

September 7, 2012

**Comments on the *Baseline Ecological Risk Assessment (BERA)*, dated August 2012, which included Responsible Party Responses to EPA comments, provided on behalf of the Port of Houston Authority**

On behalf of the Port of Houston Authority (PHA), HDR has reviewed the revised BERA (August 2012) that was to have addressed the EPA Comments of June 2012 on the Draft Baseline Ecological Risk Assessment (BERA) for the San Jacinto River Waste Pits Superfund Site. EPA's comments (referred to by number below) included general comments (numbered 1-10) and then comments specific to sections of the BERA. The comments below are ordered according to the sections of the revised BERA (August 2012).

Section 6.7 of BERA (EPA Comment #1):

The response to comment indicated that a quantitative exposure analysis was not conducted because the risk assessment concluded that organisms with small home ranges in areas near the northern impoundments are the only species potentially exposed at elevated levels, due to large home ranges that are much greater than the area of the Site. In our opinion, this response and the text provided in the revised BERA does not respond adequately to the Agency's comment.

The proposed inference is only correct if the Threatened and Endangered Species (TES) values are all less sensitive to contaminants of concern than the species used in the quantitative assessments performed. As sensitivity to particular contaminants is highly variable among species and TES are of special concern, this fact should be demonstrated in the risk assessment, or the TESs should be further evaluated as required by EPA.

In response to the RP's concern regarding the species being those exposed only to elevated contaminant levels, please note that USEPA has developed mathematical approaches to compensate for the bias in sampling strategy (i.e., where a greater number of samples are collected from contaminated areas than those without contamination) when computing the mean and the 95% UCL of the mean. This involves dividing the exposure area into a series of smaller units of the same size and calculating the average value for all data points within each smaller unit. The best estimate of the true mean is the average of the averages across the smaller units, and the UCL of the mean can be estimated from the variability between these means.

This simple approach provides a rough approximation; more reliable estimates require geostatistical modeling techniques. Guidance and software describing these methods include the Spatial Analysis and Decision Assistance (SADA) Software Home Page and GeoSEM Software (Syracuse Research Corporation). This type of analysis would reduce the level of uncertainty in the BERA.

Also, please note that information on wildlife EUs is provided in 4.1.3.6/4.3.1.6; there is an apparent discrepancy (both are noted in different places in text) that should be corrected. Also, the response provided in new Section 6.7 is rather abbreviated and should be expanded. The additional explanation of uncertainty in Section 7 is helpful.

Sections 3.4.3 and 3.8.4.3 (EPA Comment #2):

The comment pertained to the median concentration of the chemical in the upstream background sediment data set or the background soil data set being used as the concentration in impacted areas.

In responding, the RP states "The only assumption that differs is the concentrations of COPCEs in sediments within the original 1966 impoundment perimeter." The validity of doing that seems to be the crux of the issue. However, the response and revised text ignore any revision to the use of background concentrations and how they would address this concern. They only discuss that the text in Section 3.4.3 is not intended to suggest an assumption that the post-TCRA environment will not provide habitat. This explanation and the revised BERA do not adequately respond to previous comments. This issue remains a concern to the Port Of Houston Authority.

Section 7 (EPA Comment #3):

This seems to be less than a complete response. The RP agreed to address the data gaps and sources of uncertainty; however, data gaps are still not identified in the revised BERA and the explanation of uncertainty is unclear and should be expanded.

Section 4.2.5 (EPA Comment #4):

The comment requested a more accurate depiction of sampling points; the response indicated this would be done where samples were from a specific location, and is already presented where analyses were of composited samples, i.e., for small fish and clams. The text and figure have been revised to explain how and where the samples were collected; however if specific points along transects were not recorded, this should be stated clearly in the revised text.

Section 7 and elsewhere generally (EPA Comment #5):

In the response and elsewhere, the reference to July 18 "meeting" should be replaced with "conference call," "on-line meeting," or similar term. It is recognized that Table 3-11 provides more detailed follow-up to Table 3-10. The intent of the recommendation on July 18 was that Table 3-10 be used as a format or guide for the presentation of the conclusions offered in Section 8 and perhaps the discussions of Section 7. A quantitative summary should be provided in the revised BERA, as requested. Numerous individual comments were to be addressed in an overall attempt to improve the transparency of the BERA. As a basic tenet of risk assessment, the transparency of the analyses is paramount.

Section 5.3 (EPA Comment #6):

The comment was very specific – stating that it is not clear (to expert reviewers) what criteria were used in the selection of toxicity references used to develop the TRVs for benthic invertebrates. References

prioritized by endpoint, life stage of receptor, habitat of receptor, and duration of test should have been provided/are requested for inclusion, and the validity of some of the references used in deriving the TRV is questioned. This is not addressed in the revised BERA.

In responding to comments, the RP states that if concentrations of COPCs are “generally below” broadly protective screening values, then additional evaluation of the literature is not warranted. We continue to question that conclusion and the resulting lack of research. They also state that for dioxins and furans, the toxicity evaluation was described in detail in Attachment B2 of Appendix B to the RI/FS Work Plan; Section 5.3 and Appendix B of the BERA.

It is difficult to follow and/or agree with the methods and rationale for how the evaluation was performed in the BERA. Therefore, the response is considered inadequate and a plan should be devised to improve the method and/or the description of the method for inclusion in the revised BERA to assure accuracy and transparency.

Section 3.8.4.3 and Section 7 (EPA Comment #7):

Similar to Comment #2, we question the assumption that the post-TCRA exposure will be at background levels for soil and sediment for areas outside the containment area, as this may not reflect actual conditions. Additionally, the revised text does not verify the assumptions that were made. The potential for erroneous analysis and conclusions regarding risk, lack of transparency in the rationale used and resulting uncertainty surrounding both the assumptions and decision process are of concern as they directly relate to providing a sound basis for remedial decision-making.

Revised BERA (EPA Comment #9):

The comments indicated that the report should include the rationale for the assumptions and conclusions included in the BERA so that they are transparent and understandable, and conservatism is demonstrated.

Similar to Comment #6, if expert reviewers were unable to follow the rationale, the revised BERA should be considered inadequate and additional revisions to clarify these items should be provided by the RP, rather than pointing back to parts of the document already deemed difficult to understand.

Section 6.7 (EPA Comment #10):

This comment requested that the RP provide/expand its description and evaluation of food chain implications in the BERA. The Guidelines for Ecological Risk Assessment (USEPA, 1998) require that a BERA address food chains for bioaccumulative contaminants of concern; and the RP indicated in the July 18 meeting that all guidance was being followed. The Guidelines define ecologically relevant assessment endpoints as those with important characteristics and functionally related to other endpoints within the ecosystem. Most ecological risk assessments, including this BERA would include multiple “dioxin-sensitive” species.

In aquatic ecosystems, fish are ecologically relevant, as they link trophic levels within the food web and would represent both a sensitive and an ecologically relevant assessment endpoint. Dioxin effects are

particularly relevant as they have the potential to lead to reduced populations and changes in the structure, function and biodiversity of the ecosystem. Therefore, food chain issues should be addressed in the revised BERA; not dismissed because they were “not part of the RI scope”. Section 6.7 minimally comments on food chain issues, but does not provide the analyses or interpretations in sufficient detail for the revised BERA.

The response also states that “The Technical Memorandum on Bioaccumulation Modeling” provides an extensive discussion of dioxin and furan bioaccumulation based on published literature and analysis of data for the Houston Ship Channel. Given that bioaccumulation in the food chain is a key concern for the COCs at this site and the Technical Memorandum is available, can they not use that information to address the comment in the revised BERA?

Also, there are studies of similar sites, e.g., as described in *Spatially Distributed Ecological Risk for Fish of a Coastal Food Web Exposed to Dioxins*, by Micheletti C, et al, 2008, that may be appropriate to help guide such a food chain effort, should EPA wish to pursue this issue further.

List of Acronyms (EPA Comment #11): Satisfactory as written.

Section 2.1 (EPA Comment #12): Satisfactory as written.

Section 6 (EPA Comment #13): As noted in Comment #1, above the proposed inference is only correct if the Threatened and Endangered Species (TES) are less sensitive to contaminants of concern than the species used in the quantitative assessments performed; sensitivity to specific contaminants is highly variable and TES are, by definition, of special concern.

The BERA should address the inference that the TES values are only correct if all TES are less sensitive to contaminants than the species used in the quantitative assessments. This should be demonstrated in the BERA, or the TES values evaluated further to assure the inference is correct for this Site.

Section 3.4.4 (EPA Comment #14): Satisfactory as written.

Sections 3.8, 6.1 and 7 (EPA Comment #15): The language regarding interpretation of HQ values has been incorporated in the revised BERA. There appears to be continued concern regarding the basis and use of these values; the explanation of when a HQ signifies risk is unclear and in partial conflict with the equal to or less than definitions agreed to. This should be clarified to satisfy EPA comments. Also, the text provided in Section 7 regarding toxicity of mixtures does not reference HQs or TRVs directly. It is unclear how the revised text addresses the issues raised in this comment/response in anything other than general terms.

Section 2.2.1 (EPA Comment #16): See Section 3.8.4.3 and Section 7 (per EPA Comment #7). The revised BERA includes two bullet points simply stating what is included in the background data set (upstream surface sediment samples and background soil samples); it does not provide sufficient detail. This description should detail how this constitutes background in a dynamic estuarine setting, as requested.

Section 4.1.1 (EPA Comment #17): Satisfactory as written.

Section 4.1.3 (EPA Comment #18): Satisfactory as written.

Section 4.2.1 (EPA Comment #19): Satisfactory as written.

Section 4.2.2 (EPA Comment #20): Satisfactory as written.

Section 4.3.1 (EPA Comment #21): Clarification of fractional (%) values should be provided in text and Table 3-12. The units of kg sediment/kg diet are still included in Table 3-12 in revised BERA; while this equates to a percentage value, the RP chose to retain units that cancel out, as they said they would. Either expression can be considered appropriate.

Section 4.3.1.2 (EPA Comment #22): The comment is very specific – stating reasons why the validity of RBAs is being questioned and that the referenced relative bioavailability factor shall not be used and deleted from the report. Text was added to Section 4.3.1.2 as noted in the response, retaining the basic reliance on the Nosek study, which remains questionable. Section 7.2.4.1 now includes a discussion of the sensitivity analyses and results, indicating that use of the RBAs does not substantively change the resulting risk values.

However, having defensible arguments related to the issues remaining regarding Section 4.3.1.2 will largely determine the validity of the discussion provided in 7.2.4.1. This requires additional analysis. We remain unconvinced and recommend further analysis of Nosek and other potentially relevant work be completed. The corresponding reassessment of the impact of using RBAs that result from that analysis should also be completed, before the RBAs are accepted for use in the BERA.

Section 4.3.1.2 (EPA Comment #23): The text should be revised to clarify the information provided regarding conversion of tissue concentrations expressed as wet weight to dry weight, and the noted related issues to support increased transparency in the revised BERA.

Section 4.3.1.5.1 (EPA Comment #24): Satisfactory as written.

Section 4.3.1.5.2 (EPA Comment #25): Satisfactory as written.

Section 4.3.1.5.2 (EPA Comment #26): Satisfactory as written.

Section 4.3.1.5.2 (EPA Comment #27): The text provided in the revised BERA does not directly address the question of how there are TEQ values in tables but models were used because there were no congener-specific data available. In fact, it presents a varying level of detail, some of which appears to be almost verbatim use of other work, without an explanation of the information's relevance in answering the comment. Also, rather than "naive", it appears the text in 4.3.1.5.2 should refer to *native* earthworms.

Section 4.3.1.5.2 (EPA Comment #28): Appendix D includes citations of additional studies; however, it is noted that use of uptake factors comparison across congeners is questionable, which is the point EPA

had requested clarification on. The response does not provide the scope of comparison that was requested and is needed.

Section 4.3.1.5.2 (EPA Comment #29): See Section 6.7 (EPA Comment #1), regarding dealing with biased data. The RP's reluctance to analyze "skewed", site-specific data, in light of available methods to do so, remains an issue that impacts the analysis included in and potentially, the conclusions of the BERA. As was the case with #28, the revisions do not adequately address the concerns expressed, particularly as they continue to cite the Cass Lake Study, which in many ways can be considered to be comparing "apples and oranges" in terms of relative concentrations and specific congener/total PCB effects. A more thorough review and further consideration of other potentially relevant studies should be completed.

Section 4.3.1.5.2 (EPA Comment #30): The revised text now reads: *"The range of most dioxin and furan concentrations in soil at the Cass Lake site were similar to the range of concentrations in soils from the San Jacinto River Waste Pits site.: It continues: "In particular, dioxin and furan congener distributions in soils of Cass Lake are similar to or higher than the ranges of concentrations of congeners in those San Jacinto site soils collected from locations outside of the 1966 perimeter of the waste impoundments north of I-10. Therefore, for the majority of congeners, predictions made on the basis of Cass Lake soil concentration data are not outside of the range of San Jacinto site soils, supporting the premise that the Cass Lake dataset is appropriate for use in generating regression relationships that can be applied to the Site data. Two exceptions are 2,3,7,8-TCDD and 2,3,7,8-TCDF, which have higher concentrations in SJRWP soils within the impoundments relative to Cass Lake soil concentrations."*

While slight changes were made to text, it appears the RP is still disagreeing with why the revisions were to be made. As with #29, in light of the variations in data between these sites and the reluctance to complete a more thorough review and consider other potentially relevant studies, beyond the work done at Cass Lake, this continues to be an unresolved issue.

The requested analyses should be completed so we more clearly understand how the tissue concentrations may vary and impact risks to invertebrates inhabiting the bottom of the food chain, in an estuarine area contaminated with bioaccumulating chemicals.

Comment #31: Satisfactory as written.

Section 4.3.1.6 (EPA Comment #32): Satisfactory as written.

Section 4.3.1.6 (EPA Comment #33): Information from the Introduction that would clarify what was done should be carried over into 4.3.1.6 to increase transparency of the revised BERA.

Section 4.3.1.7 (EPA Comment #34): Appendix C does not apparently include the EPA-specified revisions which specified “surface water CT and RM exposure point concentrations for TEQs and Total PCBs that were used for determining the bird dose”. Text has been provided in 4.3.1.7 discussing the surface water ingestion pathway.

Section 4.3.1.9 (EPA Comment #35): Satisfactory as written.

Section 4.3.1.9 (EPA Comment #36): Satisfactory as written.

Section 4.3.2.1.2 (EPA Comment #37): Satisfactory as written.

Section 4.3.2.1.2 (EPA Comment #38): Satisfactory as written.

Section 4.3.2.1.2 (EPA Comment #39): Exhibit 2A of the revised BERA provides information on the calculation of the TEQ estimates in bird eggs.

Section 4.3.2.1.2 (EPA Comment #40): It appears these data for the heron and sandpiper are still missing from Table 4-15 in the revised BERA. The information provided in 4.3.2.3 should also be summarized and presented here for clarity.

Section 4.3.2.2.1 (EPA Comment #41): Satisfactory as written.

Section 4.3.2.2.1 (EPA Comment #42): Exhibit 2B provides information on the calculation of the PCB concentrations in bird eggs.

Section 4.3.2.3 (EPA Comment #43): We question if the revisions reflect the agreement reached with EPA during the July 18<sup>th</sup> conference call, as the response focuses on uncertainty and does not seem to address the clarifications requested. This should be provided in the text of the revised BERA.

Section 4.4.2 (EPA Comment #44): Satisfactory as written.

Section 5.3 (EPA Comment #45): Satisfactory as written.

Section 5.3 (EPA Comment #46): During the July 18<sup>th</sup> conference call, the RP noted that ARARs are not appropriate in a BERA. However, to the extent that the TSWQS are based on toxicity data, those data should be included in the data base and analyses of this BERA. There appear to be several issues where the parties do not agree; these require resolution.

Section 5.3 (EPA Comment #47): This comment related to fish TRVs appears to require further resolution. While the response correctly notes that results may have been influenced by other contaminants, so would exposures near the SJWP site. Those toxicity data should be considered when discussing the implications of multiple contaminants and other uncertainties in Sections 4 and 7 of the revised BERA. The RP does not include determination and use of the lower NOAEC, which EPA specifically requested be included in the revisions.

Section 5.3 (EPA Comment #48): This comment/response pair appears to require further resolution, as EPA states that certain aspects of uncertainty are to be evaluated and clarified and the RP states that the requested use of data, at least partially, are inappropriate. The lack of toxicity data is addressed in 6.2.5; however, the uncertainties text only mentions a lack of data for reptiles, and not bivalves.

Section 5.4 (EPA Comment #49): This appears to require further resolution, as EPA states that certain values shall be used and the RP states that no change will be made. Table 5-2 includes the RP's value. It appears Table B-11 was not included with the revised BERA for review.

Section 5.4 (EPA Comment #50): Further information on how the uncertainty between the congener-specific and total PCBs data was to be included in the discussion of uncertainty in Section 7. There is only a discussion of the use of half the ND values provided, not the total vs. congener-specific data. Section 2.2 of Appendix B includes language on uncertainty related to total PCBs and congeners, i.e., *"There is uncertainty associated with the use of Aroclor 1254 toxicity information in combination with total PCBs as the exposure metric. The mixture of PCB congeners in sediments and tissue at the Site may not reflect the same congener composition as Aroclor 1254. Nevertheless, the assessment approach should be protective ..."*

A transparent analysis of the total PCB vs. congener issue, focusing on what data were used and the related uncertainties should be provided in Section 7 of the BERA to assure accuracy and transparency in the BERA.

Section 5.4 (EPA Comment #51): The text provided in Section 5.4 states that the fish eggs and embryo data are used, and then states whole body data were used. It appears that this still requires clarification, as it remains unclear.

Section 5.6 (EPA Comment #52): See Comment #50. Further detail specifically related to the issues and uncertainties involved in using TRVs derived from Aroclor 1254 vs. total PCB values should be provided. This includes information on the use of field vs. lab study data, endpoints used in determining potential toxicity, if exposure concentrations are reported for dietary doses, whole organism tissue or eggs, and if a dose-response relationship is established between contaminated media to tissue, among other factors normally considered in deriving TRVs.

Several TRV sources and derivation methods are available; see [http://www.epa.gov/region8/r8risk/eco\\_toxicity.html](http://www.epa.gov/region8/r8risk/eco_toxicity.html).

Section 5.6 (EPA Comment #53): This comment, indicating that EPA could not duplicate the values presented related to bird and mammal TRVs ARARs appears to require further resolution to address whether barium is a COPC<sub>E</sub> south of IH-10 and the rationale for the conclusions. Barium has been removed from Table 5-3. However, it is listed in Table 3-1 as a COPC<sub>E</sub> for benthics (not wildlife) north of I-10, nor is the relevance for the South Impoundment addressed. Clarification should be provided in the revised BERA.

Section 6.2 (EPA Comment #54): Maps (which indicate exceedances) and text should be revised as requested.



Section 6.2.3 (EPA Comments #55-56): These comments reflect specific issues related to TCDD in clam tissue relative to the critical tissue residue for mollusks. See #47. The revised BERA does state that it is not possible to evaluate post-TCRA risk to clams in the vicinity of Transect 3.

Sections 6.2.3 and 8.1 (EPA Comments #57-58): These comment/response pairs, regarding conclusions reached relative to bivalve risks and related implications appear to require further resolution, as EPA expressed concern related to the conclusions reached and much of the response defends, but does not agree to revise those conclusions. Subsequently, the text has not been revised in the new version of the BERA provided for review.

Sections 6.3.1 and 6.3.2 (EPA Comment #59-60): Both these comments related estimated concentrations of contaminants relative to TRVs require further resolution, as EPA commented asking for HQs to be revised and the RP is stating they *will not* be revised.

Sections 6.3.3 EPA Comment #61): See Section 4.3.2.1.2 (EPA Comment #39-40), above.

Section 6.3.5 (EPA Comment #62): This comment/response regarding lines of evidence for risks to fish appears to require further consideration and resolution, as EPA commented asking for risks to be revisited and the RP is stating they will not be revised. They are stated to be negligible.

Section 4.2.5 (EPA Comment #63): Satisfactory as written.

Section 8.2 (EPA Comment #64): See Section 6.3.5 (EPA Comment #62), above.

Section 4.2.6 (EPA Comment #65): In response to this comment and review of Table 4-6, we suggest that the text be clarified as well as providing footnotes to Table 4-6.

Section 8.6 (EPA Comment #66): The red strikethrough version of text was not provided; this would have facilitated review of revisions made to the document.

Section 4.3 (EPA Comment #67): This comment brought to light errors that were agreed upon and were to be corrected. That seems to be completed. However, the references to Table 4-7 may be incorrect. Should the references be to Table 4-8?

Table 4-5 (EPA Comment #68): Satisfactory as written.

Table 5-1 (EPA Comment #69): This issue revolves around the estimation of the NOAEC (a long-term or chronic exposure value) that describes chemical toxicity, based on lethality, reproduction and other endpoints. The method chosen to estimate this chronic value in the BERA involves using the chemical concentration shown to be lethal to 50% of the exposed experimental population (e.g., lab rats) – known as the LC<sub>50</sub>. The LC<sub>50</sub> is a short-term or acute exposure value. The RP divides the LC<sub>50</sub> by 10 to derive the NOAEC. By definition, this determines both the most sensitive species and most critical toxic endpoint.

This determination is critical to the analyses and outcome of the BERA, as it affects the species and adverse impacts studied. That, in turn, determines the actual quantitation of ecological risk and

ultimately, whether site risks are acceptable, and if remediation is required or not. The RP explaining the inherent uncertainty surrounding the use of a NOAEC derived in this manner, though necessary, is secondary to using a defensible derivation method for these values in the first place. Therefore, further consideration is necessary before these toxicity values can be considered for use in the BERA.

Table 5-1 (EPA Comment #70): Satisfactory as written.

Table 5-2 and B- 14 (EPA Comment #71): Please refer to issues raised regarding Table 5-1 (EPA Comment #69).

Table 5-2, B-11 and B-14 (EPA Comment #72): It appears that Tables 5-2, B-11 and B-14 are not included with the revised text. If a table was prepared, as noted in the response, please provide for review.

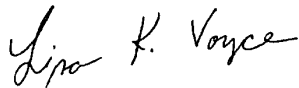
Figure 2-2 (EPA Comment #73): Satisfactory as written.

Appendix E, Section 2.5 (EPA Comment #74): The opossum is an omnivorous mammal; inclusion in the BERA and completion of the analysis to be prepared by the PRP is satisfactory.

Appendix E, Section 3.2 (EPA Comment #75): RP proposal appears to be satisfactory; however we are unable to access the referenced Tables E-5 and E-6 with revisions and reserve the right to comment at later date.

Any questions concerning these comments should be communicated to Linda Henry, Port of Houston Authority.

Sincerely,



Lisa K. Voyce

Project Manager/Risk Assessor

cc: Neil McLellan, PE, Project Manager  
Thomas Pease, PhD, PE, Senior Professional Associate  
Michael Musso, PE, Senior Professional Associate