (2) without acknowledging USACE's conclusion that the Alternative 3aN enhanced cap would be effective against such events.

It also ignores evidence of the current cap's effectiveness in containing the waste, including data Respondents collected in 2016 at Region 6's direction specifically to confirm that the existing armored cap was effective in preventing releases. Region 6 instead justifies the need for removal based on a Principal Threat Waste (PTW) determination that assumes, contrary to the body of Site-specific data, that the capped material is potentially mobile, a conclusion it reaches based on unsupported and speculative assertions about future changes in the river and Alternative 3aN's performance during ultra-extreme storm events.

C. The remedy selection process is flawed and does not provide a basis for selection of Alternative 6N.

A lack of transparency and Region 6's dismissal of Alternative 3aN without modeling its performance raise questions regarding the remedy selection process and whether that process complies with CERCLA and the National Contingency Plan (NCP).

- After working with Respondents over a course of years to define remedial alternatives and perform risk assessments for the Site in accordance with EPA guidance, Region 6 notified Respondents in April 2016 that it had decided to "take over" the completion of the FS for the Site. Region 6 also decided to perform its own "risk evaluation," one that departs in a number of key respects from the assumptions developed in the years-long, Region 6-directed Remedial Investigation (RI) process for the Site. Region 6 did not provide an opportunity for review of either its Final Interim FS or its new "risk evaluation" before it issued its Proposed Plan, which is based upon them.

- By the time it took over the FS, Region 6 appears to have settled on removal as its preferred alternative. Shortly after taking over the FS, Region 6 informed Respondents that it was no longer interested in additional data about the effectiveness of the cap that Respondents had begun collecting at Region 6's request. That data, however, was available to Region 6 before it issued the Proposed Plan and further demonstrates the current cap's effectiveness.

- Region 6 sought from USACE an "independent analysis" of the remedial alternatives for the Site, but has ignored or mischaracterized USACE's conclusions regarding the effectiveness of capping and risks of removal.

- In its Final Interim FS, Region 6 systematically downplays the risks of removal and inflates the risk of cap failure and does not perform a thorough and transparent evaluation of the NCP criteria, including a cost-effectiveness/proportionality assessment of the alternatives as required by the NCP.

- Region 6 seeks to justify selecting a removal alternative by relying on a PTW determination that is flawed and ignores Site-specific data and applicable guidance.

- Notwithstanding its obligation to do so under the NCP, Region 6 does not appear to have involved the State of Texas in developing the Proposed Plan.

- Region 6 has not explained how its preferred remedy satisfies CERCLA's requirement that a removal action (, the TCRA), to the greatest extent practicable, contribute to the efficient performance of any long-term remedial action, given that the need to remove the TCRA cap as part of Alternative 6N will impede, rather than "contribute to," the efficient performance of the remedy.

D. Steps to be taken.

For reasons set forth in these Comments, the Proposed Plan for the Northern Impoundments should be withdrawn. The current Administrative Record, although incomplete in some respects, supports the selection of Alternative 3aN (an enhanced armored cap conceived by USACE). The selection of Alternative 3aN would be subject to five-year reviews under CERCLA to assess the effectiveness of the selected remedy.

If after evaluating these Comments (and any supplemental comments that Respondents submit), together with other comments and the compelling data in the Administrative Record, Region 6 is not prepared to select Alternative 3aN, Region 6 should address the shortcomings and deficiencies in the current remedy selection process (including key data gaps) before selecting a remedy. The steps that Region 6 should take include:

- Modeling the impact of storm events on Alternative 3aN (with its larger and more robust cap), rather than relying on modeling of a less robust cap as a basis for rejecting Alternative 3aN;

- Performing a geomorphology analysis to evaluate the potential for abrupt changes in the river channel that might impact the Alternative 3aN cap and to determine whether engineering solutions exist for those potential impacts;

- Considering data collected in 2016 at Region 6's direction that demonstrates the effectiveness of the existing armored cap;

- Reevaluating its PTW designation consistent with applicable guidance and the NCP;

- Adequately and realistically defining the Best Management Practices (BMPs) that Region 6 proposes be utilized in implementing Alternative 6N in order to properly apply the CERCLA balancing criteria in selecting a remedy;

- Conducting a rigorous evaluation of the implementability of, and the scope of the releases associated with, removing the existing armored cap and excavating the underlying waste as part of Alternative 6N; and

- Providing a cost estimate that satisfies the NCP's requirements and then performing a thorough and transparent evaluation of the remedial alternatives against the nine NCP selection criteria, including a cost-effectiveness/proportionality assessment as required by the NCP.

E. Detailed summary of comments on Proposed Plan for the Northern Impoundments.

Below is a summary of Respondents' comments on the Proposed Plan for the Northern Impoundments.

1. Data collected in 2016 at Region 6's direction demonstrate the effectiveness of the existing armored cap.[9]

In 2015, Region 6 directed Respondents to collect additional data to "[c]onfirm that the [TCRA] cap continues to prevent dioxin/furan migration from the waste

[9] *See* Comments N-1 and N-2.

pits to the San Jacinto River…" The data included test results for armored cap porewater, groundwater, surface water, sediment, and fish tissue. Region 6 approved comprehensive Sampling and Analysis Plans (SAPs) for each of these data collection programs.

The test results unequivocally show the effectiveness of the existing armored cap. No target dioxin compounds were detected in porewater or groundwater, and the data show substantial decreases of dioxins and furans in surface water and sediment. These new data were provided to Region 6 prior to the issuance of the Proposed Plan, but were not considered in evaluating the effectiveness of capping alternatives.

2. To justify the selection of Alternative 6N, Region 6 has mischaracterized routine cap maintenance, thereby presenting the existing cap as ineffective.[10]

The purposes of the existing armored cap were to stabilize the Northern Impoundments and prevent any releases to the environment. These purposes have been achieved. In fact, the existing armored cap has been effective in containing the waste material, as confirmed by extensive groundwater and porewater sampling, as well as surface sediment sampling performed adjacent to cap maintenance areas.

Maintenance of the armored cap has been routine and anticipated, and the Proposed Plan's summary of "repairs" to the existing armored cap overstates the level of the required maintenance. In fact, the TCRA Operations, Monitoring, and Maintenance (OMM) Plan for the Northern Impoundments, approved by Region 6, contemplated potential maintenance of up to 5% of the cap surface—yet all maintenance activities combined at the existing armored cap have involved approximately 0.57% of the total cap.

3. USACE and EPA cap design guidance expressly presumes that routine and event monitoring will identify the need for possible cap maintenance.[11]

Design guidance issued by EPA and USACE recommends that "event-based" monitoring be used to fine-tune an OMM program as part of the monitoring of the

[10] *See* Comment N-3.
[11] *See* Comment N-3.

performance of the cap following specific storm events. Typically, in the first few years following cap construction, there is a period where monitoring and maintenance practices identify and address areas of the cap that need to be enhanced, if any, so that the long-term protectiveness of the cap can be ensured. The maintenance that has occurred at the Northern Impoundments has followed this pattern with modifications made to the OMM Plan as necessary.

4. The Alternative 3aN enhanced cap, to be constructed with much larger rock, is designed to be protective during future extreme storm events and will reduce the need for future maintenance.[12]

The enhancements to the existing armored cap as part of Alternative 3aN were developed by USACE. They include adding two feet of much larger rock to most of the cap, and adjusting slopes to increase their long-term stability.[13] This step should reduce the need for future maintenance. According to USACE, it also will be protective against erosion during future extreme events of the kind that Region 6 asserts raise questions as to the cap's long-term effectiveness.

5. Armored caps are being utilized nationally and have a strong record of performance.[14]

Table 4-1a of the Final Interim FS includes an example list of sites around the country where caps are being utilized and where conditions are similar to the Site. The report evaluating the remedial alternatives prepared by the USACE for Region 6 (USACE Report)[15] concluded that no armored cap has "failed" to date. Region 6 acknowledges this fact in the Proposed Plan.

Despite these facts, Region 6 questions the long-term effectiveness of a cap, applying a 100% certainty standard of effectiveness to Alternative 3aN over a 500-year period. At the same time, Region 6 discounts the significant releases that USACE concludes (and Region 6 acknowledges) will result from Alternative 6N. The standard of certainty applied to the capping remedy by Region 6 is inconsistent with the NCP and national remedy evaluation precedent, as well as being internally inconsistent.

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[12] *See* Comment N-4.
[13] Figure 2 (in Comment N-4) illustrates how much larger the newly-placed rock would be.
[14] *See* Comment N-3.c.
[15] Evaluation of the San Jacinto Waste Pits Feasibility Study Remediation Alternatives. Appendix A to Final Interim FS. (AR 100001060)

6. The Proposed Plan largely ignores USACE's "independent analysis" of the remedial alternatives.[16]

The Proposed Plan largely ignores USACE's independent, expert conclusions regarding the remedial alternatives for the Northern Impoundments even though Region 6 had sought USACE's input. USACE conceived the design for an enhanced armored cap (Alternative 3aN) that would be effective in withstanding the extremely severe and unprecedented storm that Region 6 asked USACE to model. In addition, USACE concluded that removing the existing armored cap and excavating the capped waste would inevitably result in significant releases of dioxins to the environment. USACE detailed the hazards of taking the unprecedented action to remove an armored cap and the technical challenges of "excavating in the dry," as called for by the new alternative USACE was directed by Region 6 to develop. These same concerns, based on decades of experience in marine construction projects, are addressed in the Palermo Report (Appendix A) and the Taylor Report (Appendix C).

The Proposed Plan, by failing to address these technical and implementability challenges and assuming without evidence that such challenges can be addressed in the design phase, does not appropriately account for the risks identified by USACE with respect to Alternative 6N.

7. The Proposed Plan is premised on the unsubstantiated risk of sudden changes in the river's course.[17]

Region 6 explicitly bases its rejection of Alternative 3aN on the possibility of a future abrupt change in the San Jacinto River's channel as a factor that could potentially cause the Alternative 3aN cap to fail. Region 6 did not, however, conduct a formal geomorphic evaluation of the river. In fact, the Administrative Record does not contain any credible support for concluding that the river could change course in the manner it speculates could occur, as is shown by the report of Dr. Shields, who has decades of experience in evaluating river geomorphology (Shields Report, Appendix D). Moreover, Region 6 never considered whether the Alternative 3aN enhanced cap would resist changes in the channel.

[16] *See* Comment N-5 and N-8.
[17] *See* Comment N-9, N-10 and N-11.

8. The Proposed Plan is premised on a PTW determination that is unnecessary, flawed, and ignores Site-specific data demonstrating that the wastes are reliably contained.[18]

EPA's PTW Guidance clearly emphasizes the primacy of the NCP remedy selection framework and its evaluation of remedial alternatives using the nine criteria in 40 CFR § 350.430(f)(1). A PTW determination is intended to streamline the identification of source material to be treated to reduce toxicity, mobility, or volume (TMV), if practicable.

In this case, Region 6 has misused the PTW Guidance to select a remedy (and, indeed, to override the applicable selection criteria), not to identify wastes that should be treated. In fact, Region 6's preferred remedy does not provide for treatment to reduce TMV; rather, the preferred remedy simply removes the waste from one location and transports it to another.

Region 6's PTW determination is also premised on a flawed risk assessment that is not based on Site-specific data and contravenes EPA's own guidance. It also relies on an arbitrary and capricious determination that the wastes in the Northern Impoundments are potentially highly mobile. As the record reflects, the Site waste is highly immobile and should not be characterized as PTW.

9. Region 6's Final Interim FS is deficient in a number of significant respects, resulting in an arbitrary and capricious Proposed Plan.[19]

The Final Interim FS does not include modeling of the long-term effectiveness of Alternative 3aN. Rather, Region 6 repeatedly references impacts shown by USACE's modeling of an ultra-extreme storm event on either the existing armored cap or the Alternative 3N cap when describing the long-term effectiveness of the Alternative 3aN cap. This is a highly questionable tact by Region 6 when it knows that Alternative 3aN is based on recommendations made by its own expert—USACE—to address the modeling results for other cap designs. The Final Interim FS therefore does not accurately assess the long-term effectiveness of Alternative 3aN.

The Final Interim FS is also deficient in not including a geomorphological evaluation to support Region 6's assertion about the risk of a change in the river's

[18] *See* Comment N-12.
[19] *See* Comment N-14.

channel.[20] In addition, for Alternative 6N, Region 6's Final Interim FS does not address constructability and the many challenges to "removal in the dry" articulated by USACE. It also does not include a supportable cost estimate that complies with the requirements of CERCLA and the NCP for its new "removal in the dry" alternative. The failure in the Final Interim FS to address these issues, among others, means that selection of Alternative 6N based on the Final Interim FS and the current Administrative Record would be arbitrary and capricious.

10. Region 6's evaluation of remedial alternatives under CERCLA and the NCP is fatally flawed.[21]

The Proposed Plan rejects the demonstrably more effective remedy (Alternative 3aN) in favor of a remedy that will cause significant releases of dioxin to the San Jacinto River. In doing so, Region 6 performs a flawed and arbitrary evaluation of the alternatives under CERCLA and the NCP's nine criteria test.

Region 6 states that both Alternative 3aN and Alternative 6N meet the threshold criteria of protection of human health and the environment and compliance with all applicable or relevant and appropriate requirements (ARARs). However, these determinations are questionable with regard to Alternative 6N because Region 6 does not clearly define how Alternative 6N will be implemented or how it will comply with applicable ARARs, given that its implementation will result in significant releases to the San Jacinto River. Region 6 has inappropriately and without a credible basis dismissed these concerns as to whether Alternative 6N meets the threshold criteria. These are not concerns that, as Region 6 suggests, can be addressed in the design phase.

The Proposed Plan acknowledges that Alternative 3aN rates higher than Alternative 6N with respect to the balancing criteria of short-term effectiveness, implementability, and cost. For the balancing criteria addressing treatment to reduce TMV, Region 6 clearly misapplies the criterion because Alternative 6N involves no treatment to reduce TMV, yet Region 6 ranks Alternative 6N as higher than Alternative 3aN on this criterion. Region 6 rates Alternative 6N higher than Alternative 3aN on long-term effectiveness and permanence by downplaying the releases that USACE predicts will occur as a result of Alternative 6N and by disregarding USACE conclusions regarding capping and the long-term record of performance of such remedies. Dr. Palermo and Dr. Reible, two of the principal

[20] Aside from not being mentioned in the Final Interim FS, no such evaluation could be identified in the Administrative Record.
[21] *See* Comments N-15 and N-16.

authors of EPA's guidance documents on capping remedies, conclude in their attached reports (Appendices A and B, respectively) that Alternative 3aN is designed to have long-term effectiveness and permanence.[22]

The Proposed Plan is not based on a cost estimate that satisfies the NCP's requirements. It also does not include a discussion of cost-effectiveness although it is a criterion that must be evaluated under CERCLA. Even in the absence of an appropriate cost estimate, Alternative 6N will be significantly more expensive to implement than Alternative 3aN. Alternative 6N also results in significantly more releases of dioxin to the environment and a much greater environmental footprint than Alternative 3aN. Alternative 3aN is clearly the more cost-effective remedy, and the Proposed Plan is flawed for not even including an evaluation of this CERCLA-required criterion.

11. The Proposed Plan contravenes CERCLA's requirement that any removal action, to the greatest extent practicable, contributes to the efficient performance of any long-term remedial action.[23]

As part of a TCRA, Respondents, under an agreed order on consent with Region 6, constructed and later enhanced the armored cap. The Action Memorandum for the TCRA, as required by §104(a)(2) of CERCLA, requires that the TCRA be consistent with the long-term remedy at the Site.

Alternative 3aN is consistent with the TCRA. In contrast, Alternative 6N deconstructs and removes the existing cap, which renders Alternative 6N far more complicated and in fact will result in releases; Alternative 6N thus is not "consistent with" the TCRA. Alternative 6N does not comply with CERCLA §104(a)(2).

12. Region 6 does not appear to have meaningfully involved the State of Texas in the selection of the proposed remedy.[24]

Under Section 121(f)(1) of CERCLA, EPA is required to provide substantial and meaningful involvement by the State in the selection of remedial actions. The State played a central role in the listing of the Site; it was involved in earlier stages of the RI process and the initial development of remedial alternatives for the Site.

[22] Reible Report at 6; Palermo Report at 24-25.
[23] *See* Comment N-17.
[24] *See* Comment N-18.

Once Region 6 apparently settled on removal as its preferred remedy, however, the State's involvement appears to have been limited.

The NCP requires that a proposed remedial action plan state either that (1) the EPA and the State have reached agreement on the preferred remedy, or (2) the EPA and the State have not reached an agreement and set out the State's concerns. This required statement is glaringly missing in the Proposed Plan, which instead simply states that the Texas Commission on Environmental Quality (TCEQ) "has been informed about the Preferred Remedy for the Site."[25]

13. The Proposed Plan is inconsistent with EPA's "Greener Cleanup Activities" policy.[26]

Under EPA's August 2, 2016, memorandum regarding "Consideration of Greener Cleanup Activities in the Superfund Cleanup Process," and associated agency policies (Greener Cleanup Policy), EPA encourages the Regions to conduct an environmental "footprint" analysis of remedial alternatives to help evaluate and quantify the environmental impact of the remedial alternatives using five core elements. A "footprint" analysis of the remedial alternatives for the Northern Impoundment does not appear to have been included in the Administrative Record. Had such an analysis been completed, however, it is clear that it would have shown that Alternative 6N will create a much larger environmental footprint than Alternative 3aN, and compares unfavorably to Alternative 3aN on all five core elements of the Greener Cleanup Policy. In the Final Interim FS, Region 6 admits that Alternative 6N is a "less sustainable" alternative "considering potential ozone precursor, [particulate matter] and greenhouse gas emissions from the construction activity."[27]

14. Full removal could result in violations of state law that are not shielded by CERCLA.[28]

As the USACE Report makes clear, the existing armored cap cannot be removed and the underlying waste excavated without releases of dioxins to the environment. Consequently, if Respondents (and their contractors) were to implement the proposed remedy, they would be subject to potential civil enforcement actions under the Texas Water Code and state water quality standards. It is highly

[25] Proposed Plan at 36.
[26] *See* Comment N-20.
[27] Final Interim FS at 126.
[28] *See* Comment N-19.

questionable whether Region 6 has the authority under CERCLA to order Respondents to implement Alternative 6N under these circumstances. Moreover, such an action by Region 6 would violate Respondents' due process rights.

The current Administrative Record fully supports selection of Alternative 3aN as the preferred alternative. For all the reasons set out above and in this Part One of these Comments, the Proposed Plan should be rejected and Region 6 should instead select Alternative 3aN. In fact, given the shortcomings in the remedy selection process identified above, selecting Alternative 6N would be arbitrary, capricious, and not supported by the Administrative Record.

Respondents strongly believe that an unbiased remedy selection assessment, based on a complete Administrative Record, supports the selection of Alternative 3aN as the preferred remedy for the Site.

IV. BACKGROUND

In 2011, Respondents completed the construction of an engineered armored cap over the Northern Impoundments at a cost of more than $9 million. Installation of the armored cap isolated waste and sediments within the original 1966 perimeter berm of the Northern Impoundments to prevent the release of dioxins and other chemicals of potential concern to the environment.[29]

The armored cap incorporated armor stone, geotextile, and geomembrane layers over an area of approximately 15.7 acres. It was designed in accordance with USACE guidance (Capping Guidance) and the EPA Contaminated Sediment Remediation Guidance (Sediment Guidance)[30] to withstand a 100-year storm event with an additional factor of safety beyond what was required by such guidance.[31] Its design was approved by Region 6, [32]which then oversaw its construction.

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[29] Final Removal Action Work Plan, Time Critical Removal Action, San Jacinto River Waste Pits Superfund Site, November 2010 (AR 9370253). (Final Work Plan), and Region 6 approval on November 8, 2010 (AR9369744). The Final Work Plan was revised in February 2011 at Region 6's direction but without changes to the design of the armored cap.
Remedial Alternatives Memorandum San Jacinto River Waste Pits Superfund Site, December 2012. (AR 685618).

[30] Contaminated Sediment Remediation Guidance for Hazardous Waste Sites. EPA-540-R-05-012. OSWER 9355.0-85. EPA, 2005. Office of Solid Waste and Emergency Response, Washington, DC.
Guidance for Subaqueous Dredged Material Capping. Technical Report DOER-1. U.S. Army Corps of Engineers, 1998. Waterways Experiment Station, Vicksburg, Mississippi. M.R. Palermo, J.E. Clausner, M.P. Rollings, G.L. Williams, T.E. Myers.

[31] In addition to a 100-year storm event, storms with return intervals (5 and 10-year) were also considered during the TCRA design to assure that the full range of flow conditions that could occur over the cap were considered. In some

The armored cap added stability to the Northern Impoundments, but it is important to note that the Northern Impoundments had remained largely intact for almost 50 years without the benefit of the armored cap, even in the face of major storm events such as the 1994 flood (mentioned in the Proposed Plan). These Impoundments lie within the inner portion of a natural river bend. In that inner bend, hydrodynamic forces are lower than forces on the outer part of the bend or within the main channel of the river during normal flows and storm and flood events. The paper mill waste placed in the Northern Impoundments is a very stable material with very low permeability of 10^{-6} to 10^{-7} cm/sec and the primary constituent of concern, dioxin, is highly immobile, tending to remain bound to the paper mill waste.[33]

A. Reassessment of the armored cap design and construction.

At Region 6's direction, following a July 2012 maintenance event, Respondents conducted a post-construction evaluation of the armored cap. A separate reassessment by USACE on behalf of Region 6 was also performed, resulting in a report dated November 2013 (USACE Reassessment Report[34]). The USACE Reassessment Report confirmed the overall validity of the armored cap's design, but also contained recommendations to address certain construction issues that may have contributed to the maintenance event, and that if implemented, would improve the armored cap's long-term effectiveness. These recommendations were implemented by Respondents in January 2014, and included flattening certain slopes and adding armor rock in selected areas, using larger-sized stone than USACE had recommended.[35]

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areas of the cap, these more frequent storms result in higher shear stresses on the cap compared to a less frequent storm such as the 100-year design event).

[32] Final Work Plan at Section 3.

[33] Remedial Investigation Report, May 2013. (RI Report) (AR 685734) at Section 5.6.4 and at 5-94. Appendices to the RI Report are included in the AR at AR 685751 (RI Report Appendices). .
Howell, N.L., H.S. Rifai, and L. Koenig, 2011. Comparative distribution, sourcing, and chemical behavior of PCDD/Fs and PCBs in an estuary environment. *Chemosphere* 83(6):873-881.

[34] Final Review of Design, Construction and Repair of TCRA Armoring for the West Berm of San Jacinto Waste Pits. Prepared for USEPA, Region 6. USACE Engineer Research and Development Center. October 2013. (AR 9470019).

[35] Memorandum from Wendell Mears, Randy Brown, David Keith, John Verduin and John Laplante to Valmichael Leos. San Jacinto River Waste Pits Armored Cap Enhancement Completion Report. February 21, 2016 (Cap Enhancement Completion Report; AR 9495412).

B. As part of the OMM Plan, cap maintenance has been performed in small discrete areas of the armored cap as contemplated by the OMM Plan, and supplemental security measures have been implemented.

Since completion of construction of the armored cap in July 2011, the armored cap and the associated fencing, access controls, and warning signs have been routinely inspected and maintained by Respondents pursuant to a Region 6-approved OMM Plan. The OMM Plan was developed to address conditions that USACE and EPA cap design guidance expressly presume could occur post-construction (such as movement of rock cover in localized areas of a cap).[36] The OMM Plan requires periodic monitoring (and monitoring following key storm events) to identify the need for possible cap maintenance, followed by appropriate maintenance activities.

The existing armored cap has now successfully undergone a total of more than five years of operation and maintenance (O&M). During this time period, occasions have arisen for which the need for maintenance in small areas of the cap have been identified, with Respondents promptly performing the maintenance pursuant to Region 6-approved maintenance plans and with no loss of waste material from beneath the cap.[37] The areas in which maintenance has been performed collectively represent 0.57% of the total surface area of the existing armored cap.

In December 2015, a Region 6 dive team inspection of the existing armored cap identified an area in the northwestern portion of the cap where the presence of armor rock could not be confirmed at the original design thickness. The area identified for repair was determined through probing to be approximately 20 feet by 22 feet (or 0.04% of the total surface area of the cap).[38] Maintenance was promptly performed to add additional armor stone to this area in accordance with a Region 6-approved work plan, along with sampling outside the perimeter of the

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[36] The OMM Plan was submitted to Region 6 in 2011 as an appendix to a Draft Removal Action Completion Report and approved by the TCRA Remedial Project Manager by email dated January 19, 2012 (Appendix G-1). In response to Region 6 comments, Respondents submitted a Revised Draft Final Removal Action Completion Report, dated March 9, 2012. Region 6 later revised and issued a Revised Final Removal Action Completion Report (Region 6-Issued RACR) in May 2012 that included the OMM Plan as Appendix N (AR 9385418). Region 6's actions in issuing the Revised Final Removal Action Completion Report are the subject of a pending dispute (and Respondents reserve all rights as to that dispute). It was and remains Respondents' understanding that the previously-approved OMM Plan was not changed.by Region 6's issuance of the report.

[37] The maintenance performed on the armored cap is described in reports submitted to Region 6 dated January 26, 2016, April 18, 2016, and May 26, 2016; these reports, which are included in the Administrative Record (AR 9647185; AR9689092; AR 9688707), address the armored cap maintenance events in greater detail.

[38] Letter from David Keith to Gary Miller. Revised Work Plan for Rock Placement on the Time Critical Removal Action Armored Cap, San Jacinto River Waste Pits Superfund Site, Channelview, Texas. December 28, 2015 (AR 9643749).

maintenance area. USACE performed an independent evaluation of the cap in this area and concluded that the waste did not appear to have migrated outside the maintenance area.[39] This was consistent with the results of sampling performed by the Respondents.[40] Adjustments were then made to the monitoring and maintenance process, including additional probing and tracking of potential cap changes in areas smaller than the one identified in the December 2015 event.

Additional aggressive monitoring and maintenance of the existing armored cap occurred in 2016, involving small, discrete areas of the cap. No releases have occurred in any of these areas.

Respondents implemented additional security measures in March 2016 for the existing armored cap. These measures included installation of security cameras that are monitored 24 hours per day, 7 days per week, and installation of a continuous line of perimeter buoys around the existing armored cap. These additional security measures would be incorporated into Alternative 3aN.[41] Moreover, future maintenance events are likely to be much less frequent as a result of further enhancements of the existing armored cap, such as further flattening of the slopes (particularly in the northwestern portion of the cap), the use of larger rock, and the construction of a barrier to prevent barge strikes.

C. Remedial Investigation.

The results of Respondents' comprehensive study of environmental conditions within the EPA's Preliminary Site Perimeter were summarized in a Remedial Investigation Report (RI Report), approved by Region 6 in May 2013 (RI Approval).[42] The RI included Region 6-approved sediment, groundwater, porewater, surface water, and fish tissue studies, and the submission of a series of deliverables, including a Region 6-approved Baseline Human Health Risk Assessment (BHHRA) and Baseline Ecological Risk Assessment (BERA).

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[39] Evaluation of the San Jacinto Pits Cap Defect, June 2016. Appendix B to Final Interim Feasibility Study Report, San Jacinto River Waste Pits. (USACE Cap Report; AR 100001060).

[40] Pre-Maintenance Armored Cap Surface Sediment Sampling Report. San Jacinto Waste Pits Superfund Site. February 2016. (AR 9643949).

[41] Memorandum from John LaPlante, Wendell Mears, and David Keith to Gary Miller. Addendum 2, Operations, Monitoring and Maintenance Plan. San Jacinto River Waste Pits Time Critical Removal Action. February 29, 2016. (Addendum 2 OMM Plan; AR 500021299).

[42] RI Report and RI Report Appendices.
Letter from Gary Miller to David Keith, April 2, 2013, approving draft RI Report with modifications (RI Approval) (AR 9477521).

A waste fingerprint analysis conducted during the RI demonstrated that prior to construction of the armored cap in 2011, dioxin associated with the paper mill waste had largely remained within the original perimeter of the Northern Impoundments; the only significant movement of waste had occurred north and west of the Impoundments (upgradient) where waste had apparently been physically dredged from the Northern Impoundments by a sand dredging operation.[43] This finding was consistent with the nature of the paper mill waste disposed of in the Northern Impoundments and the inherent immobility of dioxin in a water environment, as described above.

D. Remedial Alternatives Memorandum and Feasibility Study.

In December 2012, Respondents submitted their Final Remedial Alternatives Memorandum (RAM) to Region 6.[44] Its objectives were to:

- Identify and screen remedial alternatives and related technologies that may be applicable to the Site;
- Develop preliminary Remedial Action Objectives (RAOs) for the Site;
- Identify and screen potential disposal alternatives for removed contaminated sediment and eliminate disposal process options that are not practical to implement;
- Identify and screen remedial technologies (such as monitored natural recovery [MNR], sediment containment, or sediment treatment) to eliminate candidate remedial technologies that cannot be implemented or that may be limited in their applicability due to technical or other constraints at the Site; or
- Following the screening to narrow the range of remedial technologies, assemble the retained technologies into potential remedial alternatives to be considered (TBC) for detailed analysis in the FS.

Based on Region 6's comments on the RAM, Respondents in August 2013 submitted to a draft FS. In response to Region 6's comments on the draft FS,

[43] RI Report, Sections 5.1 and 5.7.4.1.
[44] Remedial Alternatives Memorandum, December 2012 (RAM) (AR685618). It included revisions incorporated as required by EPA in its approval of the Draft Final RAM on November 14, 2012 (AR 676460).

Respondents submitted a revised version of the FS (Draft Final Interim FS) on March 21, 2014.[45]

The Draft Final Interim FS contained a detailed analysis of the potential remedial alternatives selected by Region 6 for the Northern Impoundments relative to the NCP's CERCLA remedy selection criteria.[46] A comparative net risk evaluation, as recommended by EPA and the National Academy of Sciences Committee on Risk Management Strategy for PCB-Contaminated Sediments,[47] was used in considering both the benefits of each remedial approach and the risks associated with its implementation.[48]

The Draft Final Interim FS included a detailed evaluation of the seven Region 6-approved remedial alternatives for the Northern Impoundments. The most effective, optimal, and appropriate of these alternatives was determined to be the enhanced cap alternative (Alternative 3N as initially proposed, to be further enhanced in Alternative 3aN), which built on the existing armored cap but created a more robust cap designed to withstand the forces of a 100-year storm (*i.e.*, the 1994 flood) in accordance with EPA guidance. Unlike those alternatives that required removing all or parts of the existing armored cap during construction, Alternative 3N satisfied the provisions of CERCLA and the NCP that specify that an interim removal action, such as the TCRA, should not be inconsistent with, but should instead "contribute to the efficient performance of any long term remedial action."[49] It avoided the documented risk of releases and implementation uncertainties associated with the alternatives involving either stabilization or excavation. Finally, given the estimated cost of the stabilization and excavation alternatives (which differed by nearly an order of magnitude), Alternative 3N was also found to be the only alternative that satisfied the requirement that a selected remedy be cost-effective.

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[45] Draft Final Interim Feasibility Study Report, March 2014. (Draft Final Interim FS; Appendices G-2 and G-3).
[46] 40 CFR § 300.430(e)(9).
[47] A Risk Management Strategy for PCB-Contaminated Sediments. National Research Council, Division on Earth and Life Studies, Board on Environmental Studies and Toxicology, Committee on Remediation of PCB-Contaminated Sediments, 2001. (Risk Management Strategy); Sediment Guidance.
[48] Applying the Principles of Comparative Net Risk and Risk Management to Sediment Sites, Presented at Optimizing Decision-Making and Remediation at Complex Contaminated Sediment Sites Conference, January 8-10, 2008, New Orleans, LA. Conference jointly sponsored by U.S. Environmental Protection Agency, U.S. Navy Space and Naval Warfare Systems Center, U.S. Army Corps of Engineers – Engineer Research and Development Center, and Sediment Management Work Group.
[49] CERCLA § 104(a)(2).]

E. USACE report on remedial alternatives.

Following Respondents' submission of the Draft Final Interim FS in March 2014, Region 6 engaged USACE to conduct an independent evaluation of the remedial alternatives for the Site. Among other things, Region 6 asked USACE to develop an additional removal alternative for the Northern Impoundments in which excavation of the waste material would, to the extent feasible, be conducted "in the dry." This alternative eventually became "Alternative 6N," the alternative recommended by Region 6 in the Proposed Plan.

In August 2015, USACE issued its draft technical assessment of the remedial alternatives for the Northern Impoundments, titled "Evaluation of the San Jacinto Waste Pits Feasibility Study Remediation Alternatives" (Draft USACE Report).[50] The Draft USACE Report reached conclusions similar to those contained in the Draft Final Interim FS, concluding, for example, that an enhanced armored cap would be expected to be "highly effective."[51]

After receiving the Draft USACE Report, Region 6 sought comments from interested parties on the report and then requested that USACE address a list of concerns regarding the Draft USACE Report, including those raised by local elected officials and interested parties.

USACE issued a revised version of the Draft USACE Report in late June 2016, revised that draft in July 2016 in response to Region 6 comments[52] and issued a final report (the USACE Report)[53] in August 2016. The USACE Report provided recommendations for upgrades to Alternative 3N (the remedial alternative proposed in the Draft Final Interim FS) to address an ultra-extreme storm condition that USACE was asked to model by Region 6 (involving the synoptic occurrence of both the 1994 flood and Hurricane Ike). The upgraded Alternative 3N is referred to in Region 6's Final Interim FS as "Alternative 3aN."

USACE concluded that excavation of the waste material (Alternative 6N) will necessarily result in significant releases of dioxin to the San Jacinto River, even with the use of enhanced BMPs, and would also delay the reduction of dioxin

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[50] Evaluation of the San Jacinto Waste Pits Feasibility Study Remediation Alternatives. USACE ERDC Letter Report. Earl Hayter, Paul Schroeder, Natalie Rogers, Joe Kreitinger, and Mike Channell. Environmental Laboratory, Vicksburg, VA. August, 2015. (Appendix G-4).
[51] Draft USACE Report Executive Summary, at 2.
[52] The June 2016 draft, with comments from Region 6's Remedial Manager included, is provided in Appendix G-8.
[53] Evaluation of the San Jacinto Waste Pits Feasibility Study Remediation Alternatives. Appendix A to Final Interim FS. (AR 100001060)

concentrations in fish, potentially for decades. It will also leave some waste material in place, which will require a new armored cap. At the same time, USACE concludes that resuspension and short-term releases from capping would be "virtually non-existent" and that capping will be highly effective in controlling releases. More specifically, the USACE Report concluded as follows:

- Short term losses during removal (excavation), as proposed in Alternative 6N, will be more than 100 times the predicted losses over 500 years from capping.[54]

- "… [S]hort term releases for the new full removal [Alternative 6N] is about **400,000 times greater** than the releases from the intact cap …"[55]

- During removal, at least 0.1% and most likely 0.3% of the contaminant mass would be released to the San Jacinto River.[56]

- "… [-]f a storm … occurred during the actual removal/dredging operation, the likelihood of extremely significant releases of contaminated sediment occurring is very high."[57]

- Those releases from removal activities could be up to five times greater if any significant storms occur during the construction period and the BMPs implemented to minimize releases are overtopped.[58]

- Removal-related releases would result in the transport of contaminants in the water column and cause increases in fish tissue concentrations that would persist for a number of years.[59]

- Under the removal alternative (Alternative 6N), not all of the contaminants will be removed. A layer of contaminated material with dioxin concentrations similar to the capped waste material will remain in place[60] and must be covered by a newly installed cap in the Northwestern Area.[61]

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[54] *Id*. at 6, 1st paragraph.
[55] *Id*. at 6, 1st paragraph.
[56] *Id*. at 4, 1st paragraph.
[57] *Id*. at 185, 2nd paragraph.
[58] *Id*. at 6, 1st paragraph.
[59] *Id*. at 6, 1st paragraph.
[60] *Id*. at 99, 1st paragraph.
[61] *Id*. at 113, 1st paragraph, at 115, 4th paragraph, at 116, 2nd paragraph.

- Even in the absence of storm events, "[m]odeling clearly demonstrated that sediment residuals are predicted to be eroded from the areas that would be dredged … even during non-storm, , normal, conditions."[62]

- Implementing a removal alternative will result in increased air emissions, risk of injuries and other impacts from the thousands of barge and truck trips involved in excavating and transporting waste to a disposal site.[63]

- In contrast to removal, the proposed capping remedy (Alternative 3aN) is expected to be stable and highly effective in controlling the transport of contaminants and reducing the exposure concentration of contaminants in the water column, with resuspension and short-term releases during remedy implementation being "virtually non-existent."[64]

USACE also concluded "that reliability has been routinely achieved at other armored cap sites and facilities,"[65] and, following an extensive literature search, stated that there appears to be no documented cases of any armored cap or armored confined disposal facility breaches.[66]

F. 2015–2016 data collection and results.

In August 2015, before USACE issued its initial draft of the USACE Report, Region 6 directed Respondents to undertake new data collection efforts involving sediment, surface water, porewater, and groundwater. With respect to the Northern Impoundments, the data were intended to:

- "Confirm that the [TCRA] cap continues to prevent dioxin/furan migration from the waste pits to the San Jacinto River following storms occurring since the last cap passive pore-water sampling event in 2012.

- "Determine whether there has been any migration of dioxin/furan contaminated sediment from under the toe of the cap using sediment samples."

- "Determine whether there is any migration of dioxin/furan from the alluvial aquifer at the waste pits … into the San Jacinto River at levels above the

[62] *Id*. at 185, 2nd paragraph.
[63] Final Interim FS.
[64] USACE Report, at 4, 1st paragraph.
[65] *Id*. at 3, 2nd paragraph.
[66] *Id*. at 82, 2nd paragraph.

> Texas Surface Water Quality Standard … for dioxin/furan using passive pore-water samplers and surface water samples."[67]

In early 2016, Region 6 also required that the study include fish tissue.[68]

To address these requirements, Respondents worked with Region 6 to design the requested studies and submitted and obtained Region 6 approval of SAPs. Data quality objectives in the approved SAPs for all five studies focused on Region 6's goal of "verification that the armored cap … [is] effective in preventing releases of dioxins and furans from the paper mill wastes."[69]

The results of the data collection efforts, described in detail below in Comment N-2, demonstrate that the existing armored cap continues to be effective in preventing the release of dioxins and furans in the paper mill wastes into the environment. This extensive data collection effort, undertaken at Region 6's direction, was available to – but not considered by – Region 6 in selecting its preferred alternatives, and it was not included in the Administrative Record.[70]

G. Region 6's Final Interim FS and presentation of its preferred plan to the National Remedy Review Board.

In April 2016, Region 6 informed Respondents that it had taken over completion of the FS from Respondents. Region 6 never provided Respondents with formal notice or a written explanation for this action.

At about the same time, Region 6 informed Respondents that it did not intend to wait for the completion of the ongoing sampling that Region 6 had directed Respondents to perform, before identifying a preferred remedy. In May 2016, Region 6 submitted its preferred alternative to the National Remedy Review Board (NRRB) and it was then addressed during an NRRB meeting in June 2016.

Region 6 then, on September 28, 2016, issued both the Final Interim FS and its Proposed Plan. The Final Interim FS was issued without any explanation of the changes made by Region 6 to the Draft Final Interim FS submitted to Region 6 by

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[67] Email from G. Miller, Remedial Project Manager, USEPA, to D. Keith, Anchor QEA, LLC, regarding San Jacinto River Waste Pits Sampling, August 6, 2015. (August 2015 Email Regarding Data Collection) Appendix F-1.
[68] Sampson, J. Personal Communication (telephone call) with Gary Miller, February 25, 2016.
[69] *See* August 2015 Email Regarding Data Collection (Appendix F-1).
[70] This includes Region 6's direction to gather the data as well as the data itself. It is apparent with hindsight that Region 6 had settled on removal months before the data collection and analysis were complete.

Respondents in March 2014, and deleted or ignored key Site-specific technical information.

The Final Interim FS includes descriptions of two remedial alternatives not addressed by the Draft Final Interim FS—Alternative 3aN (as conceived by USACE, and utilizing even larger armor stone than contemplated by Alternative 3N) and Alternative 6N (modified from the alternative presented in the Draft Final Interim FS to include so-called "enhanced BMPs" but with little definition as to the nature of the specific BMPs to be implemented).

V. SUMMARY OF PROPOSED PLAN

On September 28, 2016, Region 6 issued the Proposed Plan, announcing that its preferred remedy for the Northern Impoundments is Alternative 6N (Removal of Waste Materials Exceeding Cleanup Levels, Monitored Natural Recovery, and Institutional Controls). According to Region 6, the preferred remedy will:

- Prevent releases of dioxins from the former waste impoundments;
- Reduce human exposure to dioxins from consumption of fish;
- Reduce human exposure to dioxins from contact with contaminated materials; and
- Reduce exposures of benthic macroinvertebrates (clams, crabs, etc.) to dioxin.[71]

Region 6 characterized its preferred remedy, which involves the removal of all waste material that exceeds a Preliminary Remediation Goal (PRG) established by Region 6 of 200 ng/kg, as "the only one that will reliably result in no catastrophic future release of waste material upon completion of construction."[72]

Alternative 6N is described in the Proposed Plan as having the following elements:

- Removal of the majority of the existing armored cap and the removal of 152,000 cy of waste material.

[71] Proposed Plan at 2.
[72] Proposed Plan at 2.

- **Where feasible**, the use of sheet piles in areas to be removed to reduce resuspension of the waste material.

- The use of MNR for the sediment in the sand separation area.

- BMPs recommended by USACE (unless different BMPs are determined during remedial design), possibly including:

    - Removal in stages or sections as appropriate to limit the exposure of the uncovered sections of the waste pits to potential storms.

    - Raised berms and sheet piles, in addition to dewatering and removal in the dry **where feasible**, to reduce the resuspension and spreading of the removed material.

    - Armoring of the berms on both sides with armor material removed from the areas that have geotextile present.

    - Excavation of approximately three-fourths of the waste material in the dry behind sheet pile walls, with an excavation dewatering and water treatment system operated on any day of excavation.

    - Covering of residual concentrations of contaminants following excavation and removal with at least two layers of clean fill.

    - Isolation of the work area in the Northwest area with berms/sheet piles if practicable.

- Dewatering (decanting) and stabilization of excavated waste material by addition of Portland cement or other additive at the offloading location, **as necessary**, to eliminate free liquids for transportation and disposal.

- **Possible** barge mounting of some operations, such as water treatment.

- Construction of a new armored cap over the residual concentrations of contaminants following excavation and removal in the Northwest area.

- A relatively large offloading and waste material processing facility to efficiently accomplish the work.

- Management and disposal of dewatering effluent, including treatment if necessary.

- Transportation of removed material in compliance with applicable requirements and permanent management of the removed material in an approved permitted facility cleared by EPA's regional offsite rule contact.

- An estimated 13,300 to 17,500 truck trips to transport the waste material to the off-site approved permitted facility; however, capacity of road to handle the loads will impact the truck size that can be used. The method of transportation and number of trips will be determined during the remedial design, as well as other transportation alternatives, including rail transport.

- Institutional and engineering controls.

Region 6 rejected Alternative 3aN, which as described by the Proposed Plan, includes the following elements:

- Pre-stressed concrete or concrete filled steel pipe pilings placed 30 feet apart around the perimeter of the existing cap to protect against barge strikes.

- The addition of armor stone cap with a median diameter of 15 inches and at least 24 inches thick, to be placed over 13.4 acres of the 15.7-acre existing armor cap.

- A coarse gravel filter layer placed on 1.5 acres of the Northwest Area where there is currently no geotextile under the armor cap.

- Groundwater monitoring implemented to ensure that there are no long-term unacceptable impacts to the groundwater.

- Institutional and engineering controls.[74]

The Proposed Plan identifies Region 6's rationale for selecting Alternative 6N and rejecting Alternative 3aN as:

- "The waste material is highly toxic and may be highly mobile in a severe storm and therefore is considered a Principal Threat Waste. The Environmental Protection Agency considers material at the Site with more than 300 ng/kg dioxin to be Principal Threat Waste. This concentration was calculated by multiplying the sediment Preliminary Remediation Goal of 30 ng/kg by a factor of 10."

[74] Proposed Plan at 29 (emphasis added).

- The location of materials …in a river environment that is subject to dramatic change, creating concerns about the permanence of an armored cap.

- The area has a high threat of repeated storm surges and flooding from hurricanes and tropical storms, which, if the material was left in place, could result in a release of hazardous substances.

- The history of repeated armor cap maintenance as a result of floods that are much less severe than the design 100-year flood."[75]

Based on these considerations, Region 6 concludes that Alternative 6N "provides greater permanence in comparison to other alternatives."[76]

As demonstrated in the detailed comments below, Respondents reject and dispute Region 6's stated justifications for its preferred remedy (Alternative 6N) and assert that selection of that remedy is contrary to applicable rules and guidance and is not supported by the Administrative Record. Alternative 6N's selection, based on the current Administrative Record, would therefore be arbitrary and capricious. Moreover, rather than satisfying the remedial action goals of Region 6, Respondents assert that based on the independent assessment of USACE, Alternative 6N will:

- Cause releases of dioxins from the former waste impoundments, the magnitude of which will be much greater than Region 6 acknowledges;

- Increase human exposure to dioxins from consumption of fish;

- Increase human exposure to dioxins from contact with contaminated materials; and

- Increase exposures of benthic macroinvertebrates (clams, crabs, etc.) to dioxin.

[75] Proposed Plan at 36.
[76] Proposed Plan at 37.

VI. DETAILED COMMENTS ON NORTHERN IMPOUNDMENTS

The comments provided below demonstrate that, based on the Administrative Record, (i) Region 6's Proposed Plan is flawed and unsupportable, and (ii) Region 6 preselected a preferred remedy that is not rooted in law or science.

COMMENT N-1: REGION 6 REQUIRED ADDITIONAL DATA TO BE COLLECTED TO "CONFIRM" THE EFFECTIVENESS OF THE ARMORED CAP, AND THEN IGNORED THAT DATA IN SELECTING ITS PREFERRED ALTERNATIVE

In August 2015, Region 6 directed Respondents to collect additional data on multiple environmental media to "[c]onfirm that the cap continues to prevent dioxin/furan migration from the waste pits to the San Jacinto River …. "[77] Beginning in late 2015 and through March 2016, Respondents then submitted a series of detailed SAPs for the collection of data on groundwater, porewater, surface water, sediments, and fish tissue, all of which were approved by Region 6.[78]

Respondents then moved forward to collect the requested data, with fieldwork beginning in April 2016. Between April and September 2016, as sampling results became available, Respondents provided them to Region 6.[79] Respondents met with Region 6 to present the data (2016 Data) on September 8, 2016, and submitted a report summarizing the data, titled Data Summary Report: 2016 Studies (Data Summary Report) on September 23, 2016.

The 2016 Data demonstrate that the existing armored cap—which would be enhanced under Alternative 3aN—has effectively contained the waste, contrary to the attempt by Region 6 to create the impression that the existing armored cap has not performed well.[80] But Region 6 elected to make no mention of the 2016 Data

[77] August 2015 Email Regarding Data Collection (Appendix F-1)
[78] AR 9548411; AR 9643946; AR 9689099; AR 500021341; AR 9689095; Appendix F. Approvals: UAO Monthly Report No. 077, April 15, 2016 (AR 9689097).
[79] Raw data were submitted with monthly reports in April and June through September. The site database was updated to include results in July and then again in September (UAO Monthly Report No. 80, AP 9774275; UAO Monthly Progress Report No. 82; AR 975961; Appendices F-15, F-16, F-19 and F-20.
[80] *See* Comment N-2.

in its Proposed Plan, and did not include the 2016 Data Summary Report (provided with these Comments as Appendix H) or related communications in the Administrative Record.[81] Long before the Proposed Plan was issued, Region 6 seemingly had already settled on removal (the preferred alternative it submitted to the NRRB in May 2016). Having done so, Region 6 was apparently not interested in considering data that might (and did) "confirm" the effectiveness of the existing cap.

[81] Submissions and approvals related to the 2016 sampling that were not included by Region 6 in the Administrative Record are provided in Appendix F. Regarding the failure to provide the September 23, 2016 Data Summary Report (Appendix H), it is of note that Region 6 did include in the Administrative Record other documents that were dated on or after September 23, 2016. *See*, , Administrative Record Entry Nos. 100001053; 100001061.

COMMENT N-2: THE 2016 DATA DEMONSTRATE THAT THE EXISTING ARMORED CAP—WHICH WOULD BE ENHANCED UNDER ALTERNATIVE 3AN IN ACCORDANCE WITH USACE REQUIREMENTS—HAS EFFECTIVELY CONTAINED THE WASTE

The 2016 Data demonstrate that the existing armored cap has effectively contained the waste in the Northern Impoundments.

First, the sediment data show significant reductions in concentrations of dioxin and furans in sediments in the vicinity of the Northern Impoundments, including those that through a "fingerprint" analysis have been shown to be associated with the waste in the Northern Impoundments. The 2016 sediment data show that the existing armored cap is preventing releases of dioxins in the capped waste to the environment, resulting in environmental recovery in the vicinity of the cap.

Second, the 2016 data for porewater (the water in the pore spaces between the armored rock that comprises the armored cap) show that the existing cap is effective in preventing releases of dioxin to surface water. The 2016 porewater data corroborate the results of a similar porewater study performed in 2012.[83]

Finally, the 2016 groundwater data corroborate results of prior groundwater testing and demonstrate that dioxin in the capped waste has not impacted groundwater.

Details regarding the 2016 studies, as reflected in the Data Summary Report (Appendix H), are described below.

- **Sediments**. In 2016, surface sediment samples (0 to 6 inches) were collected at 27 locations surrounding the Northern Impoundments, including 13 locations that were sampled in 2010, prior to construction of the armored cap. Results of the sediment sampling demonstrate statistically significant reductions in concentrations of the dioxin and furan congeners that characterize the waste within the Impoundments—2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) and 2,3,7,8-tetrachlorodibenzofuran (TCDF)—between 2010 and 2016. In 2016 sediments, the Toxicity Equivalent (TEQ)[84] concentrations (which take into account the 17 dioxin

[83] RI Report; RI Approval.

[84] There are 17 dioxin and furan congeners thought to act through a common mechanism of toxicity, which is initiated by the binding of the congener to the aryl hydrocarbon receptor (AhR). Of the 17 AhR-reactive congeners TCDD exhibits the greatest potential for binding with AhR. Under the toxicity equivalency factor (TEF) approach, the magnitude of toxicity of each of the 17 dioxin and furan congeners is related to the toxicity of TCDD by a TEF.

and furan congeners considered toxic), were also lower than in 2010 sediments, and were well below any applicable sediment protective concentration level (PCL).[85]

An "unmixing" analysis was also performed. It used the 2016 sediment data to "fingerprint" dioxins and furans present in individual samples, using a model that had previously been developed, approved, and applied during the RI/FS for the Site.[86]

The unmixing analysis performed on the 2016 sediment samples showed that the contribution of dioxin associated with waste from the Northern Impoundments had declined since 2010. In all but two stations sampled in both 2010 and 2016, the fractional contribution of dioxins and furans from the wastes in the Northern Impoundments declined to zero; in the other two, the contribution from the wastes in the Northern Impoundments declined from about 5% to about 2.5% (by half).[87]

In conclusion, reductions in concentrations of TEQ, TCDD, and TCDF, as well as the results of the unmixing model using 2016 Data, show a reduction from 2010 in the contribution of dioxins and furans associated with waste from the Northern Impoundments to the quality of surrounding sediments. These lines of evidence—not considered by Region 6 in identifying its preferred alternative—demonstrate that the existing armored cap has been effective in containing the dioxins and furans associated with wastes in the Northern Impoundments.

Each congener is multiplied by its respective TEF, and the resulting TCDD TEQ concentrations for all 17 congeners are summed to calculate the TEQ of the congener mixture. Where TEQ is used in this document, it refers to the TEQ calculated on the basis of the 17 dioxin and furan congeners using TEFs for mammals.

[85] A PCL of 220 ng/kg (nanograms per kilogram) is in the EPA-approved RI Report. Region 6 uses a different term, a preliminary remediation goal (or PRG) rather than a PCL; the PRG in the Final Interim FS is 200 ng/kg.

[86] The unmixing model had previously been used to evaluate the sources of dioxin in soil and sediment samples collected in 2010, prior to the construction of the TCRA cap. The analysis established that dioxins and furans associated with the waste have a distinctive "fingerprint," and that sediments with this fingerprint have been detected in sediment samples in locations within the vicinity of the Northern Impoundments. *See* Section 5.4 of the RI Report. The results of the evaluation of the spatial extent of dioxin and furans from the Northern Impoundments reported in the Region 6-approved RI Report are consistent with results of an independently conducted 2009 analysis of dioxins and furans by Louchouarn and Brinkmeyer (AR 9185984). That other study used a different fingerprinting method and a different data set, consisting of samples taken during and before 2009 from within the Northern Impoundments, their immediate vicinity, and further afield in the San Jacinto River and the Houston Ship Channel. Louchouarn and Brinkmeyer's dioxin compositional analysis also shows that dioxins from the Northern Impoundments have remained in close proximity to the original perimeter of the Impoundments. (AR 9185984 at 3)

[87] 2016 Data Summary Report (Appendix H), Table 2-3.

- **Porewater**. The 2016 studies included a second assessment of porewater immediately above the existing armored cap. The first assessment of porewater was a 2012 study performed after construction of the TCRA cap had been completed, using solid-phase microextraction passive sampling devices.[88] The study was designed to address whether vertical concentration gradients of target dioxin and furan congeners were present within the armored cap, and whether concentrations in the porewater differed from those in surface water immediately above the cap. The 2012 porewater study evaluated the presence of two target compounds (TCDD and TCDF) in porewater. The absence of vertical gradients in porewater concentrations of TCDD and TCDF showed that there were no releases of these congeners from the wastes into the surface water.[89]

  The design of the 2016 porewater study was similar to that of the 2012 study. It evaluated the same two target compounds, and a third target compound, 2,3,4,7,8-PentaCDF (PentaCDF). Consistent with EPA and TCEQ requirements, the 2016 study was designed to be highly sensitive and employed very low detection limits (below 0.03 picograms per liter [pg/L]) for all target compounds.

  In the 2016 study, the target compounds were not detected in any of the porewater samples, and the absence of a measurable vertical concentration gradient within the armor rock was confirmed.[90] These results, coupled with the 2012 porewater results[91] confirm the existing armored cap continues to effectively contain dioxins and furans in the Northern Impoundments and continues to be effective in eliminating the potential release of dissolved-phase dioxins and furans from the Northern Impoundments to surface water.

- **Groundwater**. In 2016, Respondents conducted a study of groundwater directly beneath the Northern Impoundments. Monitoring wells were installed in four locations to allow sampling from the alluvial (shallow) aquifer. In these samples, the target dioxin and furan compounds for the groundwater study (TCDD, TCDF, and PentaCDF) were not detected. This study confirmed that groundwater beneath the Northern Impoundments meets the Texas Surface Water Quality Standard (TSWQS) for TEQ of

[88] RI Report, Section 5.3.
[89] RI Report, RI Approval.
[90] 2016 Data Summary Report (Appendix H), Table 3-1.
[91] RI Report; RI Approval.

0.0797 pg/L. Estimated TEQ concentrations in all groundwater samples beneath the Northern Impoundments were 0.021 pg/L or below, confirming that groundwater beneath the Northern Impoundments is not contributing to degradation of surface water quality.[92]

The 2016 groundwater results confirm the results of previous groundwater testing performed in 2011, which demonstrated that there was no transport of dioxins and furans from the Northern Impoundments in the groundwater.[93]

In conclusion, 2016 Data on groundwater from beneath the Northern Impoundments demonstrate that the existing armored cap is effective in containing dioxins and furans associated with waste materials within the Northern Impoundments.

- **Surface Water**. In July 2016, Respondents collected high-volume surface water samples from seven locations, using the same sampling method that TCEQ used in past surface water studies. Five of the sampling locations were previously sampled by TCEQ, providing the basis for direct comparison of dioxin and furan concentrations in surface water in 2016 with concentrations from TCEQ sampling conducted in the past. In 2016, the average TEQ concentrations in three samples of surface water above the submerged portion of the Northern Impoundments were 92% lower than the average of three samples collected in 2009, prior to construction of the armored cap. The improvement is attributable to a similar reduction in the average concentration of TCDD, a constituent of the wastes in the Northern Impoundments, demonstrating the effectiveness of the armored cap.

- **Gulf Killifish Tissue.** In 2016, Respondents collected fish tissue from previously sampled locations, three near the Northern Impoundments and one in the main channel of the San Jacinto River south of I10. The results of 2016 tissue sampling indicate that the existing armored cap is effective in preventing exposure of fish to dioxins and furans in the capped wastes.

The intensive and detailed field sampling effort described above, performed at Region 6's direction and in accordance with Region 6-approved SAPs, resulted in

[92] 2016 Data Summary Report (Appendix H), Table 4-1.
[93] A report on the results of the first groundwater investigation was submitted to Region 6 in July 2011 with the Preliminary Site Characterization Report (PSCR) and revised according to Region 6 comments. (AR 670316; AR 651009 and AR 649564.)

a significant body of new information regarding the effectiveness of the existing armored cap. That body of information, ignored by Region 6 in selecting its preferred remedy, is highly relevant to evaluating whether Alternative 3aN is the more effective and appropriate remedy for the Northern Impoundments.

COMMENT N-3: REGION 6 HAS MISCHARACTERIZED ROUTINE CAP MAINTENANCE AS BEING UNUSUAL OR UNEXPECTED, THEREBY PRESENTING THE EXISTING CAP (AND ALTERNATIVE 3AN) AS BEING INEFFECTIVE

One rationale offered by Region 6 for rejecting Alternative 3aN is based on characterizing routine and expected maintenance of the existing armored cap as being unusual or unexpected and therefore as raising questions as to long-term effectiveness of a cap.[94] Region 6's characterization of that maintenance history is both inaccurate and misleading. The current cap's maintenance history is also not relevant in assessing the protectiveness of Alternative 3aN because the features of the Alternative 3aN cap will address conditions that may have contributed to the need for maintenance of the current cap, as addressed below in Comment N-4.

The need to maintain a cap is routine and expected. With respect to the armored cap, the need for maintenance was specifically anticipated in the approved cap design. In five and one-half years, only 0.57% of the surface area of the current cap has required maintenance; even that calculation includes areas in which maintenance may not have been needed but was performed out of an abundance of caution. The capped waste was not exposed to the environment in any of these maintenance events, with the single possible exception of the 2015 maintenance event (discussed below), and in that instance, sampling demonstrated and USACE also concluded that waste did not appear to have migrated outside the maintenance area.

Under the OMM Plan developed for the current cap, Respondents have been able to promptly perform any required maintenance using materials specifically stockpiled for that purpose. Procedures for monitoring have been modified as maintenance events have occurred, and additional measures have been added to the monitoring process (such as the addition of a 24/7 camera monitoring system to alert Respondents to any activity on the cap that might impact its integrity). Following the 2015 maintenance event, and consistent with USACE recommendations, additional probing was conducted and new methods to identify small areas of cap deficiency similar to the one involved in the 2015 maintenance event were implemented.

[94] *See e.g.* Proposed Plan at 4.

The maintenance performed on the existing cap to date is consistent with cap maintenance at other Superfund sites that EPA regards as being protective. In short, the need for maintenance of the existing cap does not diminish its effectiveness in containing the waste. Nor does it provide a basis for questioning Alternative 3aN's enhanced cap as a long-term remedy.

A. The need for cap maintenance is routine and expected and was contemplated as part of the TCRA armored cap design that Region 6 approved.

The Region 6-approved TCRA design assumed a need for post-construction maintenance of the armored cap.[95] With a newly constructed cap, it is not unexpected that there would be isolated areas that do not fully meet the cap's thickness criteria and the presence of those isolated areas may not be important to the cap's effectiveness, as noted by Dr. Reible, in his attached report (Appendix B).[96]

Following construction of the armored cap, and consistent with EPA and USACE guidance, Respondents prepared and Region 6 approved an OMM Plan for the armored cap.[97] As part of the OMM Plan, rock was stockpiled near the cap to be easily available for maintenance purposes.[98] As addressed below, the actual area that over the past five years has required maintenance is actually much smaller, 0.57%.

Over the past five years, Respondents have modified and refined inspection and maintenance procedures in response to maintenance issues that have been identified. In connection with an area discovered through a Region 6 dive team inspection (discussed below), Respondents have made a number of changes to their inspection program, including incorporating USACE recommendations regarding those activities. These changes have included (1) adding a 24 hour, 7 day a week security camera monitoring system to provide real time alerts regarding incursions of people, equipment, and vessels onto the cap; (2) installing a buoy warning

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[95] Final Work Plan at 34.

[96] Reible Report at 2-3. Dr. Reible notes that a recent Interstate Technology and Regulatory Council paper on contaminated sediment remediation comments states "[s]ince a cap is an area-based remedy, isolated areas that do not meet thickness criteria may not be significant. Instead, statistical measures such as 95% confidence limits on the mean thickness are more relevant performance indicators."

[97] Appendix N of the Region 6-Issued RACR.

[98] Section 9.3.1 and Appendix N of the Region 6-Issued RACR Consistent with the assumption that there could be a need to perform maintenance on up to five percent of the cap's surface, rock sufficient to cover such an area was stockpiled (970 tons of Armor Cap C and 1,720 tons of Armor Cap D rock).

system around the cap; (3) increasing the frequency of inspections; (4) conducting additional inspections during "low tide" conditions when normally submerged areas of the cap can be observed; and (5) developing a finer "grid" that can be used to identify areas where cap thickness may need to be confirmed.[99]

B. The Proposed Plan's summary of "repairs" to the existing armored cap overstates the nature of the required maintenance.

1. All maintenance activities combined have involved only 0.57% of the cap's surface.

Since the armored cap was completed more than five years ago, it has been subject to routine and expected maintenance. The frequency and scope of that maintenance is similar in scope to maintenance required by other caps and is consistent with applicable guidance. Further, procedures for monitoring the cap have been improved to address conditions that required a need for prior maintenance. Maintenance has been performed in small discrete areas, primarily in instances in which the design thickness of the armor rock could not be confirmed. In fact, all of those maintenance activities **combined** have involved only about 0.57% of the cap's area, as shown on Figure 1.

This is much less than the 5% that was assumed for purposes of the cap's design and for stockpiling armored rock pursuant to the OMM Plan for use in maintenance. Even so, the 0.57% figure likely overstates the size of the areas that actually required maintenance. In many of the locations probed, cap material was present but it was difficult to confirm its thickness, often because the cap surface had become cemented due to biological growth and mineral precipitation. Out of an abundance of caution, additional material was added to these areas to assure that minimum cap thicknesses were maintained.

2. Region 6 has mischaracterized the December 2015 maintenance event.

Region 6 points to a December 2015 maintenance event following a dive team inspection as evidence of the failure of the OMM Program and by implication, as raising questions regarding the effectiveness of capping on a long-term basis.

Region 6 overstates the December 2015 event. The maintenance event revealed a depressed area of about 200 square feet (not 500 square feet, as claimed by

[99] Addendum 2 OMM Plan.

Region 6 in the Proposed Plan) in which the presence of geotextile and armored rock at the required thickness could not be confirmed in all locations. The size of the depressed area was actually smaller than the 30 x 30 grid size approved by Region 6 in the OMM Plan for identifying changes in elevation.

Respondents promptly undertook maintenance activities, including sediment sampling outside the work area and maintenance activities to place geotextile and additional armored rock over and extending beyond the depressed area.[100] Sampling within the area found it contained dioxin, but as Region 6 acknowledges, sampling in each direction around the location at "nearby undisturbed areas of the cap" did not show elevated levels of waste materials containing dioxins.[101] USACE evaluated the conditions in this area, using sediment data collected from the impacted area and nearby stations. Based on the "fingerprint" of the sediment dioxins and furan data, USACE concluded that it clearly showed that very little, if any, sediment from the cap deficiency area reached the two stations near the exposed sediment in the armor cap area.[102]

Extensive probing was conducted following the December 2015 event. As maintenance records reflect, a number of small discrete areas requiring maintenance were identified in that process, most of them one or two feet square. As noted by Dr. Reible, these small areas detected in the 2015 and 2016 inspections are not unanticipated.[103]

C. Armored Caps, Utilized Nationally and with a Strong Record of Performance, Are Recognized by Applicable USACE and EPA Guidance as Requiring Ongoing Maintenance.

In situ capping is a proven technology selected by EPA as a remedy for numerous sediment remediation sites across the United States and has demonstrated protectiveness.[104] Typically, in the first few years following cap construction, there is a period where monitoring and maintenance practices identify and address areas of a cap that need to be enhanced, if any, so that the long-term protectiveness of the cap can be ensured. USACE and EPA cap design guidance expressly presumes that routine as well as event-based monitoring (triggered by key storm events) will be performed to identify the need for possible cap maintenance,

[100] The source of the depressed area – either a barge strike or construction issues – has not been determined.
[101] Final Interim FS at ES-3.
[102] USACE Cap Report at ES-2.
[103] Reible Report at 3.
[104] *See* Comment N-13.

followed by appropriate repair activities.[105] The design guidance recommends that event-based monitoring be used to fine-tune the OMM Program after monitoring the performance of the cap following specific storm events.[106] Thus, the need for maintenance is expected and anticipated.

For example, two sediment caps with demonstrated performance for more than 20 years have followed this progression. The St. Paul Waterway cap and the Eagle Harbor cap, constructed in the late 1980s and early 1990s, respectively, required some early maintenance in their first few years (*e.g.*, placement of additional, coarser material in an erosional area on the St. Paul Waterway cap).[107] As documented in EPA's five-year review summaries for those sites (attached as Appendices F and G), subsequent monitoring has demonstrated the continued protectiveness of these caps. EPA's confidence in the 1988 St. Paul Waterway cap was such that EPA in 1996 ultimately determined that "no further response action was required [because] physical, chemical, and biological sampling has shown that the sediment cap is functioning as planned, and that diverse biological communities are inhabiting the area."[108] Two months later, EPA delisted the sediment areas of the St. Paul Waterway site from the National Priorities List.[109] A discussion of cap maintenance at these sites was included in the Respondents' March 2014 Draft Final Interim FS but was deleted from Region 6's Final Interim FS.

[105] Assessment and Remediation of Contaminated Sediments (ARCS) Program; Guidance for In-Situ Subaqueous Capping of Contaminated Sediment (ARCS Guidance). EPA, 905-B96-004, September, 1998, at 66, 71.
[106] ARCS Guidance at 66.
[107] Second Five-Year Review Report of Commencement Bay Nearshore/Tideflat Superfund Site, Tacoma, WA, USEPA Region 10, Seattle, 2004; Third Five-Year Review Report Wykoff/Eagle Harbor Superfund Site, Bainbridge Island, WA, Prepared for USEPA Region 10 by Cami Grandinetti, 2012.
[108] 61 Fed. Reg. 44269, 8/28/96.
[109] 61 Fed. Reg. 55751, 10/29/96.

Table 1 provides examples of caps that have required maintenance but continue to be protective.

Table 1: Examples of Protective Caps with Maintenance Requirements

Site	EPA Region	Maintenance Activity
Mill-Quinnipiac River	1	Sediment cap maintained by placing additional cap materials in Year 10
St. Lawrence River	2	Armor rock repair in Year 1
Koppers Site	4	Erosion repairs made with larger aggregate
Tittabawassee River	5	River shoreline maintenance in Year 3
St. Paul Waterway	10	Intertidal armor maintenance with larger aggregate
Eagle Harbor	10	Subtidal armor maintenance
Puget Sound Naval Shipyard CAD	10	Confined aquatic disposal (CAD) cell cap maintenance by adding additional material
Georgia-Pacific Log Pond (Washington State Department of Ecology Lead Site)	10	Intertidal armor maintenance

Figure 1
2011-2016 Maintenance Areas
San Jacinto Waste Pits Superfund Site
IP/MIMC's Comments to Proposed Plan

COMMENT N-4: ALTERNATIVE 3AN'S FEATURES WILL ENHANCE ITS LONG-TERM PROTECTIVENESS AND REDUCE THE NEED FOR FUTURE MAINTENANCE

The Proposed Plan's emphasis on maintenance of the existing armored cap ignores the differences between the current cap and the Alternative 3aN cap design that will enhance the Alternative 3aN cap's long-term protectiveness. The design features of Alternative 3aN, in particular its addition of much larger armor stone over much of the cap's surface, will reduce the need for future maintenance. Maintenance events involving the current cap therefore, while consistent with the scope of anticipated maintenance for the existing armored cap, are of limited relevance to the future performance of the Alternative 3aN cap.

Alternative 3aN includes the armored cap enhancements envisioned for Alternative 3N but also is designed by USACE to be stable during ultra-extreme storm conditions such as a synoptic occurrence of Hurricane Ike and the October 1994 flood.[110] Alternative 3aN, as detailed in the USACE Report and the Final Interim FS, will include the following:

- Adding pre-stressed concrete or concrete filled steel pipe pilings placed 30 feet apart around the perimeter of the Alternative 3aN enhanced armored cap to protect against barge strikes to the cap;

- Flattening of submerged slopes and slopes in the surf zone, including in the areas of the current cap associated with maintenance events in 2012 and 2015;[111]

- Placing a course gravel filter layer on 1.5 acres of the northwest area of the current cap where the TCRA design did not include placement of geotextile under the armor cap; and

[110] The temporary armored cap was originally designed with an armor layer to provide containment of waste materials, as well as layers of geotextile and geomembrane. Armor materials were sized using a factor of safety of 1.3, greater than USACE's suggested minimum factor of safety of 1.1. In January 2014, further enhancements were made to the temporary armored cap in accordance with USACE recommendations that included placing additional armor rock along the central and southern berms to flatten the slopes to 3 horizontal to 1 vertical (3H:1V), using rock sizes that met or exceeded USACE design criteria. Draft Final Interim FS at 19. As discussed below, Alternative 3aN's design would use even larger rock over most of the cap surface, which would provide the cap with a factor of safety ranging from two to seven, depending on the area of the cap.

[111] This will include flattening submerged slopes from 2 horizontal to 1 vertical (2H:1V) to 3 horizontal to 1 vertical (3H:1V) and flattening the slopes in the surf zone from 3H:1V to 5 horizontal to 1 vertical (5H:1V).

- Addition of armor stone with a median diameter of 15 inches and at least 24 inches thick, to be placed over 13.4 acres of the 15.7 acre existing armor cap.

Alternative 3aN will also include long-term groundwater monitoring, together with institutional controls (ongoing monitoring and maintenance, periodic remedy reviews, etc.) and engineering controls (signage, buoys, cameras, etc.).

With the addition of the specified two feet of 15-inch diameter armor stone, the cap will be more than two and up to four feet thick. The addition of larger armor stone is intended to address performance in the ultra-extreme storm event described above.[112] In its evaluation of Alternative 3N, USACE concluded that adding stone with a minimum diameter of 12 inches to the existing cap would achieve the necessary protectiveness during very large floods.[113] Alternative 3aN will be even more protective, given that it will use 15-inch diameter stone.

The current cap contains stone of different sizes in different areas, the largest of which is 10-inch diameter stone that was used over about 31 percent of the cap's surface. Armor stone is typically measured by its smallest directional diameter. A stone that is 10 inches in any direction would be considered to be "10-inch" diameter rock, even though it may have a larger diameter in another direction.

A specification calling for the use of 12-inch rock requires use of rock that is about 1.72 times larger than a 10-inch rock, and a specification calling for use of 15-inch diameter rock would require use of rock that is about 3.4 times larger.[114]

[112] USACE Report at 57 ("The modeling performed of the October 1994 100-year flood event demonstrated that there should be no dislodgement and subsequent movement of large armor rock across the surface of the cap during that event.")
[113] USACE Report at 2.
[114] If one uses the assumption that a rock is a cube, a 10 by 10 by 10 inch rock would be 0.58 cubic feet, while a 12 by 12 inch rock would be 1.0 cubic foot and a 15 by 15 by 15 inch rock would be 1.95 cubic feet. Therefore, a specification calling for the use of 12 inch rock requires use of rock that is 1.72 times larger than 10-inch rock and one calling for use of 15-inch rock requires use of rock with 3.4 times larger than a 10-inch rock.

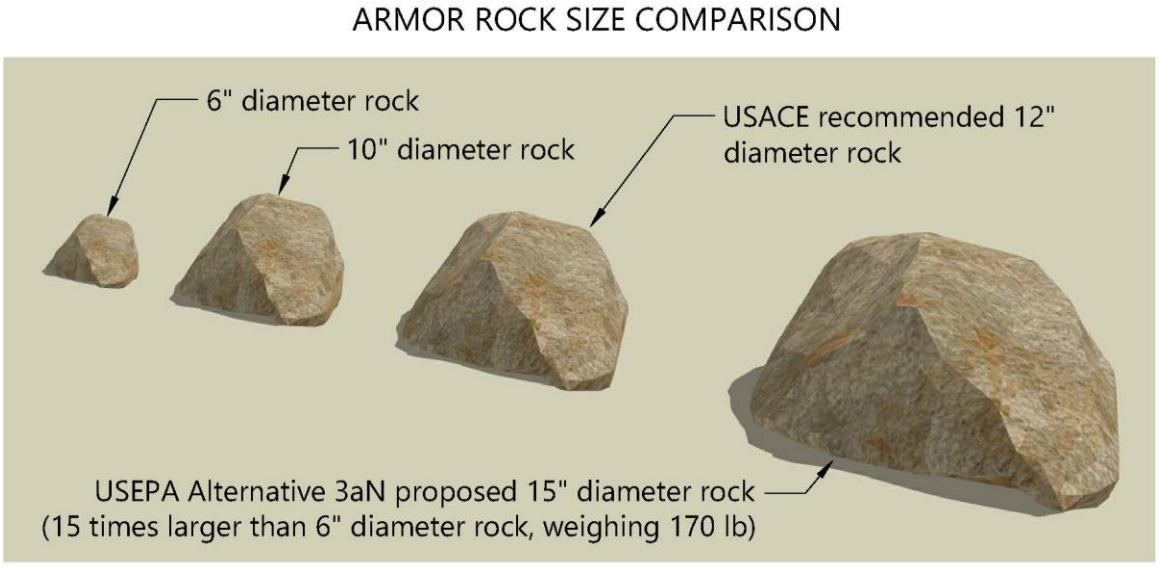


Figure 2: Armor Rock Size Comparison

The increase in rock size will have the most dramatic impact in areas of the current cap (such as the location of the December 2015 maintenance event) with three and six inch rock. The 15-inch rock required by Alternative 3aN will therefore result in an increased "factor of safety" in the cap's design and performance, well beyond EPA and USACE's design requirements. The current cap armor stone size is based on the hydrodynamic modeling performed for a full range of extreme events as described in Appendix B: Hydrodynamic Cap Modeling to the initial draft of the FS and also to the Draft Final Interim FS.[115] The cap armor stone size was computed using the Maynord method, from USEPA ARCS Guidance – Appendix A: Armor Layer Design.[116] Applying the Maynord method, the minimum safety factor for riprap design is 1.1. The factor of safety for the TCRA design was 1.3 and was 1.5 for Alternative 3N in the draft FS and Draft Final Interim FS. . By using armor stone with a D50 = 15 inches for Alternative 3aN, the safety factor would be increased to a minimum of two to more than seven depending on location.

When USACE modeled Alternative 3N (or perhaps the current cap), nearly all of the movement of armored rock was the smaller rock; there was little movement of

[115] Exhibit B to the Draft Final Interim FS was not included in the Administrative Record. It is included in Appendix I.
[116] ARCS Guidance – Appendix A: Armor Layer Design. (Maynord 1988)

the 10-inch rock. The 15-inch rock will be about 3.4 times larger than the 10-inch rock.[117]

As stated by Dr. Reible in his comments on the Proposed Plan, "Alternative 3aN armored cap should be effective and protective on a long-term basis, as has been the case of numerous other caps installed in this country and worldwide."[118] Dr. Palermo, with his decades of experience in capping remedies, echoes Dr. Reible's conclusion, noting in his report that "the Enhanced Cap as described for Alternative 3aN can be designed and constructed to meet the criterion of long term effectiveness and permanence."[119]

In summary, putting aside the routine nature of cap maintenance, the design of the Alternative 3aN enhanced cap, with its much larger rock size, will greatly reduce the need for maintenance of the kind that has occurred with the existing cap.

[117] *See* Figure 2 and discussion below in Comment N-11.
[118] Reible Report at 6.
[119] Palermo Report at 8.

COMMENT N-5: AFTER ASKING USACE TO PERFORM AN "INDEPENDENT ANALYSIS" OF REMEDIAL ALTERNATIVES, REGION 6 THEN IGNORED, MISCHARACTERIZED, OR SOUGHT TO MODIFY USACE'S CONCLUSIONS THAT DID NOT SUPPORT EPA'S PREFERRED REMEDY

A. The Proposed Plan largely discounts or disregards USACE's expert advice.

After seeking USACE's "independent analysis" of remedial alternatives, Region 6 discounts or disregards USACE's conclusions on a number of key issues. Those include:

- Suggesting that even USACE's enhanced Alternative 3aN cap would be subject to erosion. The results of modeling of the Alternative 3N cap under an ultra-extreme storm event (Hurricane Ike and the 1994 Flood) resulting in erosion of more than 80% of the cap surface are used to suggest that the enhanced Alternative 3aN cap might also be subject to similar erosion. But the 80% figure was based on the smaller rock on the current cap eroding, and the modeling actually showed that larger rock (10-inch) showed little movement even in the ultra-extreme event. Because the enhanced Alternative 3aN cap would be covered with the much larger 15-inch rock, Region 6 has no basis for implying that the enhanced Alternative 3aN cap would be subject to any similar level of erosion.

- Ignoring USACE's design for Alternative 3aN. Region 6 ignores the fact that USACE's design for the enhanced Alternative 3aN cap was conceived specifically to address Region 6's concerns about ultra-extreme storm events and dismisses USACE's conclusion that the larger rock placed over the existing cap would provide long-term effectiveness in the face of any ultra-extreme storm event.[120] Region 6 acknowledges that Alternative 3aN would "be better able to withstand a future severe storm," but then seems to dismiss Alternative 3aN's effectiveness because it was not modeled by USACE.[121] But Alternative 3aN was not modeled because Region 6 did not ask that it be modeled. In addition, USACE stated that "issues related to cap permanence can be addressed," not just that the enhanced capping remedy would be

[120] USACE Report at 2.
[121] Proposed Plan at 33.

"better able" to withstand the ultra-extreme storm event.[122] USACE's engineering opinions in this regard are sufficient in and of themselves to establish the long-term effectiveness of the enhanced Alternative 3aN cap.

- Minimizing releases in implementing Alternative 6N. USACE concluded that removing the existing cap would inevitably result in releases—even if enhanced BMPs were used—that would "set back natural recovery of the Site by up to a decade"[123] and would be "about **400,000 times greater** than the releases from the intact cap for the same period and area and about 2,500 times than the releases from stable sediment of the same area at the PCL."[124] Region 6 works to systematically downplay these findings, although it concedes that at best, only three-fourths of the waste material can be removed "in the dry."[125] It assumes that BMPs will be effective ("the [USACE] report's evaluation of excavation often focuses on risks which will be reduced and or eliminated through use of [BMPs]"[126]), while at the same time failing to make any realistic evaluation of their effectiveness, and deferring this issue to the remedial design phase.[127] But USACE's predictions of future releases clearly take into account the use of enhanced BMPs, as noted by Dr. Palermo in his report.[128] Region 6 also minimizes the potentially catastrophic release—up to two million times greater than releases from the intact cap, according to USACE—if the BMPs are overtopped in a storm event.

- Downplaying the unknowns associated with removing an engineered cap. USACE also detailed the hazards and unknowns associated with the unprecedented step of removing an existing, engineered cap. The USACE Report noted that "[i]t is difficult to understand how the armor cap material could be readily removed without snagging and disturbing the geotextile and sediment, particularly if performed underwater."[129] Further, it found that cap removal "will also expose the contaminated sediments for a period of

[122] USACE Report at 2-3 (emphasis added).
[123] USACE Report at 5.
[124] USACE Report at 6, 19. USACE found that "[e]xisting releases throughout the site are estimated to be up to 5 mg/year of dioxin-related contaminants without an erosion event, while the original full removal Alternative 6N and the new full removal Alternative 6N are predicted to release about 20,000 mg and 2,000 mg, respectively, during remediation activities covering a period of up to two years."
[125] Proposed Plan at 28.
[126] Proposed Plan at 8.
[127] Proposed Plan at 8, 28-29, 32, 34-35.
[128] Palermo Report at 17-18.
[129] USACE Report at 118, 119.

time until they are either stabilized, removed, or either covered or capped," noting the potential for further releases, including through flood events, during the removal process.[130] Region 6's response is to suggest that the geotextile be removed in small increments, without any analysis of whether that is practicable.

- Mischaracterizing cap performance. Region 6 acknowledges that no armored cap has "failed," but then by selectively quoting from the USACE Report, seeks to suggest that there is a history of failure of similar structures—something that is not true, according to the USACE Report.[131] Despite this uncontroverted fact, Region 6 appears to have eliminated Alternative 3aN from consideration by assuming that no cap could withstand a 500-year time event. Region 6 did this, despite the acknowledged history of cap performance and USACE's conclusion regarding the performance of the enhanced Alternative 3aN cap to the contrary.

USACE concluded both that the enhanced armored cap (Alternative 3aN) would be effective and that removing the existing armored cap and excavating the capped waste would inevitably result in releases of dioxins to the environment. Region 6 refuses to accept those two realities. USACE detailed the hazards of taking the unprecedented action to remove an armored cap and the technical challenges of doing so, including attempting to excavate "in the dry." Region 6, by failing to substantively address these technical challenges, relegating them instead to the design phase, does not accurately account for the true risks of its preferred remedy. Region 6's misleadingly selective use of the USACE report and its discounting of the risks clearly defined in the USACE report regarding Alternative 6N skews the Proposed Plan and results in a preference for Region 6's removal alternative.

B. Region 6 sought to delete or influence USACE's conclusions to support a pre-ordained alternative.

By the time that Region 6 informed Respondents in April 2016 that it intended to "take over" the FS, it had or was close to rejecting all capping remedies in favor of removal. It informed Respondents that it would not wait for the results of the ongoing sampling that it had directed Respondents to perform a few months earlier, with the stated objective of confirming the effectiveness of the current armored cap. By mid-May, Region 6 was preparing to submit its preferred

[130] USACE Report at 118, 119.
[131] USACE Report at 82; Proposed Plan at 8. *See also* discussion at Comment N-3 and N-4.

remedy—Alternative 6N—to the NRRB.[132] The Final Interim FS has to be viewed in this context; Region 6 issued it after it had settled on a preferred remedy, and submitted it to the NRRB. This unusual sequence raises questions as to whether the Final Interim FS truly is a fair and balanced critique of the remedial alternatives, particularly in light of its use to justify the unprecedented step of selecting a remedy that will necessarily cause harm over one that the 2016 Data demonstrated to be effective.

USACE issued a draft report in August 2015. Region 6 then asked USACE to address a long list of comments in revising that report. USACE ultimately issued a revised draft in late June 2016, which it then revised in response to additional Region 6 comments and ultimately issued in final form in August 2016. But before the revised draft report was issued, Region 6 had apparently settled on removal. Region 6 submitted extensive comments to USACE seeking revisions in the revised draft. Those comments are notable in the manner in which they consistently seek to downplay the risk and magnitude of removal and the potential for catastrophic events. Examples of these comments are identified in Table 2, and include comments urging USACE to conclude that the cap remedies have "long-term reliability" issues and/or encouraging further delineation of potential releases from catastrophic events with respect to the cap remedies, but completely glossing over gaping holes in the removal alternative review. Region 6's efforts to modify the USACE Report were largely unsuccessful, however, as the Report clearly demonstrates the preference of Alternative 3aN over Alternative 6N.

[132] Email from C. Sanchez, Region 6, to M. Harris, TCEQ, regarding National Remedy Review Board, May 20, 2016. (AR 100001090 at p. 2)

EXAMPLES OF REGION 6 COMMENTS TO THE JUNE 2016 DRAFT USACE REPORT[1]

EXAMPLES OF REGION 6 COMMENTS ATTEMPTING TO MAGNIFY THE POSSIBILITY OF RELEASES FROM CAPPING ALTERNATIVE OVER A 500-YEAR PERIOD, OVER EMPHASIZE IRRELEVANT RESULTS OF MODELING OF ALTERNATIVE 3N, AND MINIMIZE THE IMPACTS OF RELEASES FROM ALTERNATIVE 6N		
Report Section	**Report Text**	**Region 6 Comment**
Executive Summary PDF p. 15	Executive Summary.	Please add a discussion in the Executive Summary of the impacts/releases **of the extreme storm & what the dioxin releases could be**; and **compare those releases to the remediation releases for the new full removal Alternative 6N using BMPs, including caissons** as appropriate. Also, **add statement** in the Executive Summary as is included in the body regarding the **high level of uncertainty regarding the 1ong term assessment**.
Executive Summary – Permanence of Capping PDF p. 16	The evaluations performed to address the permanence of the existing repaired TCRA cap with the proposed modifications outlined in the capping Alternative 3N showed that the **cap is expected to be generally stable and permanent, requiring only maintenance or repair following unusual catastrophic events**. However, some localized disturbances of the cap may occur from bearing capacity failures of the soft sediment, gas entrapment by the geomembrane or geotextiles, or barge strikes.	"the cap is expected to be generally stable and permanent, requiring only maintenance or repair following unusual catastrophic events. However, some localized disturbances of the cap may occur from bearing capacity failures of the soft sediment, gas entrapment by the geomembrane or geotextiles, or barge strikes." **These statements appear contradictory, as the disturbances described in the second sentence are not "unusual catastrophic events,"** and certainly there is a **recent history of maintenance and**

[1] The Executive Summary portion of the June 2016 Draft USACE Report does not contain page numbers; a PDF page number has been provided. For the remainder of the Report, the page and PDF page number are provided. Bolded and/or underlined text is added for emphasis. Region 6's "comments" are cited without quotation marks; quotation marks are in original. Portions of the comments are provided for brevity, where possible.

EXAMPLES OF REGION 6 COMMENTS ATTEMPTING TO MAGNIFY THE POSSIBILITY OF RELEASES FROM CAPPING ALTERNATIVE OVER A 500-YEAR PERIOD, OVER EMPHASIZE IRRELEVANT RESULTS OF MODELING OF ALTERNATIVE 3N, AND MINIMIZE THE IMPACTS OF RELEASES FROM ALTERNATIVE 6N		
Report Section	**Report Text**	**Region 6 Comment**
		repair being required over a short period resulting from less than "unusual, catastrophic events," not only in 2012 as mentioned in the report, but also in 2013, 2015, and multiple instances in 2016."
Executive Summary – Permanence of Capping PDF p. 16	Tasks 2, 3 and 7 showed that the armored cap is **predicted to have long-term reliability** from scour related processes except in areas of the smaller armor stone sizes under very severe hydrologic and hydrodynamic events. It is recognized that the **uncertainty associated with estimates of the effects of some of the potential failure mechanisms**, e.g., propwash, stream instability, **is very high**.	The draft report states that cap has "long-term reliability" – the next sentence acknowledges the uncertainty of potential failures, and **unmentioned is the need for repeated repair/maintenance over a 500-year period** and the uncertainties associated with this being reliably accomplished. **These issues should <u>preclude</u> a finding that a cap has "long-term reliability**."
Executive Summary – Effectiveness of Capping PDF p. 18	Task 16 showed the **expected long-term releases from capping** are to be **very small and comparable to long-term releases from dredging residuals** with a well-constructed single layer residuals cover, and better than the residuals cover if mixing with residuals or erosion occurs.	This statement **appears deceptive**, as the breadth of the statement appears to **include all potential releases from the capped area, but the expected long-term releases analyzed in Task 16 are only the contaminant flux and release into the overlying water from the cap**, and does not consider the range of ordinary to extraordinary events that might result in a release. In addition, the **best management practice recommended by the draft report is a double layer cover, and so the comparison to a single layer residuals covers is not relevant**.
Task 5 and Task 6	The **long-term reliability** of the	The draft report recommends that the

EXAMPLES OF REGION 6 COMMENTS ATTEMPTING TO MAGNIFY THE POSSIBILITY OF RELEASES FROM CAPPING ALTERNATIVE OVER A 500-YEAR PERIOD, OVER EMPHASIZE IRRELEVANT RESULTS OF MODELING OF ALTERNATIVE 3N, AND MINIMIZE THE IMPACTS OF RELEASES FROM ALTERNATIVE 6N		
Report Section	**Report Text**	**Region 6 Comment**
– Northwestern Area p. 43 (PDF p. 64)	Northwestern Area **can be improved** by providing greater resistance to armor stone movement. **Flattening of slopes** steeper than 1V:3H and providing a gradual transition between the slopes **are recommended to increase the factor of safety and provide for long-term stability**.	**slope** in the Northwestern Area **be flattened, but does not provide much discussion about how this will be accomplished** or issues that will need to be resolved. In particular, the weight of rock needed to flatten this slope will press into the soft sediment, **potentially leading to releases and instability**.
Task 7 – Impact of Amor Rock Erosion p. 50 (PDF p. 71)	The modeling performed of the October 1994 100-year flood event demonstrated that there **should be no dislodgment and subsequent movement of large armor rock across the surface of the cap** during that event.	**Is this also true for the worst-case Hurricane Ike/1994 flood scenario?**
Task 8 – Frequency of Barge Accidents/ Strikes p. 52 (PDF p. 73)	. . . the chance of a strike is about three times as great as that of an individual pushboat or barge tow, yielding an effective **probability of 1 in 130 for a significant strike** in a year or 1 in 15 for a lower severity impact strike in a year.	The Executive Summary states that "Task 8 showed a low probability of barge strikes that would impact the integrity of the cap." . . . . probabilities for barge strike are given are given [sic] as the probability in any given year. **What is the probability of barge strikes over the 500 year period**?
Executive Summary – Permanence of Capping PDF p. 16	The **expected releases from catastrophic events would be expected to be very small**, more than a **thousand times smaller than releases from removal** of the contaminated sediment as predicted for dredging Alternative 6N or a new Alternative 6N with enhanced resuspension BMPs.	There is **no quantification** in the draft report **of the amount of expected releases from barge strikes** (with the exception of one scenario) or from catastrophic events (or the uncertainties of even larger releases associated with catastrophic events), **so this comparison does not appear valid**.

EXAMPLES OF REGION 6 COMMENTS ATTEMPTING TO MAGNIFY THE POSSIBILITY OF RELEASES FROM CAPPING ALTERNATIVE OVER A 500-YEAR PERIOD, OVER EMPHASIZE IRRELEVANT RESULTS OF MODELING OF ALTERNATIVE 3N, AND MINIMIZE THE IMPACTS OF RELEASES FROM ALTERNATIVE 6N		
Report Section	**Report Text**	**Region 6 Comment**
		Catastrophic event (1994 flood+hurricane IKE) resulted in erosion of much of cap; text said it might cause significant erosion of substrate but no numbers given; so what is expected release from the catastrophic event? **and how was that found to be more than a 1000 times smaller than releases from removal?** Clarify Ex Summary to reflect info in text.
Executive Summary – Permanence of Capping PDF p. 17	Task 8 showed a low probability of barge strikes that would impact the integrity of the cap. Additionally, Task 8 showed that if the cap were impacted, the **accumulative potential releases of contaminated sediment** would be **very much smaller than the releases from the complete removal Alternative 6N** when compared with the predicted releases provided in Tasks 11 and 12.	With the exception of one scenario, **the draft report provides no quantification of potential releases from barge strikes,** and **so the basis of this statement is questioned.** . . . Why can't the analysis of sediment loss used in Task 14 and/or that used for scenario 7 could [sic] be used to quantify the potential range of sediment losses under all the scenarios? Note that in the discussion on page 9 the draft report states that "[t]he 50 cubic yards would represent less than 0.1 percent of the contaminated sediment, and it would be widely dispersed and diluted with the suspended solids of the flood waters." **Dilution should not be used as an ameliorating factor in a potential release.**
Task 7 – Impact of Substrate Material Erosion.	Impact of Substrate Material Erosion.	Please assess range of substrate erosion release; and **consider what may/would happen to the geotextile where the cap was totally eroded**.

EXAMPLES OF REGION 6 COMMENTS ATTEMPTING TO MAGNIFY THE POSSIBILITY OF RELEASES FROM CAPPING ALTERNATIVE OVER A 500-YEAR PERIOD, OVER EMPHASIZE IRRELEVANT RESULTS OF MODELING OF ALTERNATIVE 3N, AND MINIMIZE THE IMPACTS OF RELEASES FROM ALTERNATIVE 6N		
Report Section	**Report Text**	**Region 6 Comment**
p. 50 (PDF p. 71)		**Should also discuss this significant erosion in the Ex Summary** & the comparative analysis of the releases for the different alternatives. **Please add total percent of the entire cap that would be eroded** or potential range of amounts, & acres of substrate exposed or unprotected by cap.
Task 7 – Impact of Substrate Material Erosion. p. 50 (PDF p. 71)	The modeling performed on the October 1994 100-year flood event demonstrated that there was no substantial erosion of the cap's substrate material. The worst case scenario defined above **might cause significant erosion** of the substrate, **but it would be speculative and not technically defensible to definitively say that it would**.	Having stated that significant portions of the cap would be removed, with estimates of the percentage of the cap affected, **why can't the analysis used in Task 14 to quantify resuspension of sediment be used to estimate potential losses**?

EXAMPLES OF REGION 6 COMMENTS ATTEMPTING TO GLOSS OVER CONCERNS WITH ALTERNATIVE 6N		
Report Section	**Report Text**	**Region 6 Comment**
Executive Summary – Impacts of Remediation PDF p. 19	The new **Alternative 6N** with enhanced BMPs, despite its much smaller short-term releases, **would still set back the natural recovery of the site by at least a decade** considering the time required for design, construction and assimilation of the releases into the sediment bed below the bioactive zone.	**The report should clarify what is meant by setback**. . . . The sediment concentrations after the releases should be compared to the cleanup level and discussed as to whether the resulting levels are still protective or not (i.e., higher or less than the cleanup level).
Executive Summary – Impacts of Remediation PDF p. 19	Tasks 11 and 12 predicted and compared the short-term releases of solids and contaminants for the various removal alternatives. **The releases represent a significant increase in exposure** (more than an order of magnitude).	Releases vary for the different alternatives, so **the report should clarify which alternative(s) these releases apply to.** What is the result for new Alt 6? Regarding exposure – please describe whether that refers to concentration or exposure time. **The sediment concentrations after the releases should be compared to the cleanup level and discussed as to whether the resulting levels are still protective or not** (i.e., higher or less than the cleanup level)."
Executive Summary – Impacts of Remediation PDF p. 19	Upon comparison with Task 16 long-term post-remediation predictions, the short-term releases during remediation **are comparable to the expected long-term releases across the entire site over the 500 years** following remediation, **and more than 100 times the predicted releases from an intact cap** over the 500 years following placement.	Short term releases for which alternative? **What is result for new 6N? Discuss whether the releases will result in levels are** [sic] **still protective or not** (i.e., higher or less than the cleanup level).
Executive Summary – Impacts of Remediation	Releases predicted in Task 14 were up to 3 percent of the mass of dioxin present in the waste pits.	Also discuss **what the releases would be for new 6N using BMPs**.

EXAMPLES OF REGION 6 COMMENTS ATTEMPTING TO GLOSS OVER CONCERNS WITH ALTERNATIVE 6N		
Report Section	**Report Text**	**Region 6 Comment**
PDF p. 20		
Task 12 – Statement p. 98 (PDF p. 119)	Identify and evaluate techniques, approaches, Best Management Practices (BMPs), temporary barriers, optional controls and/or engineering controls (*i.e.,* silt curtains, sheet piles, berms, earth cofferdams, etc.) to minimize the amount of sediment resuspension and sediment residuals concentrations during and after dredging/removal.	**Please add caissons for consideration as a BMP** especially in deeper water areas to reduce sediment resuspension/releases.
Task 12 – Sheet Pile Wall p. 126 (PDF p. 147)	The average depth in this section is 15 feet, **which makes it somewhat impractical to confine with a sheet pile wall.**	**Please add a discussion of caissons here, including their effectiveness** (relating to storms & sediment releases) compared to other methods, practicality & construction issues of using them in some areas of the site, and their relative costs to sheet piles.
Task 14 – Statement p. 153 (PDF p. 174)	Provide a model evaluation of the full removal Alternative 6N identified in the Feasibility Study as well as any new alternative(s) developed under Task 12 (Identify and evaluate techniques . . .) above. Include modeling of sediment resuspension and residuals.	. . . . **Does this analysis represent modelling** of the **relatively short period between dredging and cover placement?** – if so, that should be clarified. **Why was the modeling done of the surface of the newly exposed sediment bed when a double layer cover was recommended?** Also, **did the analysis in Task 14 include excavation** of the shallow areas of the Eastern Cell **in the dry**, an option discussed in the draft report, **or in the wet?**
Task 14 – Findings p. 154 (PDF p. 175)	The new Alternative 6N with enhanced BMPs, **despite its much smaller short-term releases, would still set back the natural recovery of the site by at least a decade**	. . . . **What is the basis for these estimates?** The report should **clarify what is meant by setback**. What is

EXAMPLES OF REGION 6 COMMENTS ATTEMPTING TO GLOSS OVER CONCERNS WITH ALTERNATIVE 6N		
Report Section	**Report Text**	**Region 6 Comment**
	considering the time required for design, construction and assimilation of the releases into the sediment bed below the bioactive zone.	significance of the setback compared to the cleanup level? **The sediment concentrations after the releases should be compared to the cleanup level** and discussed as to whether the resulting levels are still protective or not (i.e., whether higher or less than the cleanup level)." (p. 154)
Task 14 – Findings p. 154 (PDF p. 175)	In conclusion, the **full removal alternative would result in a significant, albeit short-term increase in the exposures** of the estuary to contamination due to the erosion and subsequent transport of the sediment residuals that would be present at the end of the dredging operations in the Northern Impoundments.	**What is the avg increase in sediment concentration? (before to after) & how does it compare to the cleanup level?**

COMMENT N-6: THE PROPOSED PLAN MINIMIZES THE IMPLEMENTABILITY CHALLENGES ASSOCIATED WITH ITS PREFERRED ALTERNATIVE

A. Implementability challenges need to be evaluated as part of the remedial selection process rather than being relegated to the remedial design phase.

Region 6 dismisses or marginalizes, the significant implementability issues associated with its preferred remedy, relegating considerations critical to remedy selection to the remedial design phase.[133] Independent reviews by Dr. Palermo (Appendix A) and Mr. Taylor and Mr. Vogt (Appendix C) demonstrate the extent to which Region 6 has ignored or dismissed the complexities of removing the existing cap and geotextile and then excavating or dredging the underlying waste, and underscore the extent to which Region 6 selected Alternative 6N without any recognition of the real-world complexities and the uncertainties of implementing that remedy. As Dr. Palermo notes, Region 6 has dismissed those concerns (many of which were raised by its own expert – USACE) with a "hand wave."[134] Messrs. Taylor and Vogt characterize Region 6's approach to implementation as "presume now and later determine how effective BMPs will be during Remedial Design."[135]

These issues must be seriously evaluated by Region 6 in selecting the appropriate remedial alternative; otherwise, Region 6 cannot make a reasoned decision based on a detailed analysis of NCP's nine remedy selection criteria that are discussed in Comment N-15, below. As Messrs. Taylor and Vogt note, "[t]hese are not areas for research and development at the Remedial Design stage. If they don't work, that would mean that Alternative 6N has been selected and justified on a faulty basis."[136]

[133] Proposed Plan at 35; Final Interim FS at 109.
[134] Palermo Report at 7.
[135] Taylor Report at 1.
[136] Taylor Report at 3 (emphasis added).

B. Removing the existing armored cap will involve implementability issues that, at this point, cannot be fully foreseen. Even so, there are multiple implementability issues that are apparent and that Region 6 did not meaningfully consider.

In the Proposed Plan, Region 6 acknowledges implementability issues exist for Alternatives 4N, 5N, 5aN, and 6N, including "temporary armored cap site access, limited staging areas, restrictions on equipment size, and availability of offsite staging area properties," compared to Alternative 3N and 3aN.[137] Region 6, however, does not address those implementability issues with respect to Alternative 6N to the extent required to support its selection.

As Dr. Palermo notes, there are significant unknowns associated with a large scale removal of an armored cap (something that has never been done), and with dioxin-laden material being dredged or excavated from an existing armored containment in a mostly submerged riverine site. Similar concerns are raised in the Taylor Report.[138] Thus, the removal of the existing armored cap may involve implementability issues that, at this point, cannot be foreseen and would need to be addressed by Region 6 in continuing to consider Alternative 6N.[139] As detailed in the Taylor Report, Region 6 has "not adequately identified and evaluated the implementation challenges associated with Alternative 6N."[140] Region 6's "to be determined later" approach to BMPs is fundamentally flawed and fails to address the true risks of Alternative 6N.

Even so, multiple implementability issues are apparent (including those acknowledged by Region 6 in the Proposed Plan). They include the following:

1. Dewatering

Region 6 has simply concluded that releases can be "minimized" by "working in the dry."[141] Given the nature of the material to be removed and the fact that even removal operations "in the dry" will almost all be conducted below the water table, however, equipment can be expected to become clogged with sediment, immobilized, and sometimes sink through soft layers of the material. In addition, equipment may also track contaminated material and recontaminate clean areas.

[137] Proposed Plan at 35.
[138] Taylor Report at 45.
[139] Palermo Report at 20.
[140] Taylor Report at 3.
[141] Proposed Plan at 28, 35; Final Interim FS at 66.

The fact that the material to be excavated is a waste material contaminated with dioxin exacerbates all such problems.

The excavation operation would be sloppy and subject to slow progress, depending largely on how much of the work can be accomplished in the dry and how effectively the material can dry out as work progresses—and "[d]ewatering will be an implementation issue."[142] As set forth in the Taylor Report, "[e]xcavation **in the dry** is a misnomer for this project."[143] The waste to be excavated is estimated to be up to ten feet deep and after the first two feet of the excavation, the waste "will start to become water logged and saturated."[144]

Core data show that there is clay-like material in part of the capped area, but high water content material in other areas. Dewatering will be difficult, as there will be gravity drainage of rainwater and seep water from the enclosure area into a sump and pumpout will be a constant requirement.[145] Drying an exposed surface of fine-grained material can take months at best, and even then, the drying does not extend to depth. Because of this, the work "in the dry" will require excavation of materials with high water content, given that the excavation will extend to as much as ten feet below the water table.[146] As pointed out in the Taylor Report, in the areas which are to be conducted "in the dry," excavation below the first foot or two will involve working with material that is water-logged and saturated, and will likely require use of "amphibious vessels that can work in the mud and muck"[147] ("which are the actual saturated wastes" to be removed).[148] These vehicles are ones that "can essentially float on top of the muck without getting stuck" and can operate in flooded conditions.[149] These specialized excavators, however, are less productive, meaning this would be "very time intensive work" that will "result in the disturbed wastes being exposed for long periods of time."[150] Thus, the

[142] Palermo Report at 20.
[143] Taylor Report at 3 (emphasis added).
[144] *Id.* In the "shallow waters of the Eastern Cell, there will be no 'dry' wastes, as the wastes are below river water level, and subject to the same leakage and upwelling factors as the Western Cell." *Id*. at 15.
[145] Palermo Report at 20; Taylor Report at 17. In addition to "seepage through the sheet piles," the "other source that will keep the wastes in a wet condition is the seepage from up-welling from below the waste pits." Taylor Report at 17
[146] Palermo Report at 20; Taylor Report at 15.
[147] Taylor Report at 15.
[148] *Id* at 16.
[149] *Id* at 4.
[150] *Id.*

excavation will be a slow and sloppy operation, even in areas which Region 6 claims can be done "in the dry."[151]

The need for dewatering—due to upwelling (*i.e.*, water entering the excavation area from underneath), leakage through the sheet pile walls, dewatering of the wastes and rainfall—w ill be significant, and more so at excavation depths below one or two feet, and how much of this dioxin-contaminated water will need to be managed and treated and how that could be accomplished are not addressed.[152] The amount of water could overwhelm the treatment plant constructed for that purpose, resulting in the need to bypass or dump the excess load through an overflow structure.[153] USACE raised these same implementability concerns with Region 6 early in the process, yet Region 6 never addressed them in any meaningful fashion in its Final Interim FS and Proposed Plan. For example, in March 2015, Dr. Paul Schroeder, one of the principal authors of the USACE Report, pointed out to Region 6's Remedial Project Manager, Gary Miller, some of the challenges associated with a removal alternative:

> The biggest issue is creating and maintaining a dry zone. **Sheet pile walls leak**. A caisson would be needed to perform the work in the dry, two walls of sheet piles filled with fine grained soil or lined with geosynthetic/clay liner. All of the water collected after drawdown would probably need to [be] treated since it would consist of **seepage from contaminated materials and runoff from the disturbed sediment** being removed. There are sands at depth which would produce large volumes of seepage.[154]

Dr. Schroder then went on to note other implementability and schedule issues that are discussed below:

> The construction of the containment system would be slow. Trucking of all of the materials would be difficult; roads would be needed. Dewatering of the sediment would be needed. A sizeable staging area would be needed. **It would take several years to**

[151] Palermo Report at 20.
[152] Taylor Report at 17. Even removal of the rock and geotextile "will not be a simple action, given the water environment." *Id*. at 16.
[153] *Id*. at 17.
[154] Email from Paul Schroeder to Earl Hayter, forwarded to Gary Miller on March 19, 2015. (AR 9563058) (emphasis added).

complete, exposing the site to greater risks of flooding and hurricanes.[155]

2. Incremental excavation.

To address the potential for storm and flood events during implementation, the Final Interim FS and Proposed Plan also propose that the excavation and dredging for removal of the waste be done incrementally. This is, according to Region 6, to avoid exposing the entire surface of the Northern Impoundments, reducing the risk of release if flooding does overtop the protective barrier.[156]

This need for incremental removal of armor and cap presents significant issues with respect to timing, transition between open areas being excavated and other capped areas, slope stability during excavation, and related safety of workers.[157] It is in direct conflict with USACE's recommendation that "[t]he entire cap within the sheet pile enclosure should be removed prior to solidification, excavation or dredging to limit contamination of the TCRA armor cap material."[158] The point noted by USACE is that it is difficult to excavate a portion of the waste material without tracking over clean capped areas to transport the excavated material out of the work area. In addition, the incremental excavation of sub-areas requires excavation to depth and placement of the residuals cap while still maintaining the surrounding areas without slumping and deeper slope failures. These considerations were not evaluated or taken into account by Region 6.

3. Removal of Existing Cap.

The USACE Report noted "[i]t is difficult to understand how the armor cap material could be readily removed without snagging and disturbing the geotextile and sediment [waste], particularly if performed underwater." As more bluntly stated by the Director of the ERDC Center for Contaminated Sediments at USACE, the removal of the armored cap and geotextile "will result in a … mess of turbidity, re-suspended sediments, and residuals."[159] In areas in which the water is deeper than -3 feet (shown on Figure 3), removal of the existing cap and the underlying waste will have to be done "in the wet."[160] It may be possible to use

[155] *Id*. (emphasis added); *See also* Taylor Report at 33-34, 37-38.
[156] Proposed Plan at 28.
[157] Palermo Report at 20; Taylor Report at 16, 19, 34-35.
[158] USACE Report at 118.
[159] Taylor Report at 1 & 18.
[160] *Id*. at 11

sheet pile walls to isolate at least some of these areas from the river, but the depth of the water means the excavation work will need to be performed "in the wet." [161]

In that situation, the physical removal of the armor cap and underlying geotextile will be "much more difficult" than Region 6 acknowledges and "cutting the geotextile in a precise manner and peeling back the geotextile" as contemplated by Region 6 in the Proposed Plan will be "technically impractical underwater."[162] For example, it is "expected that the geotextile will rip apart" when it is removed, and "not necessarily at the seams as they are installed and rated to be as strong as the geotextile."[163] Further, as the "remaining rocks [from the cap] spill into the underlying wastes," the subsequent removal effort will be "complicated" as they will result in "more issues of non-closed buckets when dredging."[164] Because of the way that the armor rock is embedded in the underlying geotextile and the undulating surface of the cap, it will not be possible to remove the armor rock first and then the geotextile.[165]

4. Access.

The logistics of performing Alternative 6N are daunting, and particularly challenging in the face of a storm event during the construction period, a possibility Region 6 fails to seriously consider. The Northern Impoundments are serviced by a single, low-lying access roadway immediately adjacent to and beneath the I-10 bridge and Respondents would need to obtain permission for use of the access roadway from the Texas Department of Transportation.[166] During high water levels, the access roadway can become flooded making passage difficult, if not impossible, for land-based equipment. Because Alternative 6N would remove the existing armored cap, there would also be very limited space available for an on-site staging area.

Access to the Northern Impoundments from the water would be necessary for a significant portion of the work and poses other challenges for Alternative 6N. The river navigation channel passes under the I-10 bridge, which has low clearance for marine-based equipment; thus, there is a limit to the size of the marine equipment that can access the Northern Impoundments from the water. In addition, much of

[161] *Id*. at 16
[162] *Id*. at 19.
[163] *Id*.
[164] *Id*.
[165] *Id*.
[166] Flying debris thrown or kicked up from the bridge deck by passing vehicles will be a significant safety hazard to those using the access roadway.

the existing armored cap is surrounded by relatively shallow water. This further limits access of marine-based equipment to relatively smaller, shallow-draft construction barges.[167]

5. Off-site transport and off-site facility.

An ancillary issue related to implementation of a full removal remedy is the transport of excavated waste off-site. Region 6 has indicated that barging of materials from the work area would hold advantages.[168]

But even with barging to an off-site management area, a property of sufficient size with water access and in reasonable proximity to the Northern Impoundments will need to be located and leased.[169] Region 6 acknowledges that "[i]dentifying and securing an offsite staging area is considered an even greater challenge for Alternatives 5N, 5aN, and 6N compared to Alternative 4N because removed waste material and sediment may need to be managed at the offsite staging area, which requires a larger footprint, and given the nature of the dredged material, might make finding a willing landowner difficult," but glosses over those substantial implementability issues in noting that "[p]roper management of cap material and excavated wastes, and onsite processing and management for removed sediments for offsite transportation to neighboring roadways, will be critical for effective implementation…."

The implementability challenges involve not only locating a suitable property for such a facility with an owner willing to lease or sell the property for this purpose, but also the permitting of the facility.[170] The necessary permits may require two or more years to obtain.

Given the nature of the material to be handled at the off-site staging facility, the permitting process would require notice to the public, an opportunity for comment and, if requested by any member of the public, a contested case hearing before

[167] Taylor Report at 31-32.
[168] Palermo Report at 21.
[169] Locating an off-site facility for staging of material, equipment and workers before and during construction of the TCRA was a significant challenge. For implementation of Alternative 6N, logistics will be much more complex because of the need to handle hazardous materials (the cap material and the material removed from beneath it at that location).
[170] Under 40 CFR §300.430(e)(1), no federal, state or local permits are required for on-site response actions. The term "on-site" means "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action." Respondents are not currently aware of any areas "in very close proximity" to the Northern Impoundments where the staging facility could be located.

TCEQ.[171] An off-site facility for management of wastes from the Northern Impoundments is very likely to be subject to a contested permitting process, which can last well over two years with no guaranty that the permit will be granted.[172] TCEQ's contested case hearing process is similar to a non-jury trial and is presided over by a specialized agency called the State Office of Administrative Hearings. Because a permit will be needed prior to the receipt of any waste by the facility, no cap or waste removal activity could begin at the Northern Impoundments until a permit is secured. These are all significant implementation issues that have not been appropriately considered by Region 6.

Once an off-site management area is established and the excavated material is stabilized, there will be a need for trucks to transport the material to a landfill for disposal. The Proposed Plan and Final Interim FS acknowledges that this will require an estimated 13,300 to 17,500 truck trips.[173] As Dr. Palermo notes, that number of truck trips to transport dioxin-contaminated material through one of the most populous counties in the country is not a trivial implementation issue.[174]

6. Construction duration.

Region 6's estimated construction time for Alternative 6N is 19 months.[175] The expectation that implementation of Alternative 6N, to include dewatering, excavation of more than 150,000 cubic yards of material, and installation of a new cap over the remaining material, can be accomplished in an efficient manner and completed within 19 months is unrealistic, as addressed in the Palermo Report and the Taylor Report.[176] In the absence of details regarding the BMPs, in particular, information about the placement of the proposed sheet pile walls, it is not possible to determine whether the schedule reflects the potential complexity and challenges associated with Alternative 6N's implementation, particularly given that the Proposed Plan states that BMPs are to be utilized "where feasible," "if practicable" or "as appropriate" and feasibility, practicality and appropriateness may not be apparent until implementation is underway.[177]

[171] Texas Health and Safety Code §361.061, .067, .079, .081, .089; 30 TAC § 335.2; Texas Water Code § 5/551.
[172] *See, generally*, Overview of Public Participation on Environmental Permitting for Applications Filed on or after Sep. 1, 2015, TCEQ (September 2015); *see also* Taylor Report at 36.
[173] Proposed Plan at 29, Final Interim FS at 108.
[174] Palermo Report at 21-22. *See also* Taylor Report at 36-37.
[175] Proposed Plan at 28.
[176] Palermo Report at 22; Taylor Report at 37-38.
[177] Taylor Report at 3 and 37-39.

The Taylor Report identifies several other "real-world implementation issues" that will result in an extended construction timeline for Alternative 6N. These include: (i) work "in the dry" will for the most part be "in the mud and muck," requiring the use of specialized construction equipment and creating cross-contamination issues that will extend time schedules; (ii) the number of dredging-bucket loads that will be required has been grossly underestimated due to the assumption that a larger bucket than practicable can be used for the work; and (iii) the impact of storms and flooding events during evacuation and dredging activities with exposed waste has not been adequately considered.[178] Experienced contractors, after reviewing Alternative 6N, have concluded that Region 6's 19-month implementation estimate is "unrealistic" given, for example, Region 6's inaccurate excavation "in the dry" assumptions and dredging rate assumptions.[179] It could take over two years just to locate and permit an offsite staging facility, a prerequisite to even starting the removal process.[180] Further, the construction duration would be even longer if in-water work was only conducted during favorable weather periods when the risk of inclement weather and flooding were lower, as suggested by Region 6.[181] Further delays in completing the work could be caused if any of Region 6's "where feasible," "if practicable" or "as appropriate" BMPs turn out not to be feasible or practicable—Region 6 does not appear to have built in any contingencies for such occurrences in its 19-month schedule.[182] As stated in the Taylor Report: "If just one of the many assumed BMP applications about the site is not feasible or practicable, what happens then? Redesign, reorder equipment, get new approvals, and try something else? These take time and effort, and there appears to be no contingency built into the 19 months listed in the PRAP as the construction period ...."[183]

[178] Taylor Report at 37-38.
[179] *Id*. at 37-38.
[180] *Id*. at 38.
[181] *Id*. at 37 ("While not stated in the USACE report, this would mean no excavation or dredging for 4-5 months per year.")
[182] *Id*. at 37-38.
[183] *Id*.

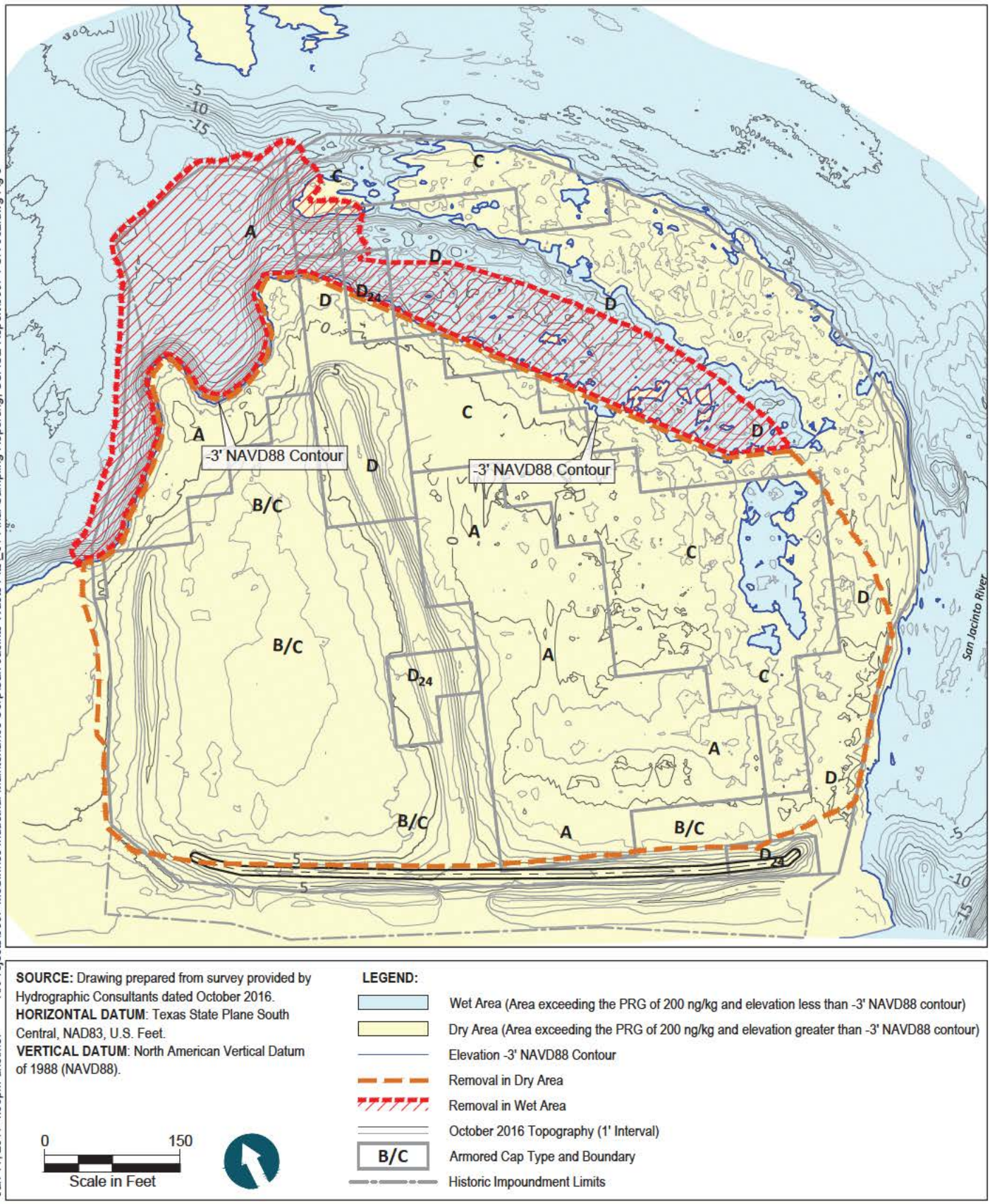
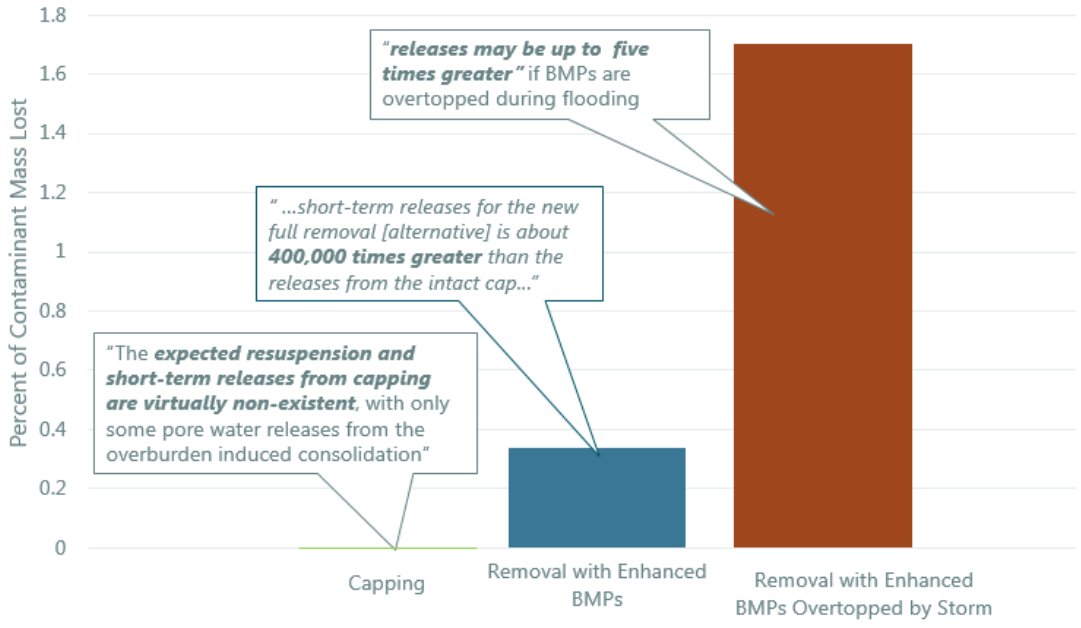


Figure 3
Proposed Plan Removal in the Dry and Wet Areas Using an Approximate -3 Foot NAVD88 Elevation
IP/MIMC January 12, 2017 Comments to Proposed Plan
San Jacinto River Waste Pits Superfund Site

<u>COMMENT N-7:</u> REGION 6 ACKNOWLEDGES THAT ALTERNATIVE 6N CANNOT BE IMPLEMENTED WITHOUT CAUSING RELEASES THAT WILL INCREASE FISH TISSUE CONCENTRATIONS OF DIOXIN AND FURANS FOR MANY YEARS.

The USACE Report confirmed that releases of waste materials during removal operations will occur, no matter what BMPs are used during construction.[184] The USACE Report also states that the Alternative 6N releases will increase the concentration of dioxins and furans in tissue of fish and other estuarine organisms.

The USACE Report concludes that dredging will cause significant contaminant releases to the San Jacinto River compared to capping, and "…short-term releases for the new full removal [alternative] is [*sic*] about **400,000 times greater** than the releases from the intact cap… "[185]. If flooding occurred during remedial construction "**releases may be up to five times greater"**[186] if BMPs constructed to prevent releases during dredging are overtopped. Figure 4 provides a graphical depiction of the releases expected by USACE to occur from implementation of Alternative 6N in comparison to Alternative 3aN.



[184] USACE Report at 19.
[185] USACE Report at 6 (emphasis added).
[186] USACE Report at 7 (emphasis added).

Figure 4: Depiction of Releases from Alternative 6N (full removal) vs. Alternative 3aN (enhanced capping).

Releases resulting from the attempted implementation of the Proposed Plan will be further exacerbated if significant storms occur during the construction period. During 2016, there have been at least two flood events in the San Jacinto River that exceeded the 10-year flood, one of which approached a 50-year flood.[187] The USACE Report states that "[i]f a storm…occurred during the actual removal/dredging operation, the likelihood of **extremely significant releases** of contaminated sediment occurring is **very high**"[188] and notes that those releases could be as much as five times higher (or 2 million times greater than for the intact cap. The USACE Report also states that "…full removal under Alternative 6N would be expected to significantly increase the short-term exposures to contaminants. As much as 3.3 percent of the contaminant mass is predicted to be released when using silt curtains… [such a release] would set back the natural recovery of the site back to existing conditions by up to two decades…"[189]

The magnitude of the two flood events (mentioned above) that occurred in the San Jacinto River in the spring of 2016 highlight the potential risks. The April 2016 flood was triggered by historic rainfall of more than 17 inches in a single day—an event that caught many local residents off guard. As shown in Figure 5, the water level increased by more than ten feet in a single day in the San Jacinto River during the May 2016 flood.[190]

[187] Harris County Flood Warning System Location 720 gage data (Location 720 Gage Data). Gage located on San Jacinto River at US 90. Data available at https://harriscountyfws.org/GageDetail/Index/720
[188] USACE Report at 185 (emphasis added).
[189] USACE Report at 5.
[190] Location 720 Gage Data.

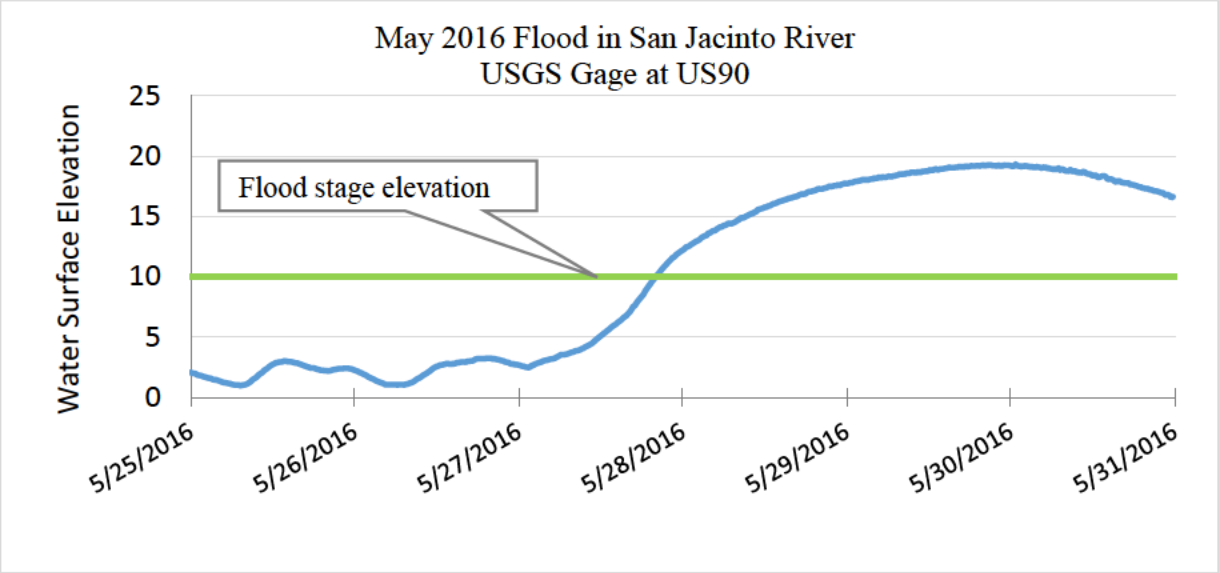


Figure 5: May 2016 Flood in San Jacinto River.

If a "dry" remediation were under way at the Northern Impoundments during either of these floods, it would have been virtually impossible to prevent the loss of material beyond the work area. It would have been equally difficult to respond to such a loss considering that the flooding prevented land access following the April flood.[191]

The Proposed Plan and Final Interim FS acknowledge that one-fourth of the waste (located in deeper areas of the Northern Impoundments) will be dredged "in the wet."[192] The USACE Report and the Final Interim FS both indicate that these deeper areas would likely require the use of silt curtains, or a combination of silt curtains and sheet piles, as part of any removal action (even with enhanced BMPs), because of the technical impracticability of using other BMPs in those deeper water areas.[193] Figure 3 depicts areas of the armored cap (in the Northwestern Area and the Eastern Cell) in which, because water levels exceed -3 feet NAV, the

[191] In late April, when the river reached flood stage, several attempts were made by Respondents' contractors to access the Northern Impoundments (including on April 19, April 20, and April 22, 2016). These efforts were unsuccessful due to flooding of I-10 and closure of I-10 off-ramps and on-ramps, local roads, and the Texas Department of Transportation right-of-way that provides access to the Northern Impoundments.

[192] *See, e.g.*, Proposed Plan at 28 (noting that "[a]pproximately three-fourths of the waste material will be excavated in the dry behind sheet pile walls" and conceding, by implication, that the remaining one-fourth will be "in the wet.").

[193] *See, e.g.,* USACE Report at 5 (addressing use of silt curtains); Final Interim FS at ES-10 ("Raised berms, sheet piles, and **silt curtains** in addition to dewatering and removal in the dry to the extent practicable will be used to reduce the resuspension and spreading of the removed material." (emphasis added) and at 66 ("Best management practices may include … excavation … with … silt curtains.").

excavation is to be performed "in the wet." acknowledges that removal would be in the wet.

Case studies have shown that cleanup remedies that involved dredging have in several instances increased fish tissue concentrations of chemicals of concern (COCs), often for several years following completion of dredging (*e.g.*, at the Commencement Bay and Duwamish Waterway Superfund sites[194]). During the 1995 non-time critical removal action (NTCRA) in the Grasse River, caged fish deployed along the perimeter of a set of three silt curtains for six weeks showed several-fold increases in PCB concentrations compared to those observed in the pre-dredging period.[195]

Lessons learned from the 1995 Grasse River NTCRA over ten additional years did not prevent a similar impact to Grasse River fish during the 2005 Remedial Options Pilot Study dredging[196]. During this pilot study, the polychlorinated biphenyl (PCB) concentrations increased substantially in fish[197]. The circumstances at the Commencement Bay, Duwamish Waterway, and Grasse River Superfund sites, among others are of serious concern at this Site as well, because dioxins and PCBs are similar types of chlorinated chemical compounds (*e.g.*, they are hydrophobic and bioaccumulative).

The USACE Report states that fish tissue contaminant concentrations are considered to be directly related to releases to the water column and that for several years after implementing a full removal alternative, fish tissue contamination will be **dozens of times greater to hundreds of times greater** than under current conditions depending on the types of BMPs used during construction.[198] Further, as noted above, the USACE Report states that "the short-term releases for the new full removal Alternative 6N is about 400,000 times greater than the releases from the intact cap for the same period and area and about 2,500 times greater than the releases from stable sediment of the same area at the

[194] Learning from the Past to Enhance Remedy Evaluation, Selection, and Implementation. Presentation by C. Patmont, S. Nadeau, and M. McCulloch at the Battelle International Conference on Remediation of Contaminated Sediments, February 2013.
[195] Sediment Dredging at Superfund Megasites: Assessing the Effectiveness, Committee on Sediment Dredging at Superfund Megasites. Board on Environmental Studies and Toxicology, Division on Earth and Life Sciences. National Research Council. The National Academy Press, Washington, DC, 2007. 263 pp. plus appendices. (NRC on Dredging).
[196] NRC on Dredging at 111.
[197] NRC on Dredging at 111.
[198] USACE Report at 6**.**

PCL."[199] This will greatly exacerbate concerns about exposure to contaminants as a result of eating local fish and shellfish.

Region 6, attempting to marginalize the USACE Report's findings regarding releases and associated fish tissue concentrations, exaggerates the benefits of the BMPs (without explaining in any detail how they would be applied and without acknowledging the complexities and uncertainty associated with the work) and marginalizes the impact of releases on fish tissue with respect to the time required for recovery even to pre-implementation levels.[200]

It is certain that there will be significant releases resulting from Alternative 6N's implementation—even with "enhanced BMPs," Region 6 cannot defer consideration of the specifics of Alternative 6N's implementation to the remedial design phase because those specifics will define the magnitude of the releases that will result from implementation, which Region 6 must assess in selecting a remedy. As noted by Dr. Palermo, Region 6 must do more than simply dismiss these issues with a "hand wave."[201]

[199] USACE Report at 6.
[200] Palermo Report at 18.
[201] Palermo Report at 7.

COMMENT N-8: THE PROPOSED PLAN MINIMIZES THE RELEASES THAT WILL RESULT FROM IMPLEMENTING ITS PREFERRED ALTERNATIVE

Region 6 acknowledges but significantly underestimates and downplays the nature and sources of releases that will occur during implementation of Alternative 6N. Region 6's assessment of releases during implementation of Alternative 6N is based on some—but not all—of the sources of releases associated with Alternative 6N. Region 6 minimizes and attempts to explain away releases identified by USACE resulting from installation and removal of sheet pile walls and those from the exterior of the bucket during excavation.[202] In addition, as noted in the Taylor Report, not only is Region 6's position with respect to releases "misleading by mischaracterizing the effectiveness of proposed BMPs,"[203] Region 6 "completely missed" two other "major sources of releases to the river that will dwarf" its estimated releases.[204]

The two "additional major sources of releases" that Region 6 did not consider are: "(1) It is estimated that about one half of the dredge's buckets will come to the surface blocked open with rocks from the armor cap, releasing the wastes to the water column; and (2) auxiliary or ancillary vessels such as tug boats and service boats cause a large amount of propeller wash and erosion of bottom sediments, resulting in significant amounts of resuspended sediments."[205] These two additional sources of releases alone substantially increase the total volume of dioxin Region 6 will cause to be released to the river through implementation of Alternative 6N.

Given that a significant portion of the work cannot be performed "in the dry," releases from open buckets could be significant and difficult to control with sheet curtains and silt screens. For example, if only half of the dredge buckets were blocked open by cap rocks and spilled their contents into the water column in the Northwestern Area and the deeper water of the Eastern Cell, "a total of 32 grams of dioxin/furans would be released into the water column"—more than 5% of the

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[202] *See, e.g.,* USACE Report at 88.
[203] Taylor Report at 41. For example, Region 6's release estimates are based on assumed benefits from BMPs, such as removal of the majority of the waste in the "dry." Region 6, however, "does not actually know if dredging behind sheet pile walls in the shallow water portion of the Eastern cell can be accomplished. If it cannot, the estimates of releases of resuspended contaminants and residuals are wrong, and the basis for selection of Alternative 6N is erroneous." *Id*. at 40.
[204] *Id*. at 41.
[205] *Id*. at 41-42.

total amount of dioxins/furans to be removed.[206] If the shallow water area of the Eastern Cell "is also dredged and not excavated in the dry . . . the total released to the water column would be 72 grams."[207] Without considering these two sources of releases, USACE estimated that 2.0 to 2.37 grams of dioxin/furans—0.34% of the total waste to be removed—would be released through implementation of Alternative 6N.[208] Using that estimate—0.34%—USACE said that Alternative 6N would set the natural recovery of the site back by up to one decade. Given that the real release is likely more than 15 times as much (and likely substantially more)[209], how many decades, if not centuries, will the river actually be set back?

In addition, auxiliary or ancillary vessels such as tugboats and service boats create propeller wash that can result in resuspended sediments.[210]

Not only did Region 6 miss these two "major sources of releases" entirely, it has an incomplete understanding of identified potential releases and has mischaracterized the effectiveness of proposed BMPs in reducing additional releases.[213] Further, USACE underestimates the resuspended sediments and residuals in three areas: increased resuspension when removing the geotextile; a smaller dredging bucket will necessarily be used requiring more dredging passes; and loss of residuals under silt curtains.[214] As such, other potential sources of resuspended dioxins/furans and residuals to the river include, for example, the following phases of Alternative 6N implementation:

- **Geotextile removal**—Region 6 has "not demonstrated an understanding of the technical challenges (*e.g.*, underwater removal of the rock, how to cut the geotextile, how to pick it up without creating a dispersion of residuals, how to remove the cap and geotextile in small sections, and how to peel back the rock and geotextile to install sheet pile) nor evaluated the environmental ramifications associated with the actual removal of the cap, geotextile and waste."[215]

- **Use of silt curtains**—It is likely that silt curtains will be the only viable BMP in portions of the Northwestern Area, and the assumptions used to

[206] *Id*. at 48.
[207] *Id*.
[208] *Id*.
[209] *Id*.
[210] *See, e.g.*, Taylor Report at 1-2, 5, 31, 33, 49-50.
[213] *See generally Id*.at 41-44.
[214] *Id*. at 3, 30, 46-48.
[215] *Id*. at 41.

estimate releases from silt curtains materially understate what the actual releases are likely to be, given how sediments disturbed by the construction activities near the bottom are likely to freely flow with the river currents and under the bottom of the silt curtains.[216] The silt curtains can also cause "more resuspension than if the curtain were not there."[217] In addition, removal of the sheet pile will result in sediments that are stuck to the sheet pile itself being washed into the river and released.[218]

- **Dewatering and Transportation of Excavated Material**— Wastes excavated "in the dry" will also need to be dewatered, as the lower portions of the excavation behind sheet piles will be subject to upwelling , storm water and leakage though the sheet piles. There is a "great uncertainty regarding the volume to be dewatered and storms and flood waters may overwhelm the treatment plant, resulting in releases of contaminants."[219] Water generated from dewatering, which would be contaminated with dioxins, would need to be treated on-site for discharge, or collected and transported off-site for treatment and disposal. The process and the transport to an off-site facility also has the potential for spillage or loss.[220] Further, if the on-site treatment plant were overwhelmed, the untreated water would bypass the plant and discharge to an overflow structure.[221]

- **Sheet pile installation/removal**—Region 6 has not fully taken into account releases associated with sheet pile installation, requiring removal of the armor rock and "peeling back" of the geotextile, causing those areas to be "subject to erosion of contaminants from storms and high water."[222] USACE also did not consider the loss of residuals after the sheet piles are removed. The Taylor Report notes that "while the excavated waste pits will be covered with two layers of clean fill, exposure to storms and flood waters will in time erode the clean fill into the river exposing the residuals to release to the

[216] *Id.* at 21, noting that with respect to silt curtains, "sediments near the bottom freely flow with the river currents and under the bottom of the silt curtains into the wider riverine environment."
[217] *Id*. at 22.
[218] *Id*. at 25.
[219] *Id*. at 50.
[220] *See, e.g., Id*. at 17, 37.
[221] *Id*. at 17, n2.
[222] Taylor Report at 16. *See also Id*. at 49—"exposure of waste materials to storm events during sheet pile installation around the Western Cell and Eastern Cell was not addressed."

River."[223] Further, on removal, "sediments that are stuck to the sheet pile will be washed into the river and released."[224]

In addition, "exposure to storm events during sheet pile installation, during cap and geotextile removal, and during waste removal is a potentially serious threat which could result in significant releases of contaminants to the river."[225] The risk of storm erosion—even with BMPs—presents a "risk of significant release of dioxins."[226] As the Taylor Report concludes, the "reality is that Alternative 6N will result in much higher levels of resuspended sediments and residuals containing suspended waste materials than EPA estimated, most of which will be released to the San Jacinto River."[227]

Region 6 has minimized the release issue and has, for the most part, simply assumed that it can be somehow addressed after selection of the remedy during the design phase. This approach violates Region 6's obligations to make a reasoned decision regarding the appropriate remedy based on a detailed evaluation of the NCP remedy selection criteria. It is particularly bewildering that Region 6 is taking this approach in light of the clear preference of Region 6's expert, USACE, for containment, as evidenced by the USACE Report and the statement of the Director of ERDC's Center for Contaminated Sediments regarding removal of the rock cap and geotextile on the Northern Impoundments: "It's never been done. It will result in a huge mess of turbidity, re-suspended sediments, and residuals."[228]

[223] Taylor Report at 49.
[224] Taylor Report at 17.
[225] Taylor Report at 34.
[226] Palermo Report at 16. *See also* Taylor Report at 49-51.
[227] Taylor Report at 41.
[228] Taylor Report at 1.

COMMENT N-9: REGION 6'S REJECTION OF ALTERNATIVE 3AN IN FAVOR OF ITS PREFERRED REMEDY IS PREMISED ON AN UNSUBSTANTIATED RISK OF ABRUPT FUTURE CHANGES IN THE RIVER'S COURSE

Region 6 explicitly bases the Proposed Plan on the possibility of abrupt future changes in the San Jacinto River channel that might result in widespread erosion and a "catastrophic" release. In its Final Interim FS, Region 6 asserts, based on review of a handful of aerial photographs, that

> … [r]iver conditions have significantly changed with respect to the location of the waste impoundments (Figures 2-4.1 through 2-4.4). These photos clearly show that the river channel has changed over time. These river changes will continue and could cause a catastrophic release of the highly toxic waste materials from the impoundments, if the waste materials remain in place.[229]

Beyond examining these aerial photographs (which as noted below, do not support the conclusions Region 6 reached in its review of them), Region 6 did not make any formal geomorphic evaluation of the river.[230] Region 6's stated rationale for not undertaking such an evaluation is that modeling has limited applicability to geomorphic changes. Whatever the perceived limitations of modeling as a tool to evaluate such an event may be, that does not excuse Region 6 from performing a technical evaluation to support this claim.[231] That is particularly true because Region 6 points to this argument as one of its primary reasons for rejecting capping as a protective remedy.

Throughout the RI process and development of remedial alternatives for the Northern Impoundments, Region 6 never raised concerns about an abrupt catastrophic future change in the river's channel as an issue to be evaluated and considered in the evaluation of remedial alternatives. Instead, this issue was raised by Region 6 with the Respondents for the first time shortly before Region 6 issued its Final Interim FS and Proposed Plan.

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[229] Proposed Plan at 8

[230] A review of the Administrative Record did not identify any such evaluation, and representatives of Region 6 have acknowledged that no such evaluation was prepared.

[231] Proposed Plan at 8 (noting that simulating an event that could lead to the river carving new channels "is beyond the ability of existing sediment transport models to simulate.").

Respondents asked Dr. Shields to review and evaluate Region 6's conclusions regarding changes in the geomorphology of the river in his report (Appendix D). As noted in Section I, Dr. Shields has 40 years of experience in water resources and environmental engineering and extensive experience in conducting geomorphic assessments of river channels. Dr. Palermo and Dr. Reible have evaluated Region 6's assertions regarding the potential for a sudden change in the river's course as well.

With regard to Region 6's assertions about abrupt river channel migration:

- There is no support for Region 6's assertion that the river channel has "changed over time," based on a limited set of aerial photographs from 1956, 1966, 1973, and 1997. These photographs visually show inundated areas but not "channel migration"[232] and do not support Region 6's assertion that they "clearly show that the river channel has changed over time." In fact, although the river is a dynamic system, which is subject to changes in size and flow paths, the main channel of the river is very stable.[233]

- Region 6 has apparently made no effect to disaggregate the effects of subsidence, erosion and dredging on channel morphology.[234]

- While Region 6 asserts that the San Jacinto River is a very dynamic system, subject to changes in size and flow paths as experienced during the 1994 storm, in fact:

    - Examination of rectified aerial photos and maps show that the 1994 storm did not change the location or alignment of the main channel of the river within 2 miles of the Northern Impoundments;

    - Changes associated with the 1994 storm consisted of erosion of high flow paths through floodplain sand mines (pits) and scour downstream from the I-10 bridge;

    - Neither type of erosion resulting from the 1994 storm imperiled or caused erosion of the Northern Impoundments, even though there was no armored cap in place at the time; and

[232] Palermo Report at 13.
[233] Shields Report at 5.
[234] Shields Report at 9.

- Neither type of erosion produced an avulsion in the main channel of the river.[235]
- Dr. Shields concludes that the Proposed Plan's extrapolation of rates of channel change from upstream reaches of the river (*i.e.*, Banana Bend) to the reach immediately adjacent to the Northern Impoundments is not supported by evidence or logic.[236]
- Dr. Shields also concludes that "my review of the aerial photo record and available topographic survey maps … suggests that the main channel of the river channel is stable with respect to the fluvial processes of lateral migration and avulsion and therefore cannot be characterized as "very dynamic."[237]
- Dr. Shields goes on to state as follows: "Despite the effects of land subsidence, in-channel and flood plain sand mining and other anthropogenic impacts, the overall stability of the San Jacinto River alignment over the last century is remarkable."[238]

- Past "changes" in the river identified by Region 6 were highly influenced by conditions that no longer exist (*e.g.*, subsidence and dredging), so there is no credible basis for Region 6's assertion that such "changes" will continue into the future.[239]

  - With respect to groundwater use, the Harris-Galveston Subsidence District (District) is a special purpose district created by the Texas Legislature in 1975. The District was created to provide for the regulation of groundwater withdrawal throughout Harris and Galveston counties for the purpose of preventing further land subsidence. Creation of the District and the subsequent restrictions on groundwater extraction put in place by the District have essentially stopped subsidence in the vicinity of the Site; there has not been any subsidence at all since 2005.[240]

  - In regards to dredging activities, historical sand mining that took place around the Northern Impoundments is no longer occurring. In 2009,

[235] Shields Report at 5-6.
[236] Shields Report at 6.
[237] Shields Report at 3.
[238] Shields Report at 4-5.
[239] Shields Report at 9.
[240] Shields Report at 5.

following the listing of the Site, USACE and TCEQ developed a cooperative permitting process to assure permitted dredging activities do not impact the Site, or expose permittees to CERCLA liability.

- Future storm events and potential climate changes will push the river towards adapting to future flows by erosion of the weakest portions of the river's channel, , the soft-fine-grained sediments and banks, rather than a highly armored structure, such as the Alternative 3aN enhanced cap.[241]

- Tools (including models) exist that could be used to evaluate the potential for the kind of event that Region 6 posits might occur.[242] For example, there are morphodynamic models that can be used to assess meander migration and existing 2-dimensional hydrodynamic models and their output can be used to assess channel boundary erosion potential during extreme events.[243] There are also tools that can be used to address model uncertainty.[244] ERDC, the section of USACE that evaluated the remedial alternatives for Region 6, has staff with specific expertise in such assessments.[245]

If Region 6 selects its preferred remedy largely on the basis of the possibility of future channel migration, that would suggest that every other chemical plant, manufacturing facility, or hazardous waste storage location along the San Jacinto River and Houston Ship Channel could be held to this standard as well. This speculative threshold would call into question current chemical and waste handling and disposal activities at those locations, and indeed throughout the United States since CERCLA is a national program. Figure 6 is a 2004 map prepared by the Bay Area Houston Economic Partnership that depicts some of these facilities in the vicinity of the Site. This figure, which refers to the Houston Ship Channel as the "Petrochemical Capital of the World," starkly illustrates the heavy concentration of industrial facilities along the channel and the San Jacinto River that could be impacted by the future channel migration Region 6 speculates could occur.

A further consideration for Region 6 is that its preferred alternative, Alternative 6N, will not remove all of the dioxin-impacted material from the waste impoundments, and a newly constructed cap on the remaining material will be

[241] Reible Report at 5.
[242] Shields Report at 8-9.
[243] Shields Report at 9.
[244] *Id*.
[245] *Id*..

required.[246] That material is expected to have dioxin concentrations similar to the waste material generally.[247] That newly-installed cap would presumably be subject to the same risk of being undermined by abrupt river channel migration as the Alternative 3aN cap. Region 6 cannot accept use of a cap for purposes of Alternative 6N and at the same time use the same rationale to disqualify Alternative 3aN.

[246] Palermo Report at 15.
[247] Palermo Report at 15-16.

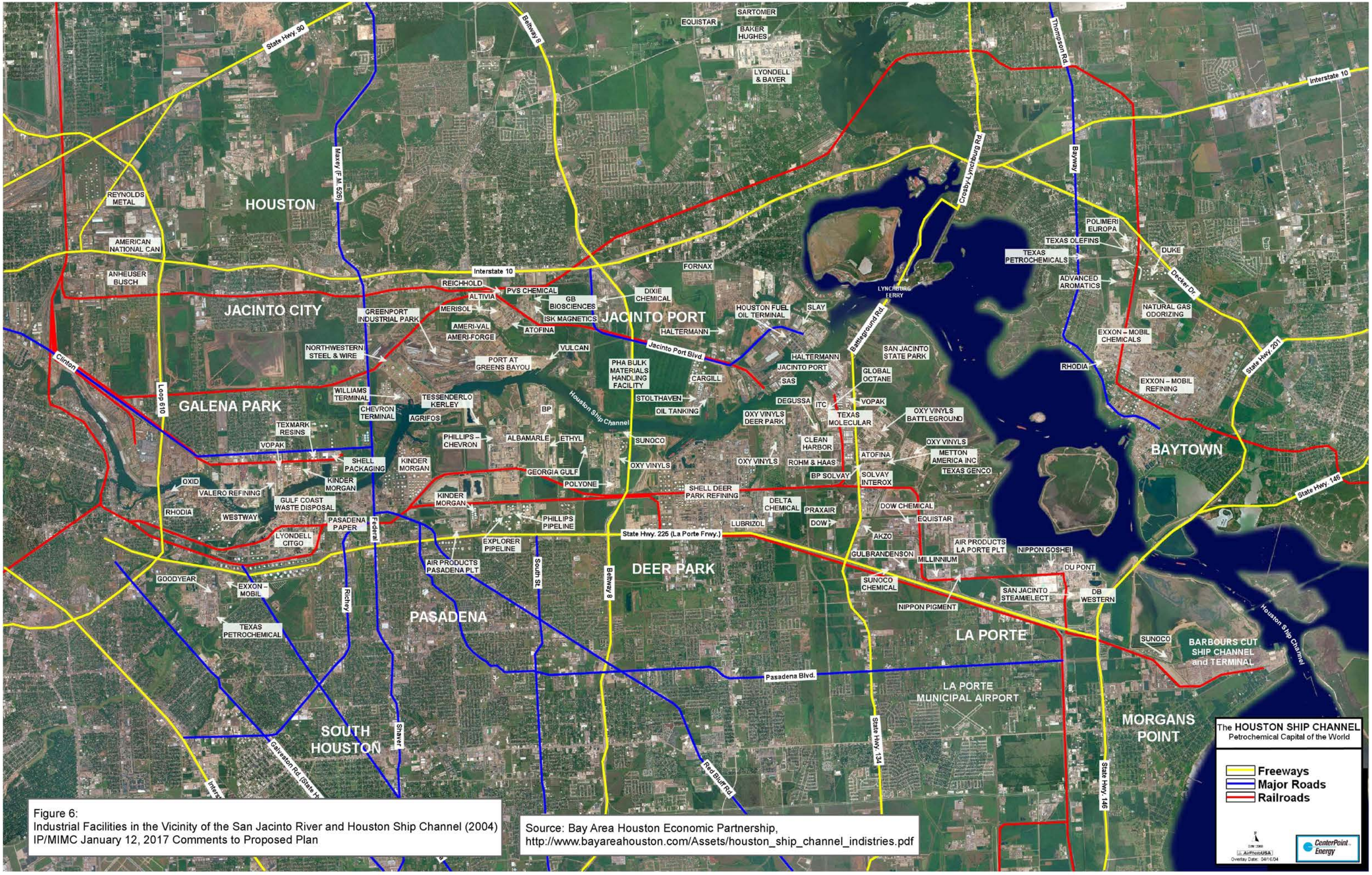

Figure 6:
Industrial Facilities in the Vicinity of the San Jacinto River and Houston Ship Channel (2004)
IP/MIMC January 12, 2017 Comments to Proposed Plan

Source: Bay Area Houston Economic Partnership,
http://www.bayareahouston.com/Assets/houston_ship_channel_indistries.pdf

<u>COMMENT N-10</u>: EVEN IF A BASIS FOR ASSERTING THAT THERE COULD BE FUTURE ABRUPT CHANGES IN THE RIVER'S CHANNEL COULD BE DEVELOPED, REGION 6 DID NOT EVALUATE HOW ALTERNATIVE 3AN ENHANCED CAP WOULD PERFORM IF THOSE CHANGES OCCURRED

Even if a basis for asserting that there could be a future abrupt change in the river channel could be developed, Region 6 would then need to evaluate whether that change in course of the river's channel would necessarily undermine the Alternative 3aN enhanced cap. It did not make any such evaluation for purposes of its Proposed Plan.

As addressed by Dr. Palermo, any potential channel migration would occur as the flow seeks a lesser resistance.[248] The armored side slopes and the Alternative 3aN enhanced armored cap itself would therefore resist the flow such that the flow would not cut a channel directly through the area containing the capped waste.[249] With the use of 15-inch diameter stone that is two feet thick, the cap surface would be expected to be very effective in resisting the flow.[250]

The primary concern related to a potential channel migration is undermining of the containment dike.[251] The potential for such an occurrence is contemplated by the enhancements that are part of Alternative 3aN, including appropriate flattening of the outer armored slopes.[252] Flattened slopes would be less subject to undermining by the river's flow. In addition, Alternative 3aN's cap design includes a thickened rock berm at the outer edges of the cap; this thickened toe berm would provide additional resistance to flow across the capped area.[253]

Dr. Shields concurs with Dr. Palermo's opinions in this regard. He notes in his report that the risk of erosion of the Northern Impoundments "may be addressed by protective measures (armored cap) sized with appropriate safety factors also as proposed by Alternative 3aN."[254]

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[248] Palermo Report at 13.
[249] *Id*.
[250] Palermo Report at 12-13.
[251] Palermo Report at 13.
[252] *Id*.
[253] Palermo Report at 14.
[254] Shields Report at 8.

In relying on river channel changes as a basis for rejecting Alternative 3aN, Region 6 also failed to consider that any remedy for the Site will be subject to five-year reviews under §121 of CERCLA. As part of the five-year review process, Region 6 will have an opportunity to systematically evaluate the effectiveness of the selected remedy and propose additional enhancements, as well was periodic OMM based on a Region 6-approved OMM Plan. The five-year review process and ongoing OMM will allow events that suggest the possibility of a river channel change or other events that could impact the Alternative 3aN enhanced cap and its design elements to be addressed. As noted by Dr. Shields:

> If appropriate engineering analyses indicate potential for unacceptable hydraulic loading on the site or river channel movement over the period of interest, there are structural measures (river training structures such as groins, spurs, jetties, revetments or bank protection structures) that could be designed, in accordance with standard guidance and with appropriate factors of safety, to address such conditions.[255]

[255] Shields Report at 10.

COMMENT N-11: REGION 6'S REJECTION OF ALTERNATIVE 3AN RESTS ON A FLAWED ASSESSMENT OF IMPACTS FROM A HYPOTHETICAL FUTURE STORM EVENT ON THE ALTERNATIVE 3AN CAP

A. Region 6's conclusions are not based on modeling of Alternative 3aN, although Region 6 repeatedly represents USACE's modeling results as being relevant to Alternative 3aN.

Based on the Administrative Record, no modeling or other technical evaluation of the long-term stability of Alternative 3aN appears to have been performed. Respondents have made repeated, but unfruitful efforts to confirm this point. As noted above, the Administrative Record does not include modeling results or a technical evaluation of Alternative 3aN. Region 6 was unwilling to provide Respondents with the modeling files, although some of them were ultimately obtained through FOIA requests to USACE. Those files, however, were incomplete and have not allowed Respondents to replicate the modeling that was performed by USACE, and Respondents are pursuing additional modeling files and may to supplement these Comments after obtaining and analyzing them.[256] Region 6's failure to make the complete modeling files part of the Administrative Record has therefore limited the Respondents' ability to comment on the Proposed Plan.

Even without full access to the modeling files, however, it appears that USACE's modeling of the cap during future storm events was based on the Alternative 3N cap or possibly the existing cap, but not the Alternative 3aN enhanced cap.[257]

Region 6 asked USACE to model the potential effects of a hypothetical synoptic occurrence of Hurricane Ike and the October 1994 flood, an ultra-extreme event (a hypothetical future storm with 500-year horizon). Region 6 required that the model make a highly conservative assumption (that is, one that would result in greater impacts on the cap) that the geotextile would be completely removed, notwithstanding the overlapping of the panels and anchoring of the geotextile by cap material.

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[256] *See* Section II.

[257] It should be noted there is some confusion as to whether this modeling result was with respect to the existing cap or the Alternative 3N cap: the USACE Report Tasks 2 and 7 never mention Alternative 3N, but do mention the "existing cap" several times. Only in the Executive Summary of the USACE Report is there any mention of modeling of Alternative 3N. USACE Report at 2.

USACE reported that in this scenario, erosion would be predicted to occur over approximately 80 percent (12.5 acres) of the 15.7 acre cap, **with the majority of that erosion being associated with smaller sized armor materials (*e.g.*, Armor Rock A D_{50} = 3 inches and Armor Rock B/C D_{50} = 6 inches) and with very little movement of the larger rock (Armor Rock D)**.[258] This conclusion cannot apply to the Alternative 3aN enhanced cap because, as noted above, the Alternative 3aN enhanced cap will include a two-foot layer of 15-inch rock over 13.4 acres of the 15.7 acre cap's surface where underlying materials potentially exceed 200 ng/kg. The final remedial design can also increase the size of armor rock in areas where the underlying materials are below 200 ng/kg to ensure the long-term stability of the entire 15.7 acre area.

Throughout the Final Interim FS and in the Proposed Plan, Region 6 uses this finding from the modeling of Alternative 3N and the resulting erosion of the smaller sized armor materials to suggest that Alternative 3aN would not have long term effectiveness or permanence. As pointed out by Dr. Palermo in his attached report (Appendix A):

> EPA refers to the erosion modeled for Alternative 3N Upgraded Cap for the dual extreme event in the [Final Interim FS] and [Proposed Plan] and associates this result with the Alternative 3aN Enhanced Cap. This is an inequitable comparison. EPA does this repeatedly, referring to the 80% erosion finding for Alternative 3N a total of **13 times** in the [Final Interim FS] and [Proposed Plan] …such repetitive mention of one modeling result is essentially a scare tactic to justify the full removal option over an enhanced cap option **that would not experience any such erosion**.[259]

The 15-inch diameter armor rock required by Alternative 3aN is 3.4 times larger than the largest 10-inch diameter armor rock that is currently on portions of the cap, and goes beyond USACE's recommendation that rock with a D50 of 12-inches or larger be used.[260] Because the enhancements in Alternative 3aN will involve much larger and thicker stone, Region 6 has no basis to use conclusions from the Alternative 3N modeling to reject Alternative 3aN.

[258] USACE Report at 17.
[259] Palermo Report at 22 (emphasis added).
[260] USACE Report at 2.

B. Region 6's focus on a hypothetical future storm event with a 500-year horizon is not consistent with the NCP's requirements.

As pointed out by Dr. Palermo in his attached report (Appendix A), "the Final Interim FS and Proposed Plan reflect a clear bias by Region 6 against containment as an effective remedy approach. Alternative 3aN was not selected as the preferred alternative based on EPA concerns over an ultra-extreme flow condition, based on a 500 year reliability benchmark. The use of a 500 year event is extreme and is inconsistent with EPA technical guidance for capping."[261]

Dr. Palermo goes on to note:

> In my opinion, the EPA Region 6 rejection of Alternative 3aN based on uncertainty surrounding a 500-year "reliability" is setting a terrible precedent. Most structures, even those designed for protection of life and property, such as dams and levees, are not designed to withstand a 500-year event. A 500-year event would essentially destroy a large piece of Houston and would result in a number of releases and environmental issues from multiple sources. Such events, were they to occur, would carry with them extreme levels of loss of life, widespread property damage, and environmental insult. Also, 500 years from now, Federal and State governments as we know them may not exist, so any landfill (including the one to which EPA is proposing that the waste from this Site be hauled) could be subject to disturbance and exposures of whatever civilization might succeed us. We cannot and do not design projects such as flood control levees or dams or coastal protection features against such events; therefore, selecting a remedy approach or designing a remedy for CERCLA on such a basis is therefore inequitable and technically inappropriate in my view.
>
> Further, the benchmark to "prevent any release of contaminated material from the Site" is not consistent with EPA's evaluation of the Alternative 6N Full Removal in which a significant mass release during implementation will without any question occur and has been

[261] Palermo Report at 6.

> deemed to be acceptable by Region 6 in the Final Interim FS. (Final Interim FS, p. ES-12)."[262]

Finally, Dr. Palermo notes that:

> For this Site, EPA Region 6 has focused on the ultra-worst case only, in its attempt to reduce uncertainty. Even so, in my opinion, there is a high degree of certainty that a robust armored cap can be designed and constructed such that the waste can be reliably contained in the face of any extreme event that can be reasonably considered.[263]

It is worth noting that EPA's Sediment Guidance points out:

> For some complex sediment sites, there may be a higher degree of uncertainty about the predicted effectiveness of various remedial alternatives. Where this is the case, it is especially important to identify and factor that uncertainty into site decisions. Project managers are encouraged to consider a range of probable effectiveness scenarios that includes both optimistic and non-ideal site conditions and remedy performance.

In the Proposed Plan, Region 6 considered only worst-case conditions for the capping remedy and even disregarded the USACE Report's conclusions regarding the long-term effectiveness of Alternative 3aN. At the same time, Region 6 disregarded the uncertainties raised by USACE regarding Alternative 6N.

[262] Palermo Report at 10.
[263] Palermo Report at 10.

COMMENT N-12: REGION 6'S CONCLUSION THAT REMOVAL IS REQUIRED RELIES ON A PTW DETERMINATION THAT IS UNNECESSARY, FLAWED AND IGNORES SITE-SPECIFIC DATA DEMONSTRATING THAT THE WASTES ARE RELIABLY CONTAINED

Region 6's approach to remedy selection misuses the concept of PTW in proposing removal of waste from the Northern Impoundments. Region 6 uses a PTW determination as a means of cutting off the meaningful comparison of the risks and benefits of capping versus removal that is required by CERCLA and the NCP. Region 6's PTW determination is unnecessary, at odds with relevant guidance, makes improper assumptions regarding potential mobility, exposure potential and toxicity, and ignores Site-specific data demonstrating that the wastes are reliably contained.

A. A PTW determination, which was not required in the first instance, is being misused to support Region 6's preferred remedy and short-cut the NCP remedy selection process.

The concept of "Principal Threat Waste" derives from §300.430(a)(1)(iii) of the NCP which states that EPA expects to use "treatment to address the principal threats posed by a site, wherever practicable." Based on EPA's guidance, it is clear that the concept of PTW is intended to identify source material that must be treated to reduce toxicity, mobility, or volume, if practicable. Region 6 is misusing this concept to justify a decision to **remove** (not treat) waste above a certain concentration level from the Northern Impoundments and dispose of it at another location. This is not consistent with CERCLA, the NCP or relevant guidance.[264]

Region 6 is not required to make a PTW determination in selecting a remedy. According to EPA's PTW Guidance, "A Guide to Principal Threat and Low Threat Wastes,"[265] source materials at a site do not have to be classified as either PTW or low threat wastes, and "the principal threat/low level threat waste concept" is to be used to help streamline and focus the remedy selection process, not as a mandatory waste classification requirement."[266]

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[264] A Guide to Principal Threat and Low Level Threat Wastes: Quick Reference Fact Sheet. Superfund Publication: 9380.3-06FS. EPA, Office of Solid Waste and Emergency Response, Washington, DC, November 1991; Rules of Thumb for Superfund Remedy Selection. OSWER 9355.0-69. EPA, Office of Solid Waste and Emergency Response, Washington, DC, August 1997 (Rules of Thumb).

[265] PTW Guidance at 2.

[266] PTW Guidance at 2.

A determination whether a source material is a principal or low level threat waste is to be based on "the inherent toxicity as well as consideration of the physical state of the material (*e.g.*, liquid), the potential mobility of the wastes in the particular environmental setting, and the lability and degradation products of the material."[267] EPA's PTW Guidance also states that "[t]here may be situations where wastes identified as constituting a principal threat may be contained rather than treated due to difficulties in treating the wastes."

Specific situations that the PTW Guidance identifies in which treatment may not be appropriate include:

- The extraordinary volume of materials or complexity of the site make implementation of treatment technologies impracticable;

- Severe effects across environmental media resulting from implementation would occur;" and

- Implementation of a treatment-based remedy would result in greater overall risk to human health and the environment due to risks posed to workers or the surrounding community during implementation.[268]

Although all three of these situations apply to the Northern Impoundments, the first and last of these situations is particularly relevant at the Site because of the unique location and complexities associated with the Northern Impoundments and the overall risk to human health and the environment and risks posed to workers and the surrounding community are much greater if the existing cap is removed than if the cap is enhanced as proposed in Alternative 3aN.

EPA's guidance emphasizes the primacy of the NCP remedy selection framework using the nine criteria in 40 CFR §300.430(f)(1) in selecting site remedies. The NCP's expectations regarding treatment and containment technologies are intended to serve as general guidelines and "**do not dictate** the selection of a particular remedial alternative."[269]

As demonstrated in Comment N-15, Alternative 3aN is clearly the preferred remedial alternative based on a detailed analysis of the NCP's selection criteria,

[267] PTW Guidance at 2.
[268] PTW Guidance at 3.
[269] PTW Guidance at 3 (emphasis added).

notwithstanding Region 6's use of a PTW determination as a basis for rejecting Alternative 3aN.

B. Region 6's PTW determination is improperly based on Region 6's speculative and unsupported assertions regarding mobility of the capped wastes.

1. Under the NCP and EPA's PTW Guidance, source material at a site should not be classified as PTW if it can be reliably contained.

As set out above, the concept of PTW involves determinations related to the mobility and toxicity of the source material at the Site. The Proposed Plan's PTW designation is partially founded on the supposed "mobility" of the wastes. This finding is based on Region 6's unsupported assertions regarding possible future changes in the river channel and potential erosion from an ultra-severe weather event.[270]

As explained below, the Administrative Record is replete with scientific data, much of which was approved by Region 6 during the RI process, demonstrating that the waste in the Northern Impoundments is highly immobile, having largely stayed within the original contours of the impoundments even before they were capped. This information in the Administrative Record is further corroborated by the 2016 Data (summarized in Section N-2 and in Appendix E), which demonstrate that the existing armored cap is effective at containing the waste in the Northern Impoundments.

2. The USACE modeling results do not support a determination that the wastes in the Northern Impoundment are potentially mobile.

One basis for Region 6's claim that the waste in the Northern Impoundments is potentially mobile is a statement in the USACE Report that 80 percent of the area of the cap over the Northern Impoundments could erode in the event of the hypothetical synoptic occurrence of Hurricane Ike and the October 1994 flood. As addressed above in Comment N-11.A, however, this statement from the USACE Report does not apply to the Alternative 3aN enhanced armored cap and does not support Region 6's assertion that the wastes are highly mobile.

[270] *See* Comment N-9 – N-11.

3. Region 6's assertion that the river could abruptly change its channel leading to mobility of the waste is unfounded.

Region 6 also bases its determination regarding potential mobility of the waste in the Northern Impoundments on the alleged possibility that the river channel could suddenly change in the future, causing damage to the cap and release of waste to the river. As discussed in Comments N-9 and N-10, this assertion by Region 6 is not supported by credible evidence in the record and is speculative.

4. Empirical data in the Administrative Record demonstrate that the Northern Impoundment waste is not mobile.

Region 6 has also not considered relevant empirical data in the Administrative Record that demonstrates that the waste in the Northern Impoundments is reliably contained.

- Data on the 1994 flood presented by U.S. Geological Survey (USGS)[271] indicate that the peak flow during the 1994 flood at the USGS river gage nearest the Northern Impoundments (USGS gage no. 08072050 near Sheldon) was 360,000 cfs (cubic feet per second), very close to flows evaluated in USACE's modeling of severe storms, hurricanes, storm surge, subsidence, etc. under Task 7.[272] Notably, this flood was the result of interaction between Hurricane Rosa and a warm front moving across the Houston area from the Gulf of Mexico[273], and therefore is similar to the "worst case" scenario that is Region 6's focus.

  Figure 7 presents the outline of the Northern Impoundments in 1966, 1990, 1992, and 1995, as well as the outline of the existing armored cap prepared using georeferenced aerial photographs from each of these years that are in the Administrative Record.[274] There is very little change in the shape or position of the Northern Impoundments over time, and almost no difference between 1992 and 1995, that is, before and after the 1994 flood. Aerial imagery available in the Administrative Record provides an important empirical check on USACE's modeling results that Region 6 appears not to have considered.

[271] Floods in Southeast Texas, October 1994: Fact Sheet. U.S. Department of the Interior, U.S. Geological Survey. January 1995. 2 pp. (USGS Fact Sheet; AR 705734).
[272] *Id.*; USACE Report at 2.
[273] Rain by the Cubit: The Great Southeast Texas Flood of 1994. Presentation by Andy Yung and Duane Barrett. (AR 9108108).
[274] 1966 (AR 9187552), 1990 (AR 610994), 1992 (AR 875083), and 1995 (AR 9182307).

- A September 2008 Region 6/TCEQ memorandum on the condition of the pre-TCRA Northern Impoundments after Hurricane Ike, which notes that "…the [Northern Impoundments] appeared to be unaffected by Hurricane Ike … There were no signs of significant erosion as a result of the flooding and the shorelines of both the northern and southern portions of the site appeared to be unaltered by the storm surge of the hurricane."[275]

- The results of the unmixing analysis, as discussed above in Comment N-2, and the independent 2009 "fingerprinting" study,[276] which both demonstrated that dioxins and furans associated with the paper mill waste were detected in sediments primarily within the immediate vicinity of the Northern Impoundments.[277]

C. Region 6's calculation of a threshold concentration of 300 ng/kg TEQ as the basis for its PTW determination deviates substantially from relevant guidance, is flawed and ignores Site-specific information in favor of information not in the Administrative Record.

In 2016, three years after the Region 6-approved and supervised risk assessment process had been completed and PCLs in environmental media had been derived and approved, a Region 6 risk assessor, Ghassan Khoury, performed a risk evaluation, which is described in a memorandum dated August 29, 2016 (Khoury Risk Evaluation).[278] Region 6 then relied upon the Khoury Risk Evaluation in designating the capped waste in the Northern Impoundments as PTW. Despite the three years and the significant resources Respondents devoted to the risk assessment process, Region 6 did not seek Respondents' comments or review of the Khoury Risk Evaluation.

The Khoury Risk Evaluation is flawed because it ignores Site-specific risk assessments (including relevant PCLs developed at Region 6's direction and under

[275] Memorandum from Stephen Tzhone (EPA) and Richard Seiler (TCEQ), October 2, 2008. USEPA/TCEQ Hurricane Ike Follow Up. Superfund Site Inspection Report. (AR 9345115).
[276] Louchuoarn and Brinkmeyer (AR9185984).
[277] With a forensic method entirely different from the method applied to the source evaluation in the RI Report, Louchuoarn and Brinkmeyer (AR 9185984) conducted their analysis prior to initiation of the RI. Using ratios of TCDD/OCDD, these authors confirmed the similarity of the wastes within the Northern Impoundments to paper mill wastes, and then characterized each of the sediment samples available at the time as to their similarity to paper mill wastes. This study concluded: "… remobilization of contaminated particles does not occur beyond the close vicinity of the pit itself." Louchuoarn and Brinkmeyer at 3.
[278] Memorandum from Ghassan A. Khoury to Gary Miller, August 29, 2016. Human Health Risk Evaluation and Recommended Sediment Cleanup Level for Site Specific Exposure to Sediment at the San Jacinto River Superfund Site (Khoury Risk Evaluation; AR 100001024).

its oversight) and Site-specific data. It also deviates in a number of material respects from the requirements contained in EPA's PTW and risk assessment guidance,[279] and Region 6's use of Khoury's results to determine and apply a PTW threshold is not consistent with EPA's PTW Guidance. The result is that a cornerstone of Region 6's rationale for its proposed remedy is arbitrary and capricious. In addition, the Khoury Risk Evaluation and the PTW determination based on it are not transparent and reach conclusions that cannot be replicated. It should be disregarded for that reason alone, and the PTW determination based on it should also be disregarded.

1. The Khoury Risk Evaluation ignores the Region 6-approved risk assessment and data from the Site and does not follow EPA guidance.

The Khoury Risk Evaluation ignores the Region 6-approved Site-specific risk assessment and Site-specific data in favor of information that is not transparent and not in the Administrative Record. Khoury calculates the PCL (which he calls "preliminary remediation goal" or "PRG") using a biota-sediment accumulation factor (BSAF). For the BSAF, he relies on a source of information unrelated to the Site even though (1) Site-specific BSAFs are available and (2) Region 6 required Respondents to develop that information because "[t]he calculation of site-specific BSAFs is important in order to be able to determine the acceptable sediment concentration to be protective of the human consumption of edible fish and shellfish."[280] Region 6 then inappropriately uses Khoury's results to calculate a much lower (by a factor of ten) PTW threshold TEQ concentration than the Site-specific data and PTW Guidance would support; Khoury offers no explanation for his decision to deviate from guidance by not using Site-specific data in his analysis.

The following are the specific shortcomings in Khoury's approach:

- Khoury calculates risk associated with recreational fishing using a noncancer reference dose (RfD).[281] Using the noncancer RfD, Khoury calculates the TEQ in sediment that corresponds to an acceptable noncancer risk level (a hazard index of 1) for a hypothetical recreational fisher.[282] The resulting

[279] PTW Guidance; Rules of Thumb; Risk Assessment Guidance for Superfund (RAGS): Volume 1 – Human Health Evaluation Manual (Part A), Interim Final. EPA, Office of Emergency and Remedial Response, Washington, DC (RAGS A).
[280] PSCR Approval (AR 651009) at 3.
[281] Khoury Risk Evaluation at 2.
[282] Khoury Risk Evaluation at 4.

PRG for sediments of 30 ng/kg TEQ accounts for both direct exposure and indirect exposure routes, including fish ingestion. The use of fish ingestion as an exposure pathway is inappropriate, for reasons discussed below.

- Khoury states that his PRG, 30 ng/kg TEQ, equates to a 2.1×10^{-5} excess lifetime cancer risk (ELCR).[283] Region 6 multiplies this value by 10 (without any explanation as to the basis for that calculation) to derive its PTW threshold of 300 ng/kg. Therefore, the Region 6 threshold value for designating wastes as PTW is equivalent to an ELCR of 2.1×10^{-4} (calculated by multiplying 2.1×10^{-5} by a factor of ten). This is a lower risk than the ELCR of 10^{-3} that EPA's PTW Guidance suggests be considered in determining whether a source material is PTW, and a lower risk than called for in EPA's 1997 guidance referred to as the "Rules of Thumb."[284] The PTW Guidance, while not explicitly defining what threshold level of risk equates to principal threat, state that "where toxicity and mobility of source material combine to pose a potential risk of 10^{-3} or greater, generally treatment alternatives should be considered."[285] Region 6's use of 300 ng/kg as a PTW threshold is overly conservative in the sense that it sets an inappropriately low cancer risk threshold (below 10^{-3}) for considering waste to be PTW.

- Further, Khoury's PRG is not derived using Site-specific information. Khoury instead uses several factors, including a BSAF from EPA's Risk Assessment Guidance for Hazardous Waste Combustion Facilities.[286] The BSAF values that Khoury uses are from a document that is not in the Administrative Record and does not use Site-specific data or data for the San Jacinto estuary. The Combustion Guidance is not clear as to how and with what data set the reported BSAFs were derived, and the BSAF used by Khoury could not be replicated by Respondents. As a result, this cornerstone of Region 6's analysis is not transparent.

- To appropriately calculate a sediment PRG that accounts for fish ingestion, Khoury should have instead used Site-specific BSAFs provided in

[283] Khoury Risk Evaluation at 12.
[284] Rules of Thumb for Remedy Selection, EPA, 1997 (Rules of Thumb) at 11.
[285] PTW guidance at 2.
[286] Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities. EPA, Office of Solid Waste and Emergency Response. EPA530-R-05-006. Sept. 2005. (Combustion Guidance)

Appendix B of the RI Report (which is in the Administrative Record),[287] Those BSAFs were derived to reflect local exposure conditions for fish, which is consistent with EPA's BSAF Guidance and, from a technical perspective is much more appropriate than relying on the BSAFs that Khoury used.[288] During the RI for this Site, when Region 6 directed Respondents to develop Site-specific BSAFs[289], that appears to have been Region 6's perspective as well. Appendix B of the RI Report includes tables with the Site-specific BSAF values, and all relevant details on how they were derived.

- Using Khoury's analysis and rationale, but using Site-specific BSAF values from Appendix B,[290] the sediment concentration corresponding to a 10^{-3} cancer risk would be 3,000 ng/kg. Putting aside other defects in Region 6's analysis, if Region 6 had used this as its PTW threshold, there would be no justification for removal of the Eastern Cell of the Northern Impoundments, since most of that part of those Impoundments (all but two surface samples) has TEQ concentrations below 3,000 ng/kg. Of the material that would be required to be removed under Alternative 6N, approximately 44,000 cy of it (or about 29% of the total 152,000 cy to be removed) is located in the Eastern Cell.

2. Region 6 inappropriately derived a PTW threshold by multiplying Khoury's PRG by a factor of ten, thereby basing its PTW threshold on an indirect exposure pathway in contravention of applicable guidance.

EPA's PTW Guidance addresses risk management associated with "source material," which is defined by EPA as "…material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, to surface water, to air, or acts as a source for direct exposure."[291] However, Region 6's threshold concentration for PTW incorporates fish ingestion as an exposure pathway. This is inappropriate

[287] The Site-specific BSAFs were developed at the specific direction of Region 6, in response to Region 6's Comment 20 on the Preliminary Site Characterization Report. AR 651009.
[288] "[T]he calculation of site-specific BSAFs is important in order to be able to determine the acceptable sediment concentration to be protective of the human consumption of edible fish and shellfish." Estimation of Biota Sediment Accumulation Factor (BSAF) from Paired Observations of Chemical Concentrations in Biota and Sediment. L. Burkhard, USEPA Office of Research and Development. Duluth, MN. Feb. 2009.
[289] PSCR Approval at 3.
[290] The value for edible hardhead catfish from fish collection area 2, which is the area in which the Northern Impoundments are located, which is 0.0251 kg sediment dry weight/kg tissue wet weight.
[291] PTW Guidance at 1.

because the fish themselves are not source material, and the fish cannot be subjected to treatment or any other remedy. Although fish may be contaminated by exposure to source material, fish tissue is not source material with which humans may have direct contact and that could be addressed by treatment. Therefore, derivation of a PTW threshold on the basis of indirect exposure through fish ingestion is not consistent with EPA PTW Guidance.

Region 6's approach to deriving a PTW threshold is further contrary to the provision of EPA's PTW Guidance that "…this concept of principal and low level threat wastes should not necessarily be equated with risks posed by site contaminants via various exposure pathways."[292] Region 6's interpretation of Khoury's analysis to derive a PTW threshold does exactly what the guidance instructs should not be done – it incorporates risk via an indirect exposure route, ingestion of fish that have bioaccumulated dioxins and furans.

3. The manner in which Khoury derived certain values and his rationale for deviating from applicable guidance cannot be determined. Given this lack of transparency, the Khoury Risk Evaluation and conclusions based on it should be disregarded, as any reliance on it would be arbitrary and capricious.

Khoury's approach to calculating a site-specific PRG for sediments is not transparent. His related calculations and conclusions cannot be replicated from information in the Administrative Record and he has not explained his rationale for deviating from applicable guidance.[293] The lack of transparency is such that any reliance on the Khoury Risk Evaluation or the conclusions reached in reliance on it would be arbitrary and capricious.

The Khoury Risk Evaluation is not transparent in a number of other respects.

- It appears to, in part, adopt the approach taken in the Region 6-approved BHHRA for the Site,[294] but does not clearly explain important departures from the BHHRA. For example, some of the exposure factors assumed by Khoury and other considerations in his exposure calculations are different

[292] PTW Guidance at 2.
[293] As noted above, from the document Khoury used as his source for BSAF values, it cannot be determined how the reported BSAFs were derived, and the BSAF used by Khoury could not be replicated by Respondents. As a result, this cornerstone of Region 6's analysis is not transparent. The lack of transparency is all the more glaring because Khoury had available to him and could have relied upon Site-specific BSAFs, in which case his calculations would be transparent and verifiable.
[294] BHHRA (AR 685631).

from those adopted in the BHHRA (*e.g.*, child body weight, life time). Neither Khoury nor Region 6 provide rationale for departing from exposure assumptions previously developed and documented by Respondents in collaboration with and approved by Region 6.[295] This is an additional reason why Region 6's choice to rely upon the Khoury Risk Evaluation as the basis for its determination of a PTW threshold is arbitrary and capricious.

- Moreover, the Khoury Risk Evaluation does not explain or present the data used to estimate exposure, and the exposure point concentrations (EPCs) he calculates are not reproducible. Khoury does not present or describe the specific environmental samples used to calculate EPCs used in his evaluation, how those data were treated (*e.g.*, averaging of duplicates), or how TEQs were calculated (*e.g.*, using a value of one-half the detection limit, the full detection limit, or zero for non-detected congeners). Khoury does not describe the statistical methods used for estimating EPCs, and does not present equations used for estimating PRGs for individual exposure pathways or for all exposure pathways combined.

- In a significant departure from EPA's risk assessment guidance,[296] Khoury fails to recognize and discuss the sources and impacts of uncertainties on the calculated risk estimates and PRGs.[297] EPA guidance on completing risk assessments, establishing PRGs, and selecting remedies clearly states that uncertainties must be evaluated, and their impacts considered in the context of decision making. EPA's 1991 Guidance for Establishing PRGs states "[r]isk based PRGs are associated with varied levels of uncertainty depending on many factors … To place risk based PRGs that have been developed for a site into perspective, an assessment of the uncertainties associated with the concentrations should be conducted."[298] EPA's Rules of Thumb states that evaluating and discussing uncertainties is a key component of the risk characterization process that is critical for the selection of a remedy.

[295] EA Memorandum (AR 9385075).
[296] Risk Assessment Guidance for Superfund (RAGS): Volume 1 – Human Health Evaluation Manual (Part B, Development of Risk-Based Preliminary Remediation Goals), Interim. EPA, Office of Emergency and Remedial Response, Washington, DC. EPA/540/R-92/003. 1991. (RAGS B).
[297] Khoury Risk Evaluation at 2.
[298] Rules of Thumb at 6, 8.

> Khoury recognizes and addresses only a single uncertainty—that resulting from using a Tier 3 cancer slope factor for dioxin.[299] He ignores other sources of uncertainty inherent in the risk assessment process including uncertainties in the data used, data processing, and exposure assessment.

In summary, the analysis presented by Khoury is completely deficient relative to the Region 6-approved Site-specific risk assessment documents and PCLs, and is not consistent with EPA's own guidance. Region 6's use of Khoury's analysis as the basis for its PTW threshold of 300 ng/kg is arbitrary and capricious, given its ambiguities and shortcomings, its lack of transparency, and the fact that its results cannot be reproduced.

[299] Khoury Risk Evaluation at 2.

Figure 7:
1966, 1990, 1992 and 1995 Aerial Photographs with Impoundment Extents
SJRWP Superfund/MIMC and IPC

COMMENT N-13: REGION 6'S REJECTION OF ALTERNATIVE 3AN HOLDS THAT ALTERNATIVE TO A STANDARD OF CERTAINTY THAT REGION 6 DID NOT APPLY TO ITS PREFERRED REMEDY AND IGNORES THE STRONG RECORD OF PERFORMANCE OF ARMORED CAPS

In its evaluation of remedial alternatives, USACE concluded that there is no site anywhere in the country in which an armored cap has "failed," Region 6 acknowledges this fact in its Proposed Plan. Moreover, removal of a fully functioning armored cap would be unprecedented and something that has apparently never been attempted.[300]

In the face of the risks and inevitable releases resulting from removing a functioning armored cap, Region 6 chooses to question the long-term effectiveness of a cap, applying a 100 percent certainty standard of effectiveness to Alternative 3aN over a 500-year period. At the same time, Region 6 discounts the significant releases that USACE concludes will necessarily result from removing the existing armored cap and fails to consider the additional sources of releases that were not addressed by USACE's analysis. The standard of certainty applied to the capping remedy by Region 6 is inconsistent with the NCP and national remedy evaluation precedent.

A. Armored caps are utilized nationally and have a strong record of performance.

1. Capping.

In situ capping, is a proven, effective and protective remedy endorsed by EPA's and USACE's capping guidance,[301] and has been selected by EPA for numerous sediment remediation sites across the United States. For example, in the Pacific Northwest, there are caps with more than 20 years of documented protectiveness. Additional examples are identified in the table included in the Respondents' Draft Final Interim FS and included by Region 6 in the Final Interim FS.[302] The current

[300] *See* Comment N-6.
[301] Capping Guidance. ARCS Guidance.
[302] Final Interim FS, Table 4-1a. In March 2015,Dr. Kathleen Garland prepared a report on behalf of a local citizens group called Texans Together, and submitted it to Region 6 (Garland Report). The report argued that EPA has rejected capping alternatives at similar sites and should do so at this Site. But at the sites offered as examples, EPA had selected capping as a component of the remedy, and where EPA selected an excavation remedy, the reasons for selecting excavation over capping relied upon factors that are not relevant to this Site (, planning for

armored cap was designed in accordance with EPA's and USACE's capping guidance to withstand a 100-year storm event with an additional factor of safety to ensure long-term protectiveness, and the Alternative 3aN cap will be strengthened and enhanced.

EPA's Sediment Guidance states that *in situ* capping should "receive detailed consideration" where site conditions meet certain characteristics identified in Highlight 5-1 of guidance. These characteristics, set out below, clearly apply to the Northern Impoundments, especially with a cap that meets the standards of Alternative 3aN:

1. Suitable types and quantities of cap material are readily available;

2. Anticipated infrastructure needs (piers, pilings, buried cables) are compatible with the cap;

3. Water depth is adequate to accommodate the cap with anticipated uses (navigation, flood control);

4. Incidence of cap-disrupting human behavior, such as large boat anchoring, is low or controllable;

5. Long-term risk reduction outweighs habitat disruption, and/or habitat improvements are provided by the cap;

6. Hydrodynamic conditions (floods, ice scour) are not likely to compromise the cap or can be accommodated in the design;

7. Rates of groundwater flow in the cap area are low and not likely to create unacceptable contaminant releases;

8. Sediment has sufficient strength to support the cap (higher density/lower water content, depending on placement method);

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future navigation dredging in the remedy footprint), as is set forth in Respondents' May 27, 2016 Supplemental Comments to the NRRB , p. 9 and Appendix D (AR 9688731). An evaluation of the CERCLA sites discussed in the Garland Report demonstrated that (1) EPA acknowledged the viability and protectiveness of capping as a remedy in connection with these sites—even for what Dr. Garland characterizes as the "most highly contaminated sediments," (2) capping was selected by EPA as a remedy at a number of these sites, contrary to her assertion that in all but one site "remedy selection for dioxin-contaminated sediments including physical removal," and (3) where EPA selected a removal option, it was because of circumstances in which capping was not a viable option (such as the presence of a chemical that was not suitable for capping, the potential for future navigational dredging within the cap footprint, or reductions in water depth from capping materials that may have impeded commercial barge traffic and restrict drainage).

9. Contaminants have low rates of flux through the cap; and

10. Contamination covers contiguous areas (, to simplify capping).

Concerns raised by Region 6 relative to characteristics 6 and 8 are addressed by Comments N-9 to N-11 and the reports of Dr. Palermo (Appendix A) and Dr. Reible (Appendix B).

Respondents disagree with Region 6's assertion that there is "uncertainty" in the long-term performance of a capping remedy. Caps have been successfully constructed as a remedial approach for multiple Superfund Sites over the last 30 years; cap construction has been documented as early at 1967, and remedial capping was developed in the 1980's.[303]

B. USACE has concluded, and Region 6 acknowledges, that no armored cap has "failed" to date.

The USACE Report concluded that no armored cap has "failed" to date. Region 6 acknowledges this fact in the Proposed Plan, but in doing, truncated a quotation from the USACE Report:

> There appears to be no documented cases of any armored cap or armored confined disposal facility breaches. However, there have been many occurrences of breaches and slope failures of armored dikes, jetties, and breakwaters, with some of those structures confining dredged material.[304]

As pointed out by Dr. Palermo, Region 6 failed to include the second part of the same statement, which states:

> None of the listed cases completely breached or failed and were discovered by routine inspections. Repairs and rehabilitation measures, when documented, were easily made."[305]

This selective and therefore misleading citation does not reflect a fair and balanced response to the USACE Report that Region 6 itself requested. This tactic of presenting partial information in an unbalanced fashion is an example of

[303] The Evolution of Cap Design, Proceedings, World Dredging Congress WODCON XVIII, Orlando, Fl., May 27-June 1, 2007, Palermo, M. and D. Reible, 2007.
[304] Proposed Plan at 8 (quoting USACE Report at 82).
[305] USACE Report at 82.

inequitable comparison of alternatives in the Final Interim FS and Proposed Plan prepared by Region 6.

COMMENT N-14: REGION 6 IN ITS FINAL INTERIM FS, ISSUED AFTER IT HAD ALREADY SETTLED ON A PREFERRED REMEDY, IGNORES KEY SITE-SPECIFIC INFORMATION DEVELOPED DURING THE RI PROCESS

A. Region 6's Final Interim FS, and the Proposed Plan based on it, ignore site-specific information developed during the RI process.

Under Region 6's oversight and direction, Respondents spent seven years working on an RI/FS and gathering and analyzing Site-specific data. This process was extensively documented and fully transparent. Region 6's apparent disregard of much of the information generated through that process together with a lack of detailed analysis of Site-specific information are among the reasons for concluding that Region 6's preferred remedy was not selected in the fact-based and analytical manner required by CERCLA and the NCP.

In addition to the 2016 Data discussed in Comment N-2 above, Region 6's remedy selection process appears to have ignored or failed to give appropriate weight to several relevant findings developed during the RI, including the results of the source evaluation and risk assessments, both required by Region 6 and performed in accordance with Region 6's specifications. The relevant findings include:

- **Dioxins and furans from within the waste impoundments have not been significantly transported outside of the original 1966 perimeter of the waste impoundments.** Sediment data and the source evaluation prepared for the RI Report (Section 5.4) demonstrate that the mixture of dioxins and furans that is characteristic of the wastes in the Northern Impoundments was not significantly present in sediments outside of the original 1966 perimeter of the Northern Impoundments even prior to construction of the existing armored cap. In that regard, the source evaluation in the Region 6-approved RI Report concludes that the mixture of dioxins and furans in most sediment samples immediately outside the perimeter of the Northern Impoundments is consistent with the pattern of dioxins and furans in urban background areas and is characterized by low TEQ concentrations and a minimal to zero contribution of dioxins and furans from the wastes in the impoundments. Exceptions to this include several sediment samples collected west of the Northern Impoundments in the sand mining and sand separation area. The presence of dioxins and furans associated with the wastes in the impoundments adjacent to the upland sand separation area is due to sand dredging that physically removed waste from the Impoundments and

transported it to adjacent property to the north and west of the Impoundments.

- **There are limits to the risk reduction that can be achieved by remedial action at the Site, regardless of the remedy selected, because of the presence of dioxins from other sources.** An evaluation of incremental risk presented in the BHHRA[307] showed that 41 to 42 percent of the baseline hazard attributed to exposure to TEQ in catfish is also present under background conditions, indicating that background TEQ contributed nearly one-half of the total risks under hypothetical exposure scenarios involving fish ingestion

- **Implementation of the TCRA and the existing cap have already achieved significant risk reduction.** Appendix F of the Region 6-approved BHHRA presents an analysis of post-TCRA human health risks. Comparison of results of the post-TCRA risk assessment with results of the baseline risk assessment quantifies the reduction of risk attributable to dioxins and furans that is achieved by the TCRA for both noncancer and cancer hazards (see Tables 5-27 and 5-28 of the RI Report). The Site-specific post-TCRA risk assessment found that the noncancer and cancer TEQ hazard indices (HI)[308] are less than 1 for all hypothetical recreational fisher and recreational visitor scenarios evaluated,[309] reflecting reductions in the incremental risk (expressed as cancer in hazard) from TCRA implementation ranging from 84 to 100 percent. This risk assessment demonstrated that the armored cap achieved an acceptable risk level for these hypothetical scenarios.

- **Baseline ecological risks were minimal, and were resolved by implementation of the TCRA and construction of the armored cap**. The Region 6-approved baseline ecological risk assessment (BERA)[310] which addressed conditions prior to implementation of the TCRA, found negligible risk to benthic invertebrate communities, to fish, and to wading birds, diving

[307] BHHRA and Appendices (AR685633).
[308] For some carcinogens, a threshold (minimum) dose must be reached before a carcinogenic effect can occur. For these carcinogens, the potential for cancer to occur as a result of the assumed exposure is estimated using a hazard metric like that used for evaluating noncancer effects. The cancer hazard metric was approved by EPA for use in the evaluation of dioxins and furans in the BHHRA on October 4, 2012, when it approved the Toxicological and Epidemiological Studies Memorandum (TESM; AR9385075).
[309] BHHRA and Appendices
[310] BERA; AR705603; Letter from Gary Miller to David Keith, February 7, 2013. Baseline Ecological Risk Assessment, Approval with Modifications (AR680092).

birds ,and terrestrial invertivorous birds from potential exposure to dioxins and furans. The BERA concluded that there were low probabilities of risks to shorebirds and small mammals from exposures to dioxins and furans, and that risks to these receptors were eliminated by implementation of the TCRA. Risks to reproduction by individual mollusks were found for clams that were collected prior to the TCRA and directly adjacent to the Northern Impoundments; this area was later covered by the TCRA Armored Cap. Therefore, under post-TCRA conditions, there are no ecological risks associated with dioxins and furans from the wastes within the Northern Impoundments.

B. In addition to ignoring Site-specific information, Region 6 eliminated key technical information included in the Draft Final Interim FS when it took over and finalized the Final Interim FS.

Region 6 prepared its Final Interim FS by deleting important technical information from the Draft Final Interim FS prepared by Respondents in 2014. In doing so, Region 6 eliminated relevant information about the effectiveness of capping and minimized statements about the risks associated with the full removal alternative. Examples of the kind of information that Region 6 removed or modified include:

- Text noting that maintenance events during the first few years after a sediment cap is constructed are not unusual and that at least two other sediment caps that were constructed in the late 1980s and early 1990s, despite some early maintenance in the first few years, have demonstrated continued protectiveness over the last 20+ years.[311]

- Comments about releases that are likely to occur as the result of dredging and have been documented in sediment remediation projects even with the use of robust engineering and operational controls and the risk of resuspension and release of waste material residuals and dioxins/furans into the water column.[312]

- The potential for BMPs to be overwhelmed during significant storm and flood events (of significant concern for Alternatives 4N, 5N, 5aN, and 6N), and the limitations of BMPs.[313]

[311] Draft Final Interim FS (Appendix G-2).at ES-9, 38
[312] Draft Final Interim FS (Appendix G-2).at Section 5.1.
[313] Draft Final Interim FS (Appendix G-2) at 41.

- Relevant technical information in the main text of the FS Report about the behavior, fate and transport of dioxins in the environment of the San Jacinto River and estuary under various remedial alternatives, and information on sources of dioxins and furans unrelated to the waste impoundments.

- Appendix A, which provided a detailed fate and transport evaluation of remedial alternatives including long-term simulations of each alternative, and references to this analysis that were in the main body of the Draft Final Interim FS. Appendix A not only provided information relevant to the detailed analysis of alternatives, but did so using a model that had undergone substantial review by Region 6 and collaborators, including the USGS and that was, as a result, wholly transparent and fully documented.

- Appendix B, which evaluated hydrodynamics for use in refinement of design specifications, was deleted without being replaced with the modeling performed by USACE on the proposed capping alternatives. As discussed in Comment N-10, Region 6 repeatedly references the results of the USACE Modeling of Alternative 3N (or possibly the existing armored cap) as a basis for its concerns regarding the long-term effectiveness of a very different remedy, Alternative 3aN. It is arbitrary and capricious for Region 6 to place such weight on the USACE modeling but then not include it as an attachment to the Final Interim FS or to suggest, as it has, that it is not required to include it in the Administrative Record. 314

[314] *See* Letter from G. Miller of Region 6 to MIMC dated January 6, 2017 (Appendix E-17).

COMMENT N-15: REGION 6'S COMPARATIVE ANALYSIS OF THE NCP CRITERIA IS FLAWED AND NOT OBJECTIVE

A. Region 6 did not make the required "detailed" and "objective" review of the nine remedy selection criteria relative to Alternatives 3aN and 6N.

A detailed evaluation of remedial alternatives is required by CERCLA and the NCP. Section 121 of CERCLA mandates that a remedial action must:

- Protect human health and the environment;
- Comply with applicable or relevant and appropriate requirements (ARARs) unless a waiver is justified;
- Be cost-effective;
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and
- Satisfy the preference for treatment as a principal element, or provide an explanation in the ROD why the preference was not met.

EPA has implemented these statutory requirements through the development of nine remedial selection criteria in the NCP. Under §300.430(f)(1), these criteria are to be used to compare remedial alternatives, to establish the basis for the selection decision, and to demonstrate that statutory requirements have been satisfied.

To accomplish this task, EPA is required to conduct both an individual assessment of the identified remedial alternatives against each criterion and a comparative analysis designed to determine the relative performance of the alternatives and identify major trade-offs among them.[315] The information assembled and evaluated during this detailed analysis of the alternatives is then to be used in selecting a remedial action. The ability to make an objective, rational decision is determined by the quality of information evaluated during this detailed analysis. As described below, Region 6 failed to develop the information necessary to perform this detailed analysis.

[315] 55 Fed. Reg. 8719, March 9, 1990.

The Final Interim FS was not issued until months after Region 6 had apparently already settled on a preferred alternative.[316] Region 6 had apparently already settled on its preferred alternative even before a revised draft of the USACE Report containing the "new" alternatives (Alternative 3aN and Alternative 6) was issued.[317] This sequence of events raises questions as to whether the required gathering of information, analysis of alternatives, and comparison of those alternatives was conducted in the sequence dictated by the NCP.

In addition, a review of the relevant portions of the Final Interim FS demonstrates that Region 6 did not engage in a balanced objective comparative analysis of the NCP criteria. Both of these precedents are important. By circumventing the information gathering and analysis required by the NCP, the Region risks elevating opinion over fact and proper scientific analysis. By failing to objectively balance the NCP criteria in its comparative analysis, the Region risks tipping the scales to fit its preconceived opinion rather than following logic and data, as well as nationally mandated process and precedent.

B. Critique of Region 6's analysis of remedial alternatives

The Proposed Plan and Final Interim FS address eight remedial action alternatives for the Northern Impoundments. Because Alternative 3aN includes cap enhancements that address the concerns of USACE relative to the long-term effectiveness and permanence of a capping/containment alternative, and because Alternative 6N is Region 6's proposed remedy, only these two alternatives will be compared in this section relative to the nine evaluation criteria.

Below is a discussion of the NCP criteria and the flaws and shortcomings in the manner in which Region 6 addressed each of the criteria. The key CERCLA criterion of cost-effectiveness is separately addressed below in Comment N-16.

The discussion first addresses the two threshold criteria (compliance with ARARs and overall protectiveness), then the balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost). It then discusses the two modifying criteria, state and community acceptance, which are to be assessed during the public comment period.

[316] Region 6 had identified its preferred remedy in its May 2016 submission to the NRRB.
[317] The draft containing these alternatives was issued in June 2016.

The Final Interim FS contains a table (Table 6-1a) that summarizes Region 6's conclusions regarding each NCP criterion as applied to the remedial alternatives for the Northern Impoundments. Table 6-1a rates each NCP criterion as either "Low," "Medium" or "High," where "Low" represents the least favorable and "High" the most favorable assessment of the alternative relative to the NCP criteria. A modified version of Table 6-1a (Modified Table 6-1a) is provided as Figure 8. It summarizes the Respondents' evaluation of Alternatives 3aN and 6N, using the same rating scale that was used by Region 6 in preparing Table 6-1a.

C. Threshold criteria.

1. Region 6 has not demonstrated that Alternative 6N complies with applicable ARARs; to the extent this alternative does not comply, Alternative 6N would need to be eliminated as a remedial alternative.

Region 6 did not identify any alternative that would not be expected to substantively meet ARARs.[318] Region 6 states specifically in the Proposed Plan that:

> [t]he substantive requirements of Section 404 were considered in the selection of the preferred remedial action. The preferred remedial action is designed to minimize adverse impacts to the United States through the use of best management practices to minimize releases to the San Jacinto River.[319]

Merely designing a remedial action to minimize adverse impacts does not, however, result in the remedial action meeting the substantive requirements of CWA Section 404(b)(1).[320] Compliance can only be achieved by selecting the "least environmentally damaging practicable alternative," as set forth in EPA's CWA Section 404(b)(1) Guidelines, in 40 C.F.R. Part 230 ("CWA Guidelines").[321] CWA Section 404(b)(1), in fact, prohibits discharges of dredged or fill material when:

> there is a practicable alternative to the proposed discharge that would have less impact on the aquatic ecosystem, provided that the alternative does not have other significant environmental consequences.[322]

A detailed analysis of the impact of each remedial alternative on the aquatic ecosystem against all other practicable alternatives and a finding that the selected remedial action's impact will be the least environmentally damaging is therefore required to satisfy CWA Section 404(b)(1)'s substantive requirements.

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[318] Final Interim FS.
[319] Proposed Plan at p. 32.
[320] 33 U.S.C. 1344 (2002).
[321] *Section 404(b)(1) Guidelines,* 40 C.F.R. Part 230. Note, an alternative will be practicable if it is available and capable of being done "after taking into consideration cost, existing technology, and logistics in light of the overall project purpose." 40 C.F.R. §§ 230.10(a); 230.3(q).
[322] 40 C.F.R. § 230.10(a).

In determining whether an action will be the "least environmentally damaging practicable alternative," the CWA Guidelines articulate a specific hierarchy of environmental impact controls wherein environmental impacts should first and foremost be avoided.[323] In the event an impact cannot be avoided, impacts should then be minimized to the fullest extent possible.[324] Finally, and solely as a last resort, practicable compensatory mitigation can be used for unavoidable impacts.[325]

Even though they are inherently flexible, and allow compliance to be assessed on a case by case basis, the CWA Guidelines are binding and prohibit an action where a practicable alternative is available that will have a less adverse effect on the environment. Accordingly, under CWA Section 404(b)(1), a remedial action that avoids environmental impact altogether must be used if it is a practicable alternative, rather than a remedial action that only minimizes an environmental impact.[326]

Despite Region 6's assertion to the contrary, Alternative 6N cannot satisfy this ARAR because it is not the least environmentally damaging practicable alternative. As an initial matter, Alternative 6N does not avoid potential environmental impacts; at best, it only minimizes them, a point that Region 6 even acknowledges in both the Proposed Plan and Final Interim FS.[327] Further, even though a remedial action that minimizes environmental impacts through BMPs could potentially be the least environmentally damaging practicable alternative, it will not be when another practicable alternative is available that avoids the environmental impact altogether. Indeed, because Alternative 3aN would fully avoid any disturbance of the waste materials, in a proper alternatives analysis under CWA Section 404(b)(1), Alternative 3aN would be the required choice.

Even assuming Alternative 6N can meet the "least environmentally damaging practicable alternative" requirement, this is only one of the requirements under CWA Section 404(b)(1) that any final remedy needs to meet to satisfy this ARAR. This is because CWA Section 404(b)(1) further prohibits a discharge of dredged or fill material if it causes or contributes to a violation of an applicable State water quality standard,[328] toxic effluent standard, or prohibition;[329] jeopardizes the

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[323] 33 C.F.R. Parts 325, 332; 40 C.F.R. Part 230; Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency: The Determination of Mitigation under the Clean Water Act Section 404(b)(1) Guidelines, 1990, available at https://www.epa.gov/cwa-404/memorandum-agreement. (1990 MOA).
[324] 1990 MOA, § IIIc.
[325] *Id*.
[326] *Id.*
[327] *E.g.*, Final Interim FS at 108; Proposed Plan at 34.
[328] 40 C.F.R. § 230.10(b)(1).

continued existence of any endangered or threatened species;[330] or causes or contributes to significant degradation of the waters of the U.S. [331] Consequently, remedial actions that result in a violation of a State water quality standard, or in degradation of water quality, are unlikely to satisfy CWA Section 404(b)(1) requirements.

Any remedy for the Northern Impoundments would therefore need to comply with applicable water quality standards under CWA Sections 303 and 304,[332] as well as the TSWQS in the Texas Water Code §§307.1-307.10, which have been designated as an ARAR by TCEQ.[333] Table 3-1 to the Final Interim FS describes the TSWQS as having "limited" applicability to the evaluation of effectiveness due to "ambient conditions in the region."[334] This statement ignores, however, that under these standards, any discharge into the San Jacinto River resulting from the selected remedy cannot contain dioxins or furans at a TEQ greater than 7.97×10^{-8} µg/L.[335] Background concentrations of dioxins and furans in the river water already exceed the standard, so any releases of waste to the water column during construction/remediation will exacerbate those exceedances.[336]

Notably, even though Region 6's Proposed Plan and its Final Interim FS acknowledge the TSWQS for dioxins and furans, Region 6 did not include any discussion of Alternative 6N's compliance with them, an analysis that is essential to demonstrating that the preferred alternative will comply with CWA Section 404(b)(1). Further, the TSWQS for dioxins and furans is identified as a PRG in the Proposed Plan in addition to having been identified as an ARAR by TCEQ.[337]

Alternative 6N would be expected to cause violations of the TSWQS because the excavation and dredging of waste and contaminated sediments would cause releases of dioxin to the San Jacinto River. This is not disputed in the Proposed Plan, and is established by the USACE Report which is attached to the Final

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[329] 40 C.F.R. § 230.10(b)(2).
[330] 40 C.F.R. § 230.10(b)(3).
[331] 40 C.F.R. § 230.10(c).
[332] 33 U.S.C. §§ 1313-1314.
[333] Email from M. Harris, TCEQ to C. Sanchez, Region 6, regarding National Remedy Review Board, June 22, 2016. (AR 068989) (June 2016 Email)
[334] Final Interim FS at Table 3-1.
[335] Final Interim FS at Table 3-1; *See also*, 30 Tex. Admin. Code §§ 307.6
[336] Total Maximum Daily Loads for Dioxins in the Houston Ship Channel. Contract No. 582-6-70860, Work Order No. 582-6-70860-02. Quarterly report No. 3, 2006. Prepared in cooperation with the TCEQ and EPA. University of Houston and Parsons Water & Infrastructure.
[337] Proposed Plan at 19; June 2016 Email.

Interim FS.[338] Region 6 admits that USACE predicts that Alternative 6N will result in releases of wastes during implementation, ranging between 0.2 and 0.34 percent.[340]

Region 6 has not, it appears, conducted any evaluation as to whether there is a basis for a waiver of this ARAR.

If this ARAR cannot be met or waived, then Alternative 6N is not a viable remedial alternative and must be eliminated from further consideration. Region 6 failed to properly analyze releases of dioxin associated with Alternative 6N, and has no basis to conclude that Alternative 6N will comply with ARARs.

In contrast, Alternative 3aN does not result in releases that potentially violate the TSWQS. In fact, the 2016 Data demonstrate that the existing armored cap is presently effective at preventing releases to the water of the State, and the existing armored cap will be enhanced under Alternative 3aN.

Based on the discussion above, Alternative 6N may not comply with applicable ARARs and should be eliminated as a remedial alternative. At the least, Modified Table 6-1a should be revised to acknowledge that ARAR compliance for Alternative 6N is unknown because an adequate evaluation of this issue has not been conducted by Region 6.

2. Region 6's application of the second threshold criteria – overall protectiveness – is flawed and supports Alternative 3aN rather than Alternative 6N.

The Proposed Plan states that "containment alternatives (2N through 5aN) will only remain protective if they are properly maintained for the length of time (hundreds of years) that the impounded waste retains its toxicity, and their integrity is not compromised by extreme weather events, barge strikes and/or changes in the river channel which could result in a future release…." The Proposed Plan concludes that "Alternative 6N best realizes the Threshold Criteria because the waste material would be removed and therefore not subject to a potential future release." This is a flawed conclusion for a number of reasons.

First, with respect to Alternative 3aN, no documentation exists in the Administrative Record demonstrating that an "extreme weather event" would

[338] Proposed Plan at 32; Final Interim FS, Appendix A.
[340] Proposed Plan at 32.

cause a release of contaminants to the river from the Alternative 3aN enhanced armored cap. The independent USACE analysis commissioned by Region 6 demonstrated that an armored cap meeting the specifications of Alternative 3aN can and will prevent future releases of waste from the Northern Impoundments. In fact, the USACE Report documents that any releases from such a cap would be much less than the releases expected from Alternative 6N over the short term and no greater than releases expected from Alternative 6N over the long term.

Alternative 3aN includes the construction of pilings to prevent future barge strikes. Alternative 3aN also includes inspection and periodic maintenance of the cap armoring. The cap inspection and maintenance requirement for this alternative protects against conditions that could lead to a release in the future. The protectiveness of the Alternative 3aN enhanced cap will be evaluated during the five-year reviews of all land disposal remedies required by Section 300.430(f)(iv)(2) of the NCP. If a problem with the Alternative 3aN enhanced cap were to occur in the future, Region 6 would have the authority to address the issue at that time.

Alternative 6N, on the other hand, raises serious concerns about overall protectiveness of human health and the environment. The independent evaluation of this alternative by USACE makes clear the magnitude of the releases associated with Alternative 6N, as set forth in Comments N-7 and N-8. Region 6 shows its lack of objectivity by discounting the findings of the USACE Report while raising the specter of catastrophic future releases from an enhanced cap (Alternative 3aN) resulting from hypothetical future changes in the river channel, even though no independent analysis has been conducted of such a scenario. In addition, Alternative 6N ultimately relies on a newly-constructed armored cap to protect residual materials left behind after removal operations to protect the dredge residuals from being eroded. Region 6 fails to acknowledge that its concerns about future river conditions would apply to this new cap as well.

The Administrative Record also does not include an analysis of whether the short-term releases predicted by USACE for Alternative 6N will result in an endangerment to human health and the environment. Given USACE's predictions about releases to the San Jacinto River that will result from Alternative 6N, Modified Table 6-1a should also be revised to state that compliance with the "Overall Protectiveness" criterion is unknown, as Region 6 has not made an adequate evaluation of this issue.

D. Balancing criteria.

1. Region 6's assessment of the long-term effectiveness and permanence of the alternatives – a primary balancing criterion – is misleading.

Region 6 initially states that all alternatives considered in its Final Interim FS are less permanent than Alternative 6N because they leave waste material in place.[341] Region 6 later states that Alternative 6N provides the greatest degree of long-term protectiveness and effectiveness because "the waste material would be permanently removed from the San Jacinto River and there would be no potential for a future release above the risk based level from the Site."[342] These statements – central to Region 6's preference for Alternative 6N – are simply not true.

First, Alternative 6N will leave waste in place, because of the technical limitations associated with dredging.[343] This was noted by USACE in its report, but downplayed by Region 6 in its characterization of Alternative 6N.[344] In the areas in which Region 6 concedes that "work in the dry" may not be possible, residual waste will be left in place in the Northwestern Area that will require the installation of a new cap. The dioxin concentrations in this capped residual material will be similar to the concentrations in the waste material that has been removed.[345] Region 6 fails to acknowledge that this new Alternative 6N cap would be subject to all of the same uncertainties it has raised with respect to the Alternative 3aN cap.[346]

Second, Region 6's characterization of Alternative 3aN as having less long-term protectiveness or effectiveness is misleading. In that regard:

- **Region 6 misused the results of modeling of Alternative 3N as a basis for concluding that Alternative 3aN would not be protective or effective in the long-term.** The Alternative 3aN enhanced cap includes an additional layer of 15-inch armor stone over most of the cap. That armor stone is 3.4 times larger than the largest type of stone (10-inch diameter) used on the

[341] Proposed Plan at 33.
[342] *Id*.
[343] USACE Report at 146; Palermo Report at 16; Taylor Report at 19 ("One negative aspect of conducting the removal and dredging in sections is that after removal of the waste in one section, subsequent removal in the adjacent sections will create residuals contaminating the "clean" section. This recontamination will occur during both the "dry" excavation as well as the underwater removal on the wet side of a sheet pile wall").
[344] Final Interim FS at ES-13.
[345] Palermo Report at 17.
[346] Palermo Report at 9.

current cap. Region 6 has no basis for using modeling of the Alternative 3N cap to conclude that the Alternative 3aN enhanced cap would not be protective or effective in the long-term, particularly given USACE's conclusion that that its enhanced capping remedy (with its addition of at least 12-inch diameter armored stone over much of the current cap) "can" withstand a severe storm event, not simply that releases from catastrophic events "can be addressed" by the cap improvements provided by Alternative 3aN.[347]

- **The lack of modeling of Alternative 3aN is a data gap that Region 6 created**. In directing USACE to perform modeling of the remedial alternatives, Region 6 never asked USACE to model Alternative 3aN.[348] This omission is particularly glaring given the specificity of the tasks assigned to USACE by the Region relative to the evaluation of remedial alternatives. Region 6 created a data gap that it cannot rely upon in concluding that the Alternative 3aN enhanced cap would not be protective.[349]

- **Region 6 lacks any credible basis for its concern about the long-term effectiveness and permanence of Alternative 3aN due to "uncertainties related to changes in channel planform morphology … which is beyond the ability of existing sediment transport models to simulate.**"[350] Region 6 never raised "changes in channel planform morphology" as part of the RI process. Having belatedly interjected it as a basis for its Proposed Plan, Region 6 cannot dismiss its obligation to conduct a technical evaluation to support that claim by simply noting that it cannot be addressed by modeling. Whatever the limitations of modeling, other means of evaluating this issue exist.[351]

- **Region 6's concerns about Alternative 3aN's effectiveness relate to the possibility of future floods that may be more intense than those in the past**. Region 6 notes that "aerial photographs document that the Site, even over just the last 60 years, is in a dynamic river environment that raises concerns about the permanence of any man made structure."[352] Going

[347] Proposed Plan at 33.
[348] Cite to EPA Work Plan to USACE.
[349] Proposed Plan at 33.
[350] *Id*
[351] Shields Report at 9.
[352] Proposed Plan at 33 (emphasis added).

beyond the hyperbolic nature of this statement, what is known about the Northern Impoundments is that they have withstood severe floods over the last 51 years (46 of those uncapped), including the 1994 flood, and Hurricane Ike, Hurricane Katrina, and other storms.

The Alternative 3aN enhanced cap is not expected to be impacted by any more intense future floods.[353] Alternative 3aN not only calls for the construction of a cap that far exceeds USACE and EPA guidance, but also for regular inspections and maintenance and five-year EPA reviews mandated by CERCLA. These additional measures should address any potential concerns about the ability of Region 6 to monitor future Site conditions.

The USACE Report states that long-term releases from the cap under Alternative 3aN should be no greater than those expected under Alternative 6N. In rejecting Alternative 3aN, the Proposed Plan relies solely on speculation about the impacts of hypothetical future events on an Alternative 3aN remedy and misleading assertions about Alternative 6N's removal of all wastes from the Northern Impoundments, to paint a biased picture about the alleged greater long-term effectiveness and permanence of Alternative 6N.

In Table 6-1a, Region 6 rates Alternative 6N as "High" and Alternative 3aN as "Medium-High" for long-term effectiveness. As discussed above, however, Alternative 3aN's long-term effectiveness should be just as good as Alternative 6N's and Respondents have therefore rated both alternatives as "High" in Modified Table 6-1a.

2. Region 6 has misapplied the balancing criteria of reduction of TMV through treatment.

The Proposed Plan identifies "Alternative 6N as resulting in the greatest volume of removal (152,000 cys)."[354] The Proposed Plan follows this assertion with the conclusion that "this alternative is the most effective in reducing the toxicity, mobility, and volume of waste compared to all of the other alternatives." Accordingly, Region 6 gives Alternative 6N a rating of "Medium" in its Table 6-1a and Alternative 3aN a rating of "Low."

[353] Shields Report at 7. Reible Report at 4-5.
[354] Proposed Plan at 29.

Region 6 has mischaracterized the nature of activities constituting "treatment" in rating Alternative 6N higher than Alternative 3aN on this criterion. EPA states in the preamble to the NCP that "the reduction analyzed pursuant to the reduction of toxicity, mobility or volume criterion **must be attained through treatment**."[355] Here, the only elements of treatment associated with Alternative 6N are dewatering and the addition of a stabilizer, , Portland cement, to reduce moisture prior to offsite landfill disposal. The addition of Portland cement to reduce moisture to meet landfill requirements prior to disposal does nothing to reduce the toxicity, mobility, or volume of the waste relative to the other alternatives. As a matter of fact, the volume of waste and wastewater increases with the addition of Portland cement and with dewatering. Alternative 6N reduces the volume of waste from the Northern Impoundments simply by moving the waste to another location, not by treating it.

Alternative 3aN, on the other hand, entails some limited treatment to reduce mobility. During TCRA construction, approximately 6,000 cy of waste in the Western Cell were stabilized and solidified during construction using Portland cement to physically stabilize the material. Alternative 3aN incorporates this treatment in its overall design.

Because Alternative 6N fails to reduce TMV through treatment, it is not favorable to Alternative 3aN relative to this criterion. Region 6 has scored all the containment alternatives as "Low" on Table 6-1a. Respondents have not modified this score for Alternative 3aN on Modified Table 6-1am but have also scored Alternative 6N as "Low," since it does not involve any treatment to reduce the TMV of the waste.

3. Region 6 discounts the short-term effectiveness of Alternative 3aN in favor of a remedy that ranks lowest in short-term effectiveness.

This criterion addresses the effectiveness of the remedial alternatives during the construction and implementation phase until remedial response objectives are met. Under this criterion, alternatives are evaluated with respect to their effects on human health and the environment during implementation of the remedial action.[356]

[355] 55 Fed. Reg. 8721 (emphasis added).
[356] 55 Fed. Reg. 8721.

The Proposed Plan describes Alterative 6N as having the lowest short-term effectiveness, and thereby the highest short term impact, as a result of (1) the longest duration for implementation (19 months), (2) the resuspension and redistribution of sediment from the full removal of the waste materials, (3) the potential for a high-water event during the lengthy construction period, (4) the higher potential for risk to workers, and (5) greater environmental impacts from emissions of ozone precursors, particulate matter, and greenhouse gases from construction equipment and trucks transporting the waste.[357] Although the Proposed Plan discusses methods to mitigate the potential short-term impacts from Alternative 6N, the Proposed Plan fails to quantify the risks to human health and the environment that will occur during implementation of Alternative 6N.

Further, the Proposed Plan simply notes that the actual impacts "will be reduced to the maximum extent practicable" by the use of BMPs during construction without providing any real explanation of how BMPs will accomplish this or how effective they will be.[358] One of the primary reasons for this, of course, is that Region 6 has never before selected a remedy that requires the removal of a fully functional armored cap from a waste impoundment in a river environment. As addressed above in Comment N-7 and N-8, releases of dioxin to the river will occur as a result of the removal process. The short-term impacts of Alternative 6N will be real, substantial and unavoidable.

Alternative 3aN has virtually no short-term impacts because it only requires enhanced cap armoring and does not require further disturbance or removal of waste materials that are already protected by the existing armored cap.

Table 6-1a appropriately scores the short-term effectiveness of Alternative 3aN as "High." However, despite its admission that Alternative 6N has the lowest short-term effectiveness of the remedial alternatives, Region 6 assigns a score of "Medium" to this alternative. In light of the significant releases predicted by USACE for this alternative (, 400,000 times the predicted releases from Alternative 3aN and 5 times more than that if a storm hits in the midst of removal activity), and the fact that the releases are likely to be even higher than Region 6 acknowledges, Respondents have assigned a score of "Low" to Alternative 6N for this criterion in Modified Table 6-1a.

[357] Proposed Plan at 35.
[358] Proposed Plan at 34.

4. Region 6 has dismissed or ignored the implementability of its preferred alternative, making its assessment of that key criterion flawed.

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation. Alternative 3aN rates much higher than Alternative 6N on this factor.

The Proposed Plan states that "Alternative 3N is a short-duration project [2 months] that entails proven technology (*i.e.*, the same activities were demonstrated during construction of the temporary armored cap) that can be deployed with readily available materials and local, experienced contractors."[359] This same statement applies equally to Alternative 3aN.

Alternative 6N is a much longer duration project, estimated to last 19 months (but would probably take longer and also has significant implementability problems, as described in Comment N-6, that are not acknowledged much less fully considered in the Proposed Plan. These issues include issues with dewatering, site access, limited staging areas, restrictions on equipment size, and availability of offsite staging area properties. These issues make this alternative far less implementable than Alternative 3aN.

Unfortunately, to a large degree, Region 6 has not evaluated most of these implementability issues. Rather, it has simply stated that these issues will be addressed during the remedial design phase. This does not satisfy Region 6's duty to provide notice and an opportunity for comment on material aspects of the Proposed Plan and prevents Region 6's decision makers from objectively evaluating the remedial alternatives as it is required to do under CERCLA.

Alternative 3aN is far more implementable than removing more than 152,000 cy of material that is mostly below the river's surface elevation. Alternative 3aN simply involves adding armor to an existing robust engineered cap. This project has already been shown to be implementable when the existing armored cap was constructed.

Region 6 has appropriately assigned an implementability score of "High" for Alternative 3aN. However, despite the myriad implementability issues associated

[359] Proposed Plan at 35.

with Alternative 6N, Region 6 has assigned it a score of "Medium." At best, Alternative 6N should be assigned a score of "Low" or "Unknown; not evaluated." Respondents have given a score of "Low" to Alternative 6N for this criterion on Modified Table 6-1a.

5. Region 6 has minimized the projected cost of Alternative 6N and failed to support it with an NCP-compliant cost estimate.

The Proposed Plan provides an estimated cost of Alternative 3aN (total present worth, or TPW) of $24.8 million and an estimated cost of Alternative 6N of $87 million TPW. Capital expenditures for Alternative 6N ($77 million) are almost four times the capital expenditures for Alternative 3aN ($19.7 million). The costs are based on a September 16, 2016 memorandum prepared by EA Engineering, Science, and Technology, Inc. (EA) for Region 6 (EA Memorandum).[360]

The NCP requires that cost be appropriately analyzed in an analysis of alternatives, including capital costs (both direct and indirect), annual operation and maintenance costs, and the net present value of capital and operation and maintenance costs.[361] Cost estimates should capture all remedial costs and provide an accuracy of +50 percent to -30 percent. [362]

The Alternative 6N estimate did not consider a sufficient level of design detail to appropriately characterize the potential cost of this alternative. A significant element of the cost estimate is for BMPs. The Proposed Plan, however, only generally defines the BMPs and then notes that they are to be used "where feasible," "if practicable," and "as appropriate." The BMPs that are actually expected to be used would need to be defined in order to determine if the cost estimate reflects the potential complexity and challenges associated with implementation; in particular, the location of proposed sheet piles walls would need to be better defined. [363] Several design components are unclear including the assumed excavation method and the assumed berm and sheet pile design. The EA Memorandum states that 76% of the material is assumed to be removed in the dry. Elsewhere, the same memorandum assumes that 100% of the material will be

[360] Letter from Brian Yost of EA Engineering, Science and Technology to Gary Miller on "Enhanced Alternative Cost Estimates." August 31, 2016. (EA Memorandum; AR 100000970).
[361] National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Final Rule, 55 Fed. Reg. 8,666 (Mar. 8, 1990). In estimating costs, costs of construction and any long-term costs to operate and maintain the alternatives must be considered. 40 C.F.R. § 300.430.
[362] Role of Cost in the Superfund Remedy Selection Process, EPA, 9200.3-23 FS, (Sep. 1996). *See also,* A Guide to Development and Documenting Cost Estimates During the Feasibility Study, EPA, 540-R-00-002 (Jul. 2000).
[363] Taylor Report at 42-44.

removed in the dry. The EA Memorandum is therefore internally inconsistent and also inconsistent with statements in the Proposed Plan and Final Interim FS that concede that only a portion of the work is expected to be performed "in the dry." This fundamental inconsistency, together with the lack of specifics as to the methods and design, raises questions as to whether the cost estimate meets the requirements of the NCP.

In addition, the EA Memorandum does not discuss assumptions made to cost the perimeter sheet pile construction. Therefore, it is unclear how the lump sum costs for berm and sheet pile construction were developed. Sheet pile costs vary widely and are dependent on factors such as pile section and length, support structures, current market costs, installation methods, and site access constraints. The EA Memorandum should have considered the type of sheets and lengths, support types and details, and provided figures to show the proposed installation locations. It is also uncertain if the costs include removal of the sheet pile at the completion of construction; those costs, if not included, would be significant.

Because Region 6 did not provide a figure showing the proposed berm and sheet pile alignment, the locations of the proposed berm and sheet piles are unclear. From the limited information in EA Memorandum's description, it appears some of the berms are assumed to be constructed on top of contaminated sediments and left in place after excavation. To remove all of the contaminated material from the footprint as described under Alternative 6N, this would require additional materials and construction to create a larger perimeter enclosure around the work area; this extra work does not appear to be addressed in the Alternative 6N cost estimate. The length of the perimeter sheet pile, as referenced in the cost estimate, appears to be short. [364] Finally, local experienced contractors, after reviewing site access constraints and the proposed Alternative 6N, believe that the Region 6 cost estimate for Alternative 6N may underestimate the cost of the perimeter sheet pile system, by a factor of at least five times. Given this apparent discrepancy **as** to a major element of the cost estimate, Region 6's cost estimate for Alternative 6N is outside the acceptable accuracy of +50/-30% for FS-level cost estimates.[365] Moreover, as shown in Table 2, Region 6 urged USACE to include caissons as a possible BMP. The Region 6 cost estimate does not factor in the cost of caissons; if they were required, the cost of Alternative 6N would be even higher, making Alternative 6N even less cost effective.

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[364] Final Interim FS at Table 4-3.

[365] A Guide to Developing and Documenting Cost Estimates during the Feasibility Study. EPA-540-R-00-002. USEPA and USACE. July, 2000.

Region 6's cost estimate for Alternative 6N makes reference to the "enhanced BMPs" that are required, but these BMPs are conceptual and undefined at this point, and therefore their costs are difficult if not impossible to accurately estimate. The BMPs described have not been employed for a similar project under similar site conditions; therefore, past experience cannot be used to verify the Region 6 estimate.

Considering the types of BMPs that may be required and input from experienced marine contractors familiar with the unique access constraints posed by the Site, the cost of Alternative 6N is likely to have been significantly underestimated by Region 6**.**

E. Modifying criteria.

1. Community acceptance of Alternative 6N should not be assumed.

Community acceptance is a criterion that will be addressed based on comments on the Proposed Plan. Region 6 suggests that this criteria will favor Alternative 6N, but that should not be assumed. It is not clear whether there would be public acceptance of Alternative 6N given that:

> (1) it will not, as presented, result in "full removal" and will leave waste in place under a newly-placed cap;
>
> (2) it cannot be implemented without significant and apparently unavoidable releases, and its implementation could result in much larger and potentially catastrophic releases due to storm events during implementation, causing concerns for business organizations whose members are located in the area, as evidenced by letters from the Texas Association of Business[366] and Texas Association of Manufacturers[367] included in the Administrative Record;[368]
>
> (3) releases from implementation of the alternative will result in higher concentrations of dioxins and furans in fish tissue, causing grave concerns for local marine-based businesses and restaurants as

[366] AR975960.
[367] AR975959.

evidenced by letters submitted to EPA in response to the Proposed Plan; [369]

(4) its period of implementation may be much longer than estimated;

(5) it will require a large off-site facility that will handle and treat dioxin-impacted waste;

(6) 13,000 to 17,500 trips by trucks to transport the excavated waste will be required;[370] and

(7) removal of the wastes may result in significant odors, creating a nuisance for nearby residents and travelers on I-10.[371]

2. State acceptance is unknown as Region 6 did not confer with the State before selecting the Proposed Plan.

It is unclear to what extent Region 6 conferred with TCEQ in developing and selecting its preferred alternatives. What is known is that Region 6 failed to include in the Proposed Plan the statement, required by the NCP, as to whether the State supports the preferred alternative. [372]

F. Modified Table 6-1a clearly demonstrates that Alternative 3aN is superior to Alternative 6N under the NCP's required remedial alternatives selection process.

As shown in Respondents' Modified Table 6-1a (Figure 8), Alternative 3aN clearly ranks higher than Alternative 6N under NCP's Threshold and Balancing Criteria.

Alternative 3aN clearly satisfies both Threshold Criteria; however, it is questionable whether Alternative 6N satisfies either of these criteria since it will clearly result in significant releases of dioxin to the San Jacinto River, releases that

[369] *See* November 23, 2016, letter from the Texas Outdoor Coastal Council to Region 6 Administrator; December 21, 2016, letter from the Texas Restaurant Association to the Region 6 Administrator (Appendix G-9 and G-10).
[370] Proposed Plan at 29; Final Interim FS at 108.
[371] Palermo Report at 19 ("Another aspect of releases from the Site is an issue of odor from the exposed waste during the removal operations. There is no mention of this issue in either the Final Interim FS or PRAP. This could be a major issue with ramifications for community support if the community is not properly informed.").
[372] *See* Comment N-18.

Region 6 has chosen to downplay rather than seriously evaluate applicable ARARs.

With respect to the Balancing Criteria, Alternative 3aN is clearly far superior to Alternative 6N on short-term effectiveness, implementability, and cost effectiveness, and at least equal to Alternative 6N on long-term effectiveness and "reduction of toxicity, mobility and volume through treatment."

Using the NCP's required remedy selection criteria, Alternative 3aN is the preferred remedy.

Figure 8. Modified Table 6-1a*
Summary of Detailed Evaluation – Area North of I-10

Remedial Alternative	Evaluation Criterion						
	Overall Protection	Compliance with ARARs	Long-Term Effectiveness	Reduction of TMV Through Treatment	Short-Term Effectiveness	Implementability	Cost Effectiveness
3aN Enhanced Cap, ICs and MNR	Meet	Meet	~~Med~~ High	Low	High	High	~~Medium~~High
6N Full Removal of Materials Exceeding the PRG, MNR & ICs	~~Meet~~Unknown; not evaluated	~~Meet~~Unknown; not evaluated	High	~~Medium~~Low	~~Medium~~Low	~~Medium~~Low	~~Medium~~Low

*Shows Respondents' modifications to Region 6's Table 6-1a.

COMMENT N-16: THE PROPOSED PLAN DOES NOT COMPLY WITH THE NCP'S COST-EFFECTIVENESS REQUIREMENTS

Cost-effectiveness is defined as when "costs are proportional to [the remedy's] overall effectiveness."[373] Here, the substantial incremental costs of Alternative 6N are disproportionate to its effectiveness as compared to the Alternative 3aN enhanced armored cap.

Alternative 3aN is the only alternative for the Northern Impoundments that meets CERCLA's "cost-effectiveness" requirement. Under the NCP's Preamble, "if the difference in effectiveness is small but the difference in cost is very large, a proportional relationship between the alternatives does not exist."[374] Here, if an appropriate evaluation of the Alternative 3aN engineered cap is undertaken, capping will be shown to be more protective in both the short term and long term relative to Alternative 6N with its inevitable releases of contaminants during removal of the existing cap and the underlying waste.

The additional cost of Alternative 6N cannot be justified when Alternative 3aN:

- is more effective at meeting the threshold criteria (and Alternative 6N may not even meet the threshold criteria);
- is much more protective under the short-term effectiveness criterion, and is much more implementable;
- does not pose long-term effectiveness concerns when proper consideration is given to the USACE Report, the long-term OMM requirements, and regular five-year reviews required by CERCLA; and
- is at least equal to Alternative 6N relative to the reduction in TMV through treatment criterion.

Thus, in summary, the additional cost of Alternative 6N cannot be justified when Alternative 3aN also complies with ARARs and provides overall protection of human health and the environment, but at a much lower costs. This is particularly true given that the short-term risks of Alternative 3aN are much lower than those of Alternative 6N.

[373] 40 CFR §300.430(f)(1)(ii)(D).
[374] 55 Fed. Reg. 8728, March 8, 1990.

Had Region 6 made a thorough and complete cost-effectiveness analysis of Alternatives 3aN and 6N, based on a fair, objective and balanced evaluation of the remedial alternatives, that analysis would identify Alternative 3aN as the most cost-effective alternative.

The results of the cost-effectiveness analysis would be all the more compelling to the extent that Region 6 has underestimated the cost of Alternative 6N.[375]

Remarkably, Region 6 has rated both alternatives as "Medium" for this criterion in its Table 6-1a. Region 6 does not include a discussion of cost-effectiveness in either the Final Interim FS or the Proposed Plan, so no basis for these ratings is provided. It is clear, however, based on the discussion above, that Alternative 3aN should be rated "High" for this criterion and Alternative 6N should be rated "Low."

[375] *See* discussion in Comment N-16, above

COMMENT N-17: THE PROPOSED PLAN CONTRAVENES CERCLA'S REQUIREMENT THAT ANY REMOVAL ACTION, TO THE GREATEST EXTENT PRACTICABLE, CONTRIBUTE TO THE EFFICIENT PERFORMANCE OF ANY LONG-TERM REMEDIAL ACTION

Alternative 6N requires removal of the TCRA-mandated engineered armored cap, which cost more than $9 million to construct. That requirement violates the provisions of Section 104 (a)(2) of CERCLA and does not comply with the requirements contained in the Superfund Removal Guide for Preparing Action Memos (Removal Guide).[376]

CERCLA §104(a)(2) provides that "[a]ny removal action undertaken by the President … should, to the extent the President deems practicable, contribute to the efficient performance of any long-term remedial action with respect to the release or threatened release concerned." EPA's Removal Guide includes a Model Action Memorandum (AM) "that addresses the major statutory, regulatory, policy and program requirements affecting removal decisions."[377] Section V.A.2 of the Model AM is titled "Contribution to remedial performance."[378] This Section requires EPA to include a statement in the AM that "the proposed actions will, to the extent practicable, contribute to the efficient performance of any long-term remedial action …"[379] The Removal Guide also directs EPA to provide an explanation if the "contribution to remedial action" provisions conflict with other program goals such as pursuit of PRP cleanup."[380]

Consistent with the Removal Guide, Region 6's AM for the TCRA states that the removal action (mandating the construction of the TCRA cap) would involve actions "consistent with any long-term remediation strategies that may be developed for the Site."[381] Region 6 did not provide in the AM any explanation of any concerns about contribution of the removal action to a long-term remedial action.

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[376] Superfund Removal Guide for Preparing Action Memoranda. Office of Emergency Management, Office of Solid Waste and Emergency Response, Washington, DC. 75 pp. November 2001. (Removal Guide).
[377] Removal Guide at 7.
[378] Removal Guide at 20.
[379] Removal Guide at 20.
[380] Removal Guide at 20.
[381] Memorandum from V. Leos, Region 6 TCRA Remedial Project Manager to S. Coleman, Director, Superfund Division (6SF). Request for a Time Critical Removal Action at the San Jacinto River Waste Pits Site, Harris County, Texas. April 2, 2010. Section V.A.2.

The Remedial Action Objectives (RAOs) for the TCRA included: (1) prevent direct human contact with the waste materials; (2) prevent benthic contact with the waste materials; and (3) ensure that "[b]ecause this action constitutes source control, these actions are consistent with any long-term remediation strategies that may be developed for the [S]ite."[382] The first two are also RAOs for the final remedy.

Requiring that a working engineered cap be removed would be inconsistent with both CERCLA's requirement and the objectives established for the TCRA. Here, the presence of the armored cap will make implementation of Alternative 6N much more complex and risky; thus, the Proposed Plan identifies a preferred remedy that the removal action neither "contribut[es] to" or is "consistent with."

[382] *Id.*

COMMENT N-18: REGION 6 DID NOT MEANINGFULLY INVOLVE THE STATE OF TEXAS IN EVALUATING REMEDIAL ALTERNATIVES OR SELECTING ITS PREFERRED REMEDY, CONTRARY TO CERCLA AND THE NCP

Under §121(f)(1) of CERCLA, EPA is to "… promulgate regulations providing for substantial and meaningful involvement by each State in initiation, development, and selection of remedial actions to be undertaken in that State." These regulations must, at a minimum, include a reasonable opportunity for a state to review and comment on the "remedial investigation and feasibility study and all data and technical documents leading to its issuance" and on "the planned remedial action…."[383]

EPA has implemented the CERCLA mandate for state involvement in the remedy selection process through provisions in the NCP. EPA acknowledges in the preamble to the NCP the important role of the states in selecting remedies at sites located in those states,[384] and then in § 300.515(e)(1) of the NCP, establishes the following requirements applicable to a State's role in selecting a remedy:

- Both EPA **and the state** shall be involved in preliminary discussions of remedial alternatives addressed in the FS **prior to preparation of the Proposed Plan** and the ROD;

- At the conclusion of the RI/FS, EPA, **in conjunction with the support agency** (at this Site, TCEQ), shall develop a Proposed Plan; and

- The Proposed Plan shall include a statement that EPA and the support agency have reached agreement or, where this is not the case, a statement explaining the concerns of the support agency with EPA's Proposed Plan.

In addition, under §300.430(f)(1)(ii) of the NCP, EPA **in conjunction with the support agency**, is required to identify a preferred alternative and present it in the Proposed Plan.

Region 6 appears to have disregarded its obligations under CERCLA and the NCP to involve the State of Texas in selection of a preferred remedy and the preparation of the Proposed Plan. The Administrative Record does not appear to contain any

[383] § 121(f)(1)(E)(i) and (ii).
[384] 55 Fed. Reg.8,666 (Mar. 8 1990).

documents that reflect such involvement.[385] To the extent Region 6 failed to involve TCEQ, it has failed to meet the requirements of both CERCLA § 121(f) (1) and § 300.515(e)(1) of the NCP.

It is even more unlikely that TCEQ was involved in the development of the Proposed Plan. This is evidenced by the fact that Region 6 did not include either of the statements required by §300.515(e)(1) of the NCP in the Proposed Plan: a statement that Region 6 and the TCEQ had reached an agreement on the preferred remedy, or, alternatively, a statement explaining the concerns of the TCEQ with Region 6's preferred plan. Instead, all that is stated in the Proposed Plan is that the TCEQ "has been informed about the Preferred Remedy for the Site."[386] This does not satisfy Region 6's important obligation to meaningfully involve the State of Texas in the selection process.

Region 6's failure to involve TCEQ in the remedy selection process is further evidenced by a September 7, 2016 letter from Brent Wade, Deputy Director of TCEQ's Office of Waste to Carl Edlund of Region 6.[387] In this letter, Mr. Wade states that "TCEQ understands that the EPA is developing the final Proposed Plan" for the Site. There is absolutely no indication in this letter – dated three weeks before Region 6 issued its Proposed Plan and months after Region 6 submitted its preferred alternative to the NRRB – that TCEQ had been involved in development of the Proposed Plan.[388]

Mr. Wade also encourages Region 6 "to consider all appropriate science and mitigation against further contamination in choosing a remedy that is protective of human health and the environment over both short and long-term conditions when selecting…" the proposed remedy.[389] Given USACE's prediction that Region 6's proposed remedy will result in short-term releases that are about 400,000 times greater than releases from the intact cap and that these releases "may be up to five times greater" if the BMPs are overtopped during the construction phase, it is questionable whether TCEQ considers the Region's proposed remedy to be consistent with TCEQ's stated concerns in the September 7, 2016 letter about "mitigation against further contamination in choosing a remedy."

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[385] A review of the entries in the Administrative Record shows no communication or involvement with the State regarding remedial alternatives after the State submitted its comments on the FS in April 2014.
[386] Proposed Plan at 36.
[387] Letter from Brent Wade, Deputy Director of TCEQ's Office of Waste to Carl Edlund of Region 6 September 7, 2016, (Wade Letter; AR 100000990).
[388] Wade Letter.
[389] Wade Letter.

COMMENT N-19: REGION 6 LACKS THE LEGAL AUTHORITY TO REQUIRE RESPONDENTS TO IMPLEMENT A REMEDY (ALTERNATIVE 6N) THAT COULD RESULT IN VIOLATIONS OF STATE LAW THAT ARE NOT SHIELDED BY CERCLA

If Region 6 were to issue a CERCLA Section 106(a) unilateral administrative order ("UAO") to Respondents that they implement Alternative 6N (which will require them to release dioxins into the San Jacinto River), they will be forced to make a "Hobson's Choice" that will violate their due process rights. In response to such a UAO, Respondents will have only two choices: (1) comply with the UAO, incurring the cost of performing the selected remedy as well as incurring the additional, unknown, potential liability for state statutory and common law claims resulting from the release of dioxin into the environment; or (2) refuse to comply with the UAO, becoming subject to $53,907 per day (nearly $20 million per year) in penalties, along with potential treble damages if EPA elects to perform the work.

Releasing dioxin into the environment at Region 6's direction could expose Respondents (and their contactors) to liability under both Texas common law (including potential toxic torts and personal injury claims) and statutes, such as the Texas Water Code. The Texas Water Code, for example, imposes a maximum daily penalty of up to $25,000 per day for the unauthorized discharge of hazardous substances (such as dioxin) into the environment.[390] CERCLA contains express "savings clauses," which provide, for example, that "[n]othing in this chapter shall affect or modify in any way the obligations or liabilities of any person under other Federal or State law, including common law, with respect to releases of hazardous substances or other pollutants or contaminants."[391] These state law claims may be subject to preemption defenses, but the Fifth Circuit has held that CERCLA does not preempt all state law claims.[392]

While Respondents note that CERCLA § 119(a) provides for some federal immunity to "contractors" for releases that occur during implementation of an

[390] *See,* , Texas Water Code § 7.102. Maximum Penalty (penalties for violations up to $25,000 per day); § 7.351. Civil Suits (providing for civil suits for violations of Texas Water code); and § 26.121. Unauthorized Discharges Prohibited (unauthorized discharges subject to liability under state law).
[391] 42 U.S.C. § 9652(d).
[392] *See, , MSOF Corp .v. Exxon Corp*., 295 F.3d 485, 490 (5th Cir. 2002) ("In enacting CERCLA, Congress expressly disclaimed an intent to preempt state tort liability for the release of hazardous substances. CERCLA contains a general saving clause and several section-specific saving clauses." *Citing* to 42 U.S.C. § 9652(d)124); *Barnes ex rel. Estate of Barnes v. Koppers, Inc.* (5th Circuit 2008) 534 F.3d 357 (Fifth Circuit held that the plaintiff's claim was barred by state statute of limitations, rejecting plaintiff's argument that CERCLA's tolling statute broadly preempted the state statute).

EPA-selected remedy, but does not provide a similar protection for potentially responsible parties.[393] Further, EPA guidance on the subject (and the plain language of CERCLA) provides that CERCLA does not protect responsible parties or their contractors from state law liability for such releases.[394]

Given the potential substantial state law liability that would arise by complying with the UAO and the substantial CERCLA liability for non-compliance with the UAO, issuance of the UAO would violate Respondents' due process rights. As the Supreme Court held in *Sackett v. EPA*, ("*Sackett*"),[395] judicial review in an action brought by EPA, but which the aggrieved party cannot initiate and which exposes the aggrieved party to substantial daily penalties "each day they wait for the agency to drop the hammer," violates that party's due process rights under the Fifth Amendment.[396]

Here, the potential damages and penalties accruing before the Respondents would have an opportunity to challenge the UAO or Region 6's selected remedy in court is an "enormous" penalty, which would necessarily intimidate the Respondents from testing the validity of Region 6's actions. As set forth in Justice Alito's concurring opinion in *Sackett*, once EPA issues a compliance order, a party faces substantial daily fines, and if they "want their day in court" to challenge the EPA's determination, "well, as a practical matter, that is just too bad."[397] "Until the EPA sues them, they are blocked from access to the courts, and the EPA may wait as long as it wants before deciding to sue."[398] That means that a party is at the peril of EPA, being subjected to millions of dollars in fines on a timetable and process utterly controlled by EPA. As Justice Alito sums it up, "[i]n a nation that values due process … such treatment is unthinkable."[399] .

In addition to questions of due process, it is highly questionable whether Region 6 has the authority to order the Respondents to implement a remedy that will result in releases of hazardous substances to the environment, when no such releases are currently occurring (as demonstrated by the 2016 Data). First, under CERCLA §

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[393] *See* CERCLA § 119(b)(1); 42 U.S.C. § 9619(b)(1).
[394] *See* October 6, 1987 EPA Interim Guidance on Indemnification of Superfund Action Contractors under Section 119 of SARA.
[395] 132 S. Ct. 1367 (2012).
[396] *Sackett v. EPA*, 132 S. Ct. 1367, 1372. The Respondents note, however, that *Sackett* was not decided under CERCLA, which, as noted above, contains express "savings clauses" as well as an express bar against pre-enforcement review.
[397] *Sackett* at 1375.
[398] *Id.*
[399] *Id.* (emphasis added).

106(a), EPA may only issue an order based on a determination that there may be an imminent and substantial endangerment to public health or welfare or the environment because of an actual or threatened release of hazardous substances from a facility.[400] Here, no actual or threatened release exists based on the 2016 Data and prior studies conducted during the RI. Further, EPA's action in issuing such an order would not lead to an abatement of a release or threatened release, but instead would mandate that Respondents perform a remedial action that will cause releases of hazardous substances to the environment. Such an action by Region 6 would be wholly inconsistent with the scope of EPA's authority under CERCLA.

[400] 42 U.S.C. § 9606(a).

COMMENT N-20: SELECTION OF ALTERNATIVE 6N IS INCONSISTENT WITH EPA'S "GREENER CLEANUP ACTIVITIES" POLICY

Not only does Alternative 3aN clearly rate higher than Alternative 6N under the NCP's nine-criteria analysis, Alternative 3aN provides a much greener cleanup alternative than does Alternative 6N.

Under EPA's Greener Cleanup Policy, EPA encourages the Regions to conduct an environmental footprint analysis of remedial alternatives to evaluate and quantify the environmental impact of the remedial alternatives using five core elements. Similar to EPA's PTW Guidance, the Greener Cleanup Policy does not displace the nine-criteria analysis under the NCP. The Policy can, however, become a part of the evaluation of the short-term effectiveness criterion and/or one of the other criteria under the broader nine-criteria analysis.

It appears that Region 6 did not conduct a footprint analysis of the Site remedial alternatives, as one is not in the Administrative Record. It is clear, however, that Alternative 6N creates a much larger environmental footprint than does Alternative 3aN. In the Final Interim FS, Region 6 admits that Alternative 6N is a "less sustainable" alternative "considering potential ozone precursor, PM and greenhouse gas emissions from the construction activity and truck traffic."[401]

Alternative 6N compares unfavorably to Alternative 3aN on all five core elements of the Greener Cleanup Policy. The following table compares Alternative 6N to Alternative 3aN relative to the core elements.

Table 3: Comparison of Alternative 3aN with Alternative 6N

Core Elements	Comparison	
	Alternative 3aN	Alternative 6N
Minimize total energy use and maximize use of renewable energy	• 5,000 equipment hours to install additional armor rock and perimeter piling • Negligible truck miles to ship incidental debris and waste to landfill	• 21,000 equipment hours for construction • 7.5 million truck miles to ship sediment to landfill

[401] Final Interim FS at 126.

Core Elements	Comparison	
	Alternative 3aN	**Alternative 6N**
Minimize air pollutants and greenhouse gas emissions	• 0.5 million grams of particulates (PM) • 4 million grams of nitrogen oxides (NOx) • 1 million grams of carbon monoxide (CO)	• 4 million grams of particulates (PM) • 87 million grams of nitrogen oxides (NOx) • 24 million grams of carbon monoxide (CO)
Minimize water use and impacts to water resources	• No effluent to be processed • Negligible water quality impacts associated with armor rock placement	• 20 million gallons of dredge material effluent to be processed • 10 million gallons of work site dewatering effluent to be processed • Water quality impacts associated with dredging releases
Reduce, reuse and recycle materials and wastes	• Reuse of all existing TCRA armor rock as base of enhanced cap	• Reuse of some existing TCRA armor rock to protect perimeter sheet piling • Disposal of remaining TCRA armor rock removed during dredging
Protect land and ecosystems	• No upland sediment processing facility required • Negligible water quality impacts associated with armor rock placement	• Large upland sediment processing facility required to manage dredged material • Water quality impacts associated with dredging releases

As clearly demonstrated in Table 3, Alternative 6N creates a large environmental footprint whereas Alternative 3aN does not. This analysis provides further support for the selection of Alternative 3aN as the preferred remedy for the Northern Impoundments.

COMMENT N-21: CONCLUSION

The Proposed Plan is arbitrary and capricious and should be rejected for the reasons identified above.

The above also demonstrates that Alternative 3aN is the alternative that will best satisfy the NCP's criteria, will be more effective in preventing releases in both the short-term and the long-term, will avoid the uncertainty as to implementability and risk of releases associated with removing the existing cap and excavating the impoundments, and is clearly the most cost-effective alternative.

Should Region 6 not select Alternative 3aN, it should defer selecting a remedy until it takes additional steps to assess the remedial alternatives for the Site consistent with the requirements of the NCP. This means that before a new Proposed Plan is presented, the following must occur:

- The USACE enhanced cap alternative (Alternative 3aN) is modeled;
- A full geomorphic evaluation is completed to assess the potential for the configuration of the river to change abruptly, and to evaluate whether the Alternative 3aN cap includes or may be modified to include adequate safeguards against changes in the river channel if this is determined to be a real issue;
- The 2016 Data, which confirms the effectiveness of the capping alternatives, is fully considered;
- The PTW determination is reevaluated, consistent with the issues raised in these Comments;
- A serious and rigorous assessment is made of the implementability challenges associated with Alternative 6N (in light of the above Comments and the assessments by Dr. Palermo and Mr. Taylor and Mr. Vogt) that includes specifically defining the BMPs to be employed in place of the Proposed Plan's conceptual outline of BMPs;
- Full consideration is given to USACE's predictions (largely ignored in the Proposed Plan) and the assessments made by Dr. Palermo and Mr. Taylor and Mr. Vogt regarding the scope of releases associated with removing the existing cap as part of Alternative 6N, even using enhanced BMPs;

- A cost estimate for Alternative 6N that meets the NCP's requirements is prepared; and

- A thorough and transparent evaluation is performed of the NCP criteria, including cost-effectiveness/proportionality assessment as required by the NCP.

PART TWO: SOUTHERN IMPOUNDMENT

VII. EXECUTIVE SUMMARY—SOUTHERN IMPOUNDMENT

Region 6's preferred remedy for the Southern Impoundment (Alternative 4S) is the excavation and off-site disposal of approximately 50,000 cy of soil and debris that contains paper mill waste and other waste. This soil and debris, buried at depth in an industrial area, is currently contained. This has been confirmed by extensive sampling of soil, sediment, groundwater and surface water in and around the area south of I-10. Unless disturbed, the buried waste does not pose a risk to any potential receptors or the environment.

Region 6's preferred remedy will result in short-term exposures of those involved in excavation of the waste and of the surrounding environment and community, and will result in risk of releases if storm events occur during the excavation process. It will also require an estimated 7,000 truck trips to transport the excavated soil to a landfill, and is estimated to cost $9.9 million. Region 6 proposes to select Alternative 4S over other alternatives (Alternatives 2S and 3S), which would leave the waste in place with institutional and engineering controls. These alternatives do not result in short-term exposures and risks that are associated with Alternative 4S, are equally protective in the long-term, and are much more implementable and cost-effective. Added cost should bring additional protectiveness, but with respect to the Southern Impoundment preferred remedy, the opposite is true.

Region 6 has used the same flawed rationale and analysis it applied to the Northern Impoundments to argue that the buried waste is mobile and therefore must be considered to be PTW (and therefore should be excavated). As with the PTW determination for the Northern Impoundments, Region 6 has ignored Site-specific information developed in the years-long RI process, and performed an opaque and unreproducible "risk evaluation" to justify its PTW determination. Region 6 has based its determination that wastes south of I-10 are PTW on an exposure pathway (of a recreational fisherman) that has no application in the context of buried waste in an industrialized area.

Aside from these defects in Region 6's PTW determination, the extensive sampling performed for the RI – of soil, sediment, surface water and groundwater – and data analysis reported in the RI Report demonstrate that the waste in the Southern Impoundment is contained. In addition, there is no credible basis for concluding that the waste could suddenly become mobile, given that the mean elevation of the

Southern Impoundment is five feet greater than the mean elevation of the Northern Impoundments, that the location of the waste is at depth (at least one and primarily four to five feet below ground surface [bgs]) which Region 6 acknowledges, and lack of evidence that either storm events, flooding or other events could cause the buried waste to be mobilized. As demonstrated below, the 1994 flood event discussed at length in the Proposed Plan had virtually no impact on the area of the Southern Impoundment.

VIII. BACKGROUND

A. The area south of I-10 and size and location of the Southern Impoundment.

The Southern Impoundment is on an approximately 50-acre upland peninsula, located south of the I-10 bridge and the Northern Impoundments. The precise location and area of the impoundment are unknown, but the possible areas determined from aerial photographs and historical records[402] (Figure 9) range from 13 to 22 acres. Mean elevations in the vicinity of the Southern Impoundment are eight feet above sea level, approximately five feet higher than the mean elevation of the Northern Impoundments.[403]

The peninsula is, and has been since the 1950s, an area in which there has been active and intensive industrial activity, with operations of several marine and fleeting operations located there, including Kirby Inland Marine, Southwest Shipyards, and Glendale Boat Works.[404] Available historical information includes evidence of potential paper mill waste disposal during the mid-1960s in a bermed area on the western side of the peninsula, and anthropogenic waste disposal and other industrial activities thereafter.[405]

B. Remedial investigation of conditions south of I-10.

The RI of the area south of I-10, conducted by International Paper,[406] identified paper mill waste (along with a variety of unrelated wastes) disposed of in an area in the northwest portion of the peninsula, as shown on Figure 9. This area is west

[402] See Figures 6-3 and 6-4, RI Report; 1966 Engineering Report (AR 9298862).
[403] *See* Figure 3-1, RI Report.
[404] 1989 Aerial Photograph. AR 9182306.
[405] Aerial photographs from various dates. AR 9187552.
[406] MIMC declined to participate in the investigation of the area south of I-10.

of Market Street, the street which bisects the peninsula and is used by the businesses located there.

As part of the RI for the Site, International Paper performed sampling of soil, sediment, groundwater, and surface water between 2011 and 2016. The soil sampling demonstrated that dioxins and furans at concentrations above background are a minimum of one foot and most often four to six feet bgs. In all but one of the 26 locations where soil cores were collected, the depth-weighted TEQ concentrations in the upper two feet of soil are less than 51 ng/kg, the value Region 6 refers to as a "soil protective level" that allows for unrestricted use;[407] most cores also show an additional two to four feet of soil with very low TEQ concentrations (Figure 10). The sampling also demonstrated that there were no impacts groundwater or surface water. The RI also included an assessment of the risks to ecological and human receptors. The risk assessments approved by Region 6[408] found no unacceptable risks to commercial workers and trespassers. The only human health risk identified was to a hypothetical future construction worker in four specific locations; the soil PCL for this receptor was presented in the RI Report, and is 450 ng/kg. There were no unacceptable risks to ecological receptors associated with dioxins and furans. In summary, the sampling and the risk assessment have confirmed that dioxins and furans in the buried paper mill waste are contained, are not migrating, and do not currently pose unacceptable risk to people or the environment.[409]

IX. SUMMARY OF PROPOSED PLAN—SOUTHERN IMPOUNDMENT

The Proposed Plan describes the selected alternative, Alternative S4, as requiring the excavation and replacement of an estimated 50,000 cy of soil.[410] Excavation would be required in areas exceeding the "preliminary remediation goal" identified by Region 6 described in the Final Interim FS.[411]

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[407] Final Interim FS at 115.
[408] EPA Approval of BHHRA (AR 681229).
[409] *See* Section 6.4 of the RI Report; Results of sampling in 2011 to 2013 were presented in Draft Remedial Investigation Report Addendum 1, San Jacinto River Water Pits Superfund Site. Anchor QEA and Integral, November 2013. (RI Report Addendum; AR 696136).
The results of the 2016 sampling are contained in the 2016 Data Summary Report (Appendix H). The results of all of the sampling are described in detail below in Comment S-1.
[410] Proposed Plan at 31.
[411] This soil PRG value differs from that which was developed and approved as part of the RI process, but no explanation of the change is provided.

Dewatering to lower the water table to allow excavation of impacted soil in "relatively dry" conditions would be required, and the excavated soil may need to be further dewatered or solidified as necessary prior to transporting it for disposal at an appropriately permitted landfill.[412] Any effluent from excavation and dewatering would also require potential treatment prior to disposal.[413] The excavated areas would be backfilled with imported soil after which vegetation would be reestablished.

Alternative 4S would also require the demolition and removal of an existing building and concrete slab to allow access to the underlying soil and these features "would be replaced, if necessary."[414]

Following construction, institutional controls would be applied to ensure the continued industrial use of the area.[415]

X. DETAILED COMMENTS ON SOUTHERN IMPOUNDMENT

COMMENT S-1: SITE SPECIFIC DATA – INCLUDING 2016 DATA THAT REGION 6 DECLINED TO CONSIDER – DEMONSTRATES THAT THE WASTES IN THE SOUTHERN IMPOUNDMENT ARE CONTAINED AND DO NOT PRESENT AN UNACCEPTABLE RISK TO PEOPLE OR THE ENVIRONMENT

In identifying Alternative 4S as its preferred alternative for the Southern Impoundment, Region 6 has ignored results of environmental sampling conducted under its direction in a series of sampling events in 2010, 2011, 2012, 2013, and 2016. The results of that sampling demonstrate that the dioxins and furans in the buried paper mill waste in the Southern Impoundment are contained, do not pose unacceptable risks, are covered by clean soil, and are not migrating in groundwater to surface water or to the deep groundwater.[416]

[412] Proposed Plan at 31.
[413] Proposed Plan at 31.
[414] Proposed Plan at 31.
[415] Proposed Plan at 31.
[416] RI Report, RI Report Addendum 1, 2016 Data Summary Report (Appendix H).

The 2016 Data are the result of the 2016 studies that Region 6 required Respondents to perform, but then later, after it decided to take over the FS, indicated that it was not interested in considering in its remedy selection process. With respect to the Southern Impoundment, Region 6's stated reason for requiring this additional sampling was to "[d]etermine whether there is any migration of dioxin/furan from . . the [Southern Impoundment] into the San Jacinto River at levels above the [TSWQS]" or "any migration of groundwater in the [Southern Impoundment" to the surface water in the Old River channel at levels above the [TSWQS] …."[417]

Below are key findings from the RI and the 2016 sampling:[418]

- Soil Sampling. Soil sampling conducted in 2011 and 2012 identified locations in which paper mill wastes containing dioxins and furans were located together with material originating from other sources. Dioxins and furans associated with paper mill waste were located at depth, ranging from one foot but mostly four to five feet bgs, as shown on Figure 10. Depth weighted TEQ concentrations in the top two feet of soil are below Region 6's soil protective level of 51 ng/kg (Figure 10) in all but one location. Depth-weighted TEQ concentrations in the top two feet of soil are below regional background TEQ surface soil concentrations in 24 of the 26 core samples for the RI (Figure 10)[419].

- Sediment. Sediment samples collected adjacent to the Southern Impoundment in 2010 and 2012 have relatively low TEQ concentrations. An "unmixing" analysis presented in the approved RI Report found that less than 5 percent of the mass of dioxins and furans in the sediment samples is attributable to paper mill wastes.[420]

- Surface Water. Surface water samples were collected in 2016 at a location adjacent to the Southern Impoundment. The results for dioxins and furans were comparable to those at the other two sampling stations in the vicinity of the waste impoundments that were sampled as part of the 2016 studies.

- Groundwater. Groundwater sampling was conducted in 2011, 2012, 2013, and again in 2016, and involved installation of a total of 10 wells in the area

[417] August 2015 Email (Appendix G.1).
[418] RI Report, 2016 Data Summary Report (Appendix H).
[419] The reference envelope value (background) concentration is 24.3 ng TEQ/kg.
[420] RI Report, Table 5-23. The unmixing analysis is also discussed in Comment N-2.

south of I-10.[421] The 2013 sampling, confirmed in the 2016 studies, demonstrated that the dioxins and furans were contained and not migrating in groundwater or to surface water. In that regard:

- In 2016 groundwater samples, the target compounds (2,3,7,8-TCDD, 2,3,7,8-TCDF, and 2,3,4,7,8- PentaCDF) were not detected, except in two shallow wells that were drilled directly into the waste.

- None of the target compounds were detected in shoreline wells on the peninsula south of I-10 in 2016, indicating that target compounds are not transported by groundwater from waste areas to surface water, consistent with results of groundwater sampling reported in 2013.

- Other than in the two wells drilled directly into the waste, groundwater sampled in 2016 meets the TSWQS of 0.0797 TEQ/L and the relatively low TEQ concentrations in sediment samples corroborates the results of groundwater studies.

This strong empirical data set collected as part of the RI demonstrated that current conditions effectively contain dioxins and furans within the Southern Impoundment. The 2016 data, which Region 6 had available to it but did not consider, further confirms that the dioxins and furans are effectively contained. The objectives that Region 6 established for the 2016 sampling were to determine whether "any migration of dioxin/furan from … the [Southern Impoundment] into the San Jacinto River at levels above the [TSWQS]" or "any migration of groundwater in the Southern Impoundment to the surface water in the Old River channel at levels above the [TSWQS]" was occurring; the results of the 2016 sampling confirm that no such migration is occurring.

Region 6 should give serious weight to the additional 2016 data (provided in Appendix E), in the context of the previously existing data set.

[421] RI Report Addendum 1; 2016 Data Summary Report (Appendix H).

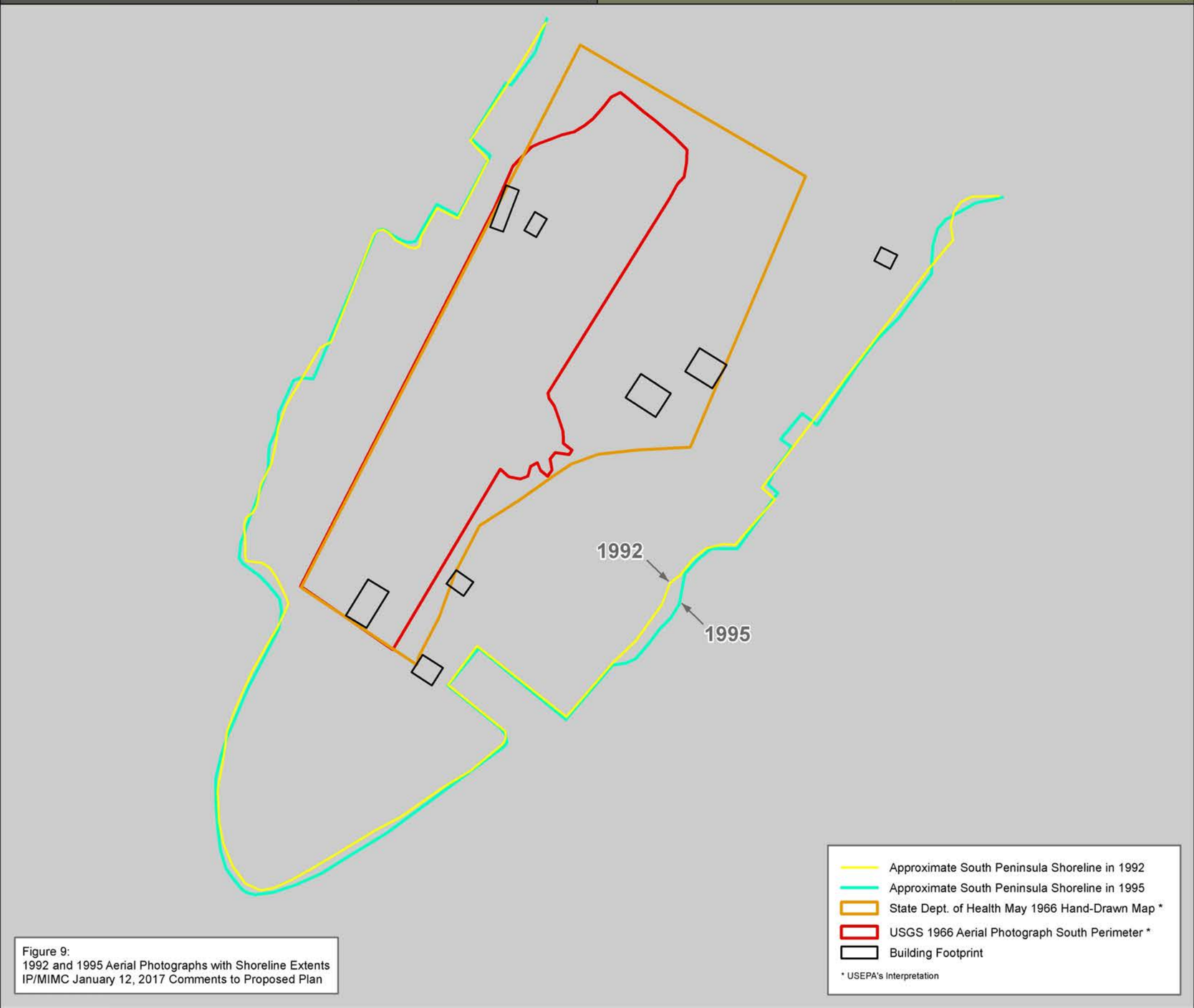

Figure 9:
1992 and 1995 Aerial Photographs with Shoreline Extents
IP/MIMC January 12, 2017 Comments to Proposed Plan

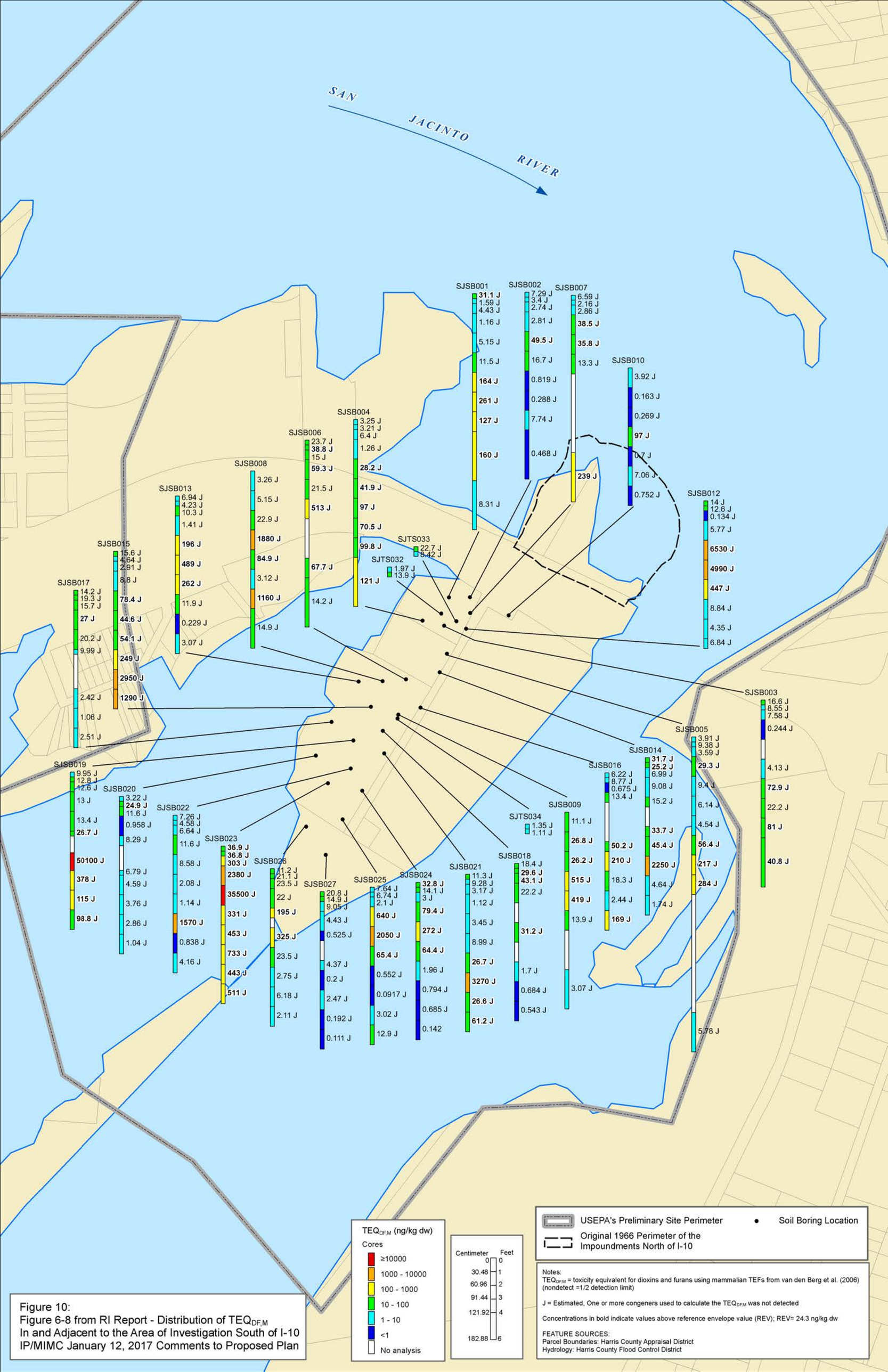

Figure 10:
Figure 6-8 from RI Report - Distribution of $TEQ_{DF,M}$
In and Adjacent to the Area of Investigation South of I-10
IP/MIMC January 12, 2017 Comments to Proposed Plan

Notes:
$TEQ_{DF,M}$ = toxicity equivalent for dioxins and furans using mammalian TEFs from van den Berg et al. (2006) (nondetect =1/2 detection limit)

J = Estimated, One or more congeners used to calculate the $TEQ_{DF,M}$ was not detected

Concentrations in bold indicate values above reference envelope value (REV); REV= 24.3 ng/kg dw

FEATURE SOURCES:
Parcel Boundaries: Harris County Appraisal District
Hydrology: Harris County Flood Control District

COMMENT S-2: REGION 6 HAS NO CREDIBLE BASIS FOR ASSERTING THAT BURIED WASTE IN THE SOUTHERN IMPOUNDMENT COULD BECOME MOBILE

Region 6's designation of the buried waste in the Southern Impoundment as PTW is based on its assertion that the buried waste could become mobile. In addition to the other reasons why Region 6's PTW determination is flawed (as addressed below in Comment S-3), there is no credible support in the record for Region 6's assertion.

Region 6 does not support its assertion that the buried waste in the Southern Impoundment could be mobilized with a rigorous technical evaluation of the hydrodynamics and physical forces that could occur during flooding on the peninsula south of I-10; such an analysis is a necessary underpinning of any conclusion that dioxins in the buried waste could purportedly become mobile.

Region 6 appears to have simply assumed that the circumstances it contends could impact the Northern Impoundments – an ultra-extreme storm event and an abrupt change in the river channel – would cause the buried waste to be eroded.[422] There is no evidence in the record to support such a claim.

The average elevation of the Southern Impoundment is five feet greater than the average elevation of the Northern Impoundments. Its location along the River and relative to the main channel of the river is different from those of the Northern Impoundments. The Administrative Record contains no information or analysis addressing scour, the potential for catastrophic release, or any other mechanism of mobility of the buried wastes in the Southern Impoundment. Region 6 did not request that USACE evaluate these issues with respect to the area south of I-10.[423]

The Southern Impoundment is in an upland area; the aerial photograph documentation record provides evidence of the stability of this area from 1956 to 2016. Moreover, the aerial photography record that Region 6 relied upon (without sufficient grounds, as set forth in Comments N-9 and N-10) and uses to speculate about future changes in the river's course shows **the peninsula to be stable with no perceptible changes to the Southern Impoundment from the 360,000 cfs**

[422] *See* Comments N-9 and N-10.

[423] See USACE Report. USACE was asked to address scour in the river channel south of the I-10 bridge, but this channel is not physically or hydrologically analogous to the Southern Impoundment with respect to the forces present during a very large flood of 390,000 cfs. USACE Report (Tasks 2 and 7).

flood of 1994. For example, several buildings, roads and other structures present across the peninsula south of I-10 in the 1992 and 1994 photographs were also present in 1995 (Figure 9). The historical photographic record for the peninsula south of I-10 shows the perimeter of the peninsula and other characteristics of this area to have been stable in the 1994 flood.

Contrary to Region 6's foundational assumption that the wastes south of I-10 could mobilize, facts demonstrate that the Southern Impoundment has been stable, is likely to continue to be stable, and is not subject to the depth of erosion that would be required to mobilize buried materials in the future. Moreover, if there could be a "catastrophic" release in a flood, that raises questions about the current permitting for hazardous substances used and stored by businesses operating on the peninsula south of I-10, as well as elsewhere along the river and in the Houston Ship Channel (Figure 6).

Finally, any concerns about future events that might impact the Southern Impoundment, such as changes in the river channel, can be addressed through the CERCLA five-year reviews of the remedy.

<u>COMMENT S-3</u>: EVEN IF THE WASTE IS CONSIDERED MOBILE, REGION 6'S PTW ANALYSIS IS FLAWED AND IS NOT TRANSPARENT FOR THE REASONS SET FORTH IN COMMENT N-12.

Even if Region 6 had a credible basis for concluding that the waste in soil is mobile or potentially mobile, other aspects of its PTW analysis are fatally flawed, for the reasons set forth in Comment N-12. As noted there, a PTW determination is not a substitute for an analysis of the nine criteria under the NCP, and the proper application of the nine criteria (as addressed in Comment S-5 below) does not support the selection of Region 6's preferred remedy.

An additional reason why Region 6's PTW determination is not applicable to the waste in the Southern Impoundment is that it is based on a sediment-based PRG using an exposure scenario that has no relevance to the Southern Impoundment, where the dioxins and furans are in soil. Applying a sediment-based PRG is simply not appropriate for material buried in the soil south of I-10.[424]

Whatever arguments Region 6 might make regarding the validity of the Khoury Risk Evaluation and technical approach with respect to the Northern Impoundments, it can offer no credible basis for applying the results to the Southern Impoundment. The risk assessments that are in the Administrative Record for the area of investigation south of I-10 thoroughly and transparently address industrial/commercial workers, trespassers, and future construction workers as hypothetical receptors that could potentially come into contact with the dioxin-contaminated wastes or related dioxins and furans in surface and subsurface soils south of I-10, if any.[425] Human and ecological receptors solely exposed to surface soil had no unacceptable risks related to dioxin exposure.

The only hypothetical human receptor for which risks were unacceptable was the hypothetical future construction worker. Table 6-7 of the approved RI report shows the cancer risk levels associated with exposure scenarios for a hypothetical future construction worker, and Table 6-1 presents the associated soil EPCs. Using the information in Tables 6-1 and 6-7, the soil concentration corresponding to an ELCR of 10^{-3} for a hypothetical future construction worker is 320,000 ng/kg. Thus, if Region 6 properly based the analysis of PTW for the Southern Impoundment on risk to a hypothetical future construction worker, the PTW

[424] Sediment PRGs protective of fishers are generally lower than those for soil protective of industrial workers, because of the differences in exposure pathways from an aquatic vs. terrestrial environment to people.
[425] RI Report; BHHRA.

threshold concentration would be 320,000 ng TEQ/kg. **None of the waste in the Southern Impoundment exceeds that threshold**.

COMMENT S-4: REGION 6'S APPROACH LACKS TRANSPARENCY AND DOES NOT EXPLAIN WHY REGION 6 IGNORES VALUES ESTABLISHED THROUGH THE RI PROCESS AND IN THE APPROVED RI REPORT

Again and again, a lack of transparency appears in Region 6's presentation of key values that it uses to support its selection of its preferred alternatives. For example, in the case of the Southern Impoundment, the Final Interim FS refers to a "soil protective level" of 51 ng/kg.[426] No citation or other basis for this value is provided in the Final Interim FS, and no explanation of the basis or derivation of this value has been located in the Administrative Record. No explanation is provided as to why the site-specific protective concentration level in soil for construction workers that was derived in the RI Report of 450 ng/kg is no longer being referenced.

The Final Interim FS and the Proposed Plan therefore fail to provide the explanation for this value, which Respondents were unable to otherwise tie to prior investigations or data. Region 6 should provide the appropriate explanation of this value (and its reason and rationale for rejecting the Site-specific value that was derived as part of the RI process) and then provide an opportunity for further comment once it has done so. A similar explanation is needed for Region 6's decision to ignore Site-specific data, in this case, in connection with its PTW determination. In the absence of those steps, the remedy selection process will lack the required transparency.

An even more problematic example is Region 6's depiction of "preliminary remedial action areas" for removal of soils south of I-10.[427] The volume of soil for removal under Alternative 4S is the same in the Draft Final Interim FS and the Final Interim FS (50,000 cy). The locations, number, and sizes of the areas identified as "preliminary remedial action areas for soil removal" in the Final Interim FS differ significantly from those in the Draft Final Interim FS developed as part of the RI/FS process. The latter identifies three such areas, all with different shapes, in Figure 4-11 of the Draft Final Interim FS.[428] Figure 4-11 of Region 6's Final Interim FS shows five areas, all with the same shape. In fact, Region 6's Figure 4-11 identifies the same areas identified as "exposure units" in the risk assessment reports for the Southern Impoundment. As a result, it is not clear

[426] Proposed Plan at 20.
[427] Final Interim FS, Figure 4-11; Proposed Plan, Figure 15.
[428] Appendix G-2.

whether Region 6 actually intends that the areas specified in Figure 4-11 of its Final Interim FS are the areas which are to be excavated, based perhaps on its new and unexplained soil PRGs. In any case, Region 6's intent, supporting rationale, and specifications used in identifying areas for soil removal under Alternative 4S are not clear, and its methodology and objectives are not transparent. This raises questions as to the process by which Region 6 selected Alternative 4S as its preferred alternative. The above are not the only instances in which Region 6 has arbitrarily and without explanation disregarded information developed under its supervision as part of the RI process in favor of information or specifications that it then fails to explain and fails to provide the detail that would allow a reviewer to understand how such values were derived and their intent for its application.

<u>COMMENT S-5</u>: REGION 6 HAS NOT PROPERLY EVALUATED THE ALTERNATIVES FOR THE SOUTHERN IMPOUNDMENT AGAINST THE NCP'S NINE REMEDY SELECTION CRITERIA

Region 6 failed to appropriately analyze and apply the nine NCP remedy selection criteria in selecting Alternative 4S as its preferred alternative, and Region **6's Interim Final FS fails to provide the requisite technical and scientific basis for its selection of Alternative 4S.** Region 6's selection of Alternative 4S is not supported by an appropriate evaluation of the four alternatives against the NCP's nine remedy evaluation criteria, a necessary step even if the material is considered a principal threat. When appropriately applied, those criteria point to the selection of Alternative 2S or 3S rather than Alternative 4S.

Alternative 4S is the least cost-effective remedial alternative, with a cost that is more than seven times that of the next most costly alternative, Alternative 3S. Notwithstanding its much higher cost, Alternative 4S does not reduce risk, but would result in increased short-term risks to workers, the surrounding community (including the risk of releases during storm events while the excavation is open), and to the environment while achieving no gains in reduction of toxicity, mobility, or volume. Alternative 4S is the most difficult to implement. In proposing Alternative 4S, Region 6 demonstrates a failure to properly consider the nine remedy selection criteria for the range of alternatives. Both Alternatives 2S and 3S better meet all of the nine criteria.

Other than the "no action" alternative, the other alternatives for the Southern Impoundment meet the threshold criteria (overall protectiveness of human health and the environment, and compliance with ARARs). Therefore, it is the five balancing criteria and two modifying criteria that should determine the preferred remedy.

Of the five primary balancing criteria, Region 6 inappropriately rates Alternative 4S as better with respect to two criteria – long-term effectiveness and reduction of TMV. Region 6 has no credible factual basis for this rating and in fact, the other alternatives rate the same on those criteria. Region 6 acknowledges that its preferred alternative creates short-term risks; if anything, the magnitude of those short-term risks have been downplayed by Region 6, and its preferred alternative, Alternative 4S, is the least cost-effective of the alternatives. These four criteria are discussed below; no discussion is included of the remaining balancing criterion, implementability, because the alternatives are all implementable.

The modifying criteria – community acceptance and State acceptance – remain to be evaluated. As discussed below, community acceptance of Region 6's preferred remedy should not be assumed, given the impacts of the 7,000 truck trips involved in removing the buried waste, the impacts on local businesses and the exposure risks. State acceptance remains to be evaluated, given that Region 6 apparently did not consult with TCEQ in the manner required by the NCP in identifying its preferred remedy (as discussed in Comment N-18).

A. Long term effectiveness.

The Proposed Plan states that Alternative 4S would provide greater long-term permanence than the other alternatives because it would permanently remove wastes from an area that Region 6 believes could undergo a "catastrophic" release in a flood during a future extreme storm.[429] As addressed in Comment S-2, Region 6 lacks any credible basis for that conclusion. There is no credible basis for Region 6 to conclude that a removal remedy such as Alternative 4S would provide greater long-term effectiveness than the other remedies.

B. Reduction of TMV.

Region 6's Proposed Plan argues that Alternative 4S will reduce volume because the material will be transported to a landfill. This is a misapplication of this criterion because the actual mass and volume of dioxin will simply be transferred to a new location; no reduction of dioxin mass or volume in the waste soil would result.

Simply moving the waste from one secure capped area to another merely transfers risk without material gain in protectiveness. Both locations will be monitored in the future, and if both are modeled 500 years into the future, or longer, neither could pass the virtual 100% certainty test.

Therefore the alternatives all rate the same on this criterion.

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[429] *See,.e.g.*, Proposed Plan at 2. *See also* Shields Report at 4-5 ("the overall stability of the San Jacinto River alignment over the last century is remarkable.") and at 8 ("The peninsula containing the Southern Impoundment is immediately downstream from the Interstate 10 crossing, but it would be impacted by bridge scour only in the event of a major realignment of the San Jacinto River main channel. As noted above, that channel has been stable and nearly static for a century and exhibits characteristics similar to stable rivers found elsewhere. Such a major realignment would be highly unlikely.")

C. Short-term effectiveness.

Alternative 2S and 3S have a much higher degree of short-term effectiveness than Alternative 4S. Because Alternative 4S requires the excavation, treatment, transport, and disposal of approximately 50,000 cy of contaminated soil, the potential for worker or other public and environmental exposure to dioxin-containing wastes is much greater under Alternative 4S than under Alternatives 2S and 3S. The potential for exposure is acknowledged in the Proposed Plan, which states that "Alternative 4S would require exposing soil with dioxin concentrations exceeding the Preliminary Remediation Levels, which introduces the potential for exposure to contaminants of concern through direct contact with the soil, inhalation or ingestion of impacted dust, and contact with impacted soil suspended in runoff."[430] Alternative 4S is also described as requiring dewatering at the excavation site and additional dewatering and/or solidification following excavation, and will require demolition of a structure and concrete slab.

Additional environmental risks of implementation of Alternative 4S include the possibility of releases during treatment and solidification and subsequent transportation to the disposal facility as well as possible releases from the off-site landfill to which the wastes would be transported. In addition to these environmental risks, compared to the other three remedial alternatives, Region 6 acknowledges that the construction of this alternative has higher greenhouse gas and particulate matter impacts and ozone generation associated with construction emissions from equipment operating within the project work area, and from equipment required for transportation and disposal of excavated soil.[431]

For Alternative 2S, there is essentially no potential for human exposure to dioxin containing soils, and for Alternative 3S, the potential is minimal. Region 6 proposed to select the only alternative that results in significantly elevated potential for exposure of workers, the community and the environment to contamination, and for other short-term risks. There is no offsetting reason for these increased risks, particularly given the immobility and isolation of the residual dioxin-containing wastes in the Southern Impoundment.

Further, even if Region 6 had a basis for designating the impacted soils south of I-10 as PTW, the selection of Alternative 4S conflicts with EPA guidance on remedy

[430] Proposed Plan at 35.
[431] The Proposed Plan states that "Alternative 4S would require offsite transportation of the soil to a disposal facility, increasing the potential for exposure to contaminants of concern, emissions of greenhouse gasses, nitrogen oxides, and particulate matter, and potential tracking of contaminants of concern offsite." Proposed Plan at 35.

selection.[432] That guidance states clearly that it may be more appropriate to contain principal threat waste when implementation of the remedy "...would result in greater overall risk to human health and the environment due to risks posed to workers, the surrounding community, or impacted ecosystems during implementation."[433]

D. Costs and cost-effectiveness.

The Proposed Plan lacks an appropriate analysis of cost-effectiveness of the three alternatives. The costs are $1,024,000 TPW for Alternative 2S, $1,409,000 for Alternative 3S and $9.9 million TPW for Alternative 4S. The differences in capital expenditures between the three are even greater: capital expenditures for Alterative 4S are approximately 140 times higher than for Alternative 2S and 25 times higher than for Alternative 3S.

The additional expense of Alternative 4S cannot be justified when Alternative 2S and 3S are equally effective at meeting the threshold criteria and Alternatives 2S and 3S are **more** protective using the short-term effectiveness criterion. The higher cost of Alternative 4S (~$10 million) versus the other alternatives (beginning at ~$1 million) also cannot be justified, given that all of the alternatives will provide overall protection of human health and the environment and compliance with ARARs.

E. Community acceptance.

It cannot be assumed that the public and the businesses located on the peninsula will accept Region 6's preferred remedy. Region 6's proposed remedy will result in potential disruption to the fleeting and other marine services operations located on the peninsula south of I-10, and the 7,000 truck trips required and the associated increased risk of accidents and impacts from the transport 50,000 cy of dioxin-containing soil to a regional landfill is not a trivial consideration.[434]

F. State acceptance.

As discussed in Comment N-18, Region 6 does not appear to have followed the requirements in the NCP regarding the participation of TCEQ in selecting a proposed remedy. At this point, there is no basis to assume that TCEQ will

[432] Rules of Thumb at 12.
[433] Rules of Thumb at 12.
[434] See Palermo Report at 21-22 (addressing truck trips associated with Northern Impoundment remedy).

support Alternative 4S. If that remedy were to be selected – premised on a future "catastrophic" release scenario, it would raise questions as to whether TCEQ might then need to review the permitting of other operations on the peninsula and in other locations along the River.

G. Appropriate application of the nine NCP remedy selection criteria would clearly result in selection of Alternative 2S or Alternative 3S as the most appropriate remedy for the Southern Impoundment.

Alternative 2S avoids the unnecessary exposure to workers and the environment caused by excavating waste that is securely located two to ten feet below grade and transference of potential risk from one location to another, and Alternative 3S presents a much lesser set of risks than Alternative 4S. Both Alternatives 2S and 3S are far more protective in the short term, equally implementable, and significantly more cost-effective. The costs of Alternative 4S are about $9 million more, or 10 times, more than the costs of Alternative 2S; and about 7 times greater than the costs of Alternative 3S.

COMMENT S-6: SELECTION OF ALTERNATIVE 4S IS INCONSISTENT WITH EPA'S "GREENER CLEANUP ACTIVITIES" POLICY

Alternative 4S is the least "green" of the alternatives for the Southern Impoundment under EPA's Greener Cleanup Policy. That Policy does not displace the nine-criteria analysis under the NCP, but can become a part of the evaluation of the short-term effectiveness criterion and/or one of the other criteria under the broader nine-criteria analysis.

Region 6 does not appear to have conducted a footprint analysis of the remedial alternatives for the Southern Impoundments, but had it done so, Alternative 2S would be the most sustainable. Alternative 2S has virtually no "footprint." Alternative 3S involves some (related to excavation to place a belowground barrier), but Alternative 4S clearly involves the most, given both the construction activity and truck trips it requires. The table below compares the alternatives on the five core elements of the Policy.

Table 4: Comparison of Alternatives 2S, 3S, and 4S

Core Elements	Comparison		
	Alternative 2S	Alternative 3S	Alternative 4S
Minimize total energy use and maximize use of renewable energy	• None	• 160 equipment hours for construction • 0.3 million truck miles to ship excavated soil to landfill	• 900 equipment hours for construction • 2 million truck miles to ship excavated soil to landfill
Minimize air pollutants and greenhouse gas emissions	• None	• 60,000 grams of particulates (PM) • 2 million grams of nitrogen oxides (NOx) • 0.5 million grams of carbon monoxide (CO)	• 350,000 grams of particulates (PM) • 12 million grams of nitrogen oxides (NOx) • 3 million grams of carbon monoxide (CO)
Minimize water use and impacts to water resources	• None	• No excavation below the water table proposed, therefore negligible potential impacts to water resources	• Excavation below the water table would require dewatering, management of dewatering effluent,

Core Elements	Comparison		
	Alternative 2S	Alternative 3S	Alternative 4S
			and discharge, with potential impacts to water resources during construction
Reduce, reuse and recycle materials and wastes	• None	• No functional structures affected by proposed excavation	• Functional building must be demolished to accomplish proposed excavation
Protect land and ecosystems	• None	• Lower quantity of excavated material reduces potential risks from material handling, processing, and offsite shipment	• More than 5 times the excavated quantity of material compared to Alternative 3S, which increases the risk for environmental impacts during material handling, processing, and offsite shipment

As clearly demonstrated in Table 4, Alternative 4S creates a large environmental footprint while Alternative 2S creates none. This analysis provides further support for the selection of Alternative 2S as the preferred remedy for the Southern Impoundments.

COMMENT S-7: CONCLUSION

Region 6's approach to the evaluation of alternatives for remediation south of I-10 ignores site specific information that the dioxins associated with the buried wastes are contained, lacks transparency on key issues such as the appropriate PRG for the site, and appears to equate exposure areas for risk assessment with remedial action areas without explanation. As a result, Region 6's Proposed Plan does not reflect the detailed evaluation of alternatives required by the NCP and is arbitrary and capricious.

Under the required weighing of the nine NCP criteria, and in particular, cost-effectiveness, there is no basis for selecting Alternative 4S. It is not only the most costly (by a factor of ten as compared with Alternative 2S), but it alone involves significant short-term risks and impacts, and those risks and impacts are not offset by any additional long-term protectiveness. To the extent that Region 6 identified Alternative 4S as its preferred remedy based on concerns about longer term events, such as changes in the river channel, there is no basis for concluding those events could occur abruptly and any concerns about future events that could impact the Southern Impoundment could be addressed through the required five-year reviews of the remedy.