EPA COMMENTS
Lower Passaic River Study Area Draft February 2015 Remedial Investigation Report

No.	General Comments
1	The terms "high," "low," and "moderate" as used throughout this report (e.g., Executive Summary, Section 4, and Section 6) must be defined and must use effects-based concentrations. Overall, there is a lack of data evaluation relative to environmentally-relevant benchmarks, which is standard practice in remedial investigations (RI). The figures and text of Section 4 refer to values of 250 parts per trillion (ppt) and 500 ppt 2,3,7,8-TCDD. Comments specific to Section 4 below discuss that the distribution of contamination relative to risk thresholds should be presented in the report discussion and on figures. EPA acknowledges that CPG has presented 500 ppt as the Remedial Action Level in the draft Feasibility Study (FS) submitted April 2015. EPA will separately provide comments on the FS deliverables. EPA would like to discuss this topic further with the CPG.
2	The terms "recovery" and "decline" should be defined whenever they are used in the report (e.g., ES.2 and Section 10). Areas described as "recovering" or "declining" remain contaminated with concentrations orders of magnitude above risk-based levels of concern. EPA recommends using the term "recovery" when referring to recovery of the LPRSA as a whole (as in monitored natural recovery) and the term "decline" when referring to declines in contaminant concentrations.
3	The document states repeatedly (e.g., Executive Summary, Section 3, Section 5, and Section 11) that exposure is limited to the top two centimeters of sediment. Site-specific data from the LPRSA show that species that utilize much deeper sediment fractions are present in the system. A large body of literature on this topic supports the assumption that ecological receptors are exposed to a minimum of the top six inches of sediment in systems similar to the Lower Passaic River Study Area (LPRSA). EPA and CPG are currently in dispute over use of the upper 2 centimeters of the sediment bed as the benthic exposure zone. Depending on the resolution of the dispute on this topic, revisions to the text may be required to account for the decision.
4	Any references in the document to a "unique" fish community that is "limited" or that has a "shortened" food chain in the LPRSA should be removed from the document (e.g., Executive Summary and Section 3). Similarly, discussion about proliferation of non-native species should be removed as this is also incorrect. The LPRSA supports a robust fish community with a food chain that resembles similar systems in the Northeast; the LPRSA provides adult, migratory, and spawning habitat for a variety of fish species; the entire LPRSA is

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	designated Essential Fish Habitat for a variety of fish species.
5	Extensive comments provided by EPA on both the Draft Baseline Ecological Risk Assessment (BERA) and the Draft Baseline Human Health Risk Assessment (BHHRA) directing substantive changes to both documents will result in substantial changes throughout the RI Report (e.g., ES.3, Section 8, Section 9, and Section 11.3).
6	Characteristics of the system should not be described as "typical" (e.g., ES.1, Section 1, summary box, and Section 3, first sentence); the high concentrations of contaminants in the LPRSA are not typical of urban systems.
7	There is no evidence that upstream transport of contaminated sediment is restricted to areas downstream of RM 14 (e.g., Executive Summary and Section 6.3.1), although occurs likely infrequently both currently and historically. Therefore these statements should be qualified or removed from the report. As stated in Section 3.3, under some conditions the salt front (and the estuarine turbidity maximum) extends upstream of RM 14. High concentrations of 2,3,7,8-TCDD are present above RM 14 with at least one hot spot indicated at approximately RM 14.6 (shown on Figure 4-1b; described in Sections 3.5 and 4.1), although the cause of the elevated concentrations at RM14.6 has not been identified.
8	Discussion of "limited" human contact with the river water and sediment below RM 8 should be removed from the document (e.g., Section 3). The LPRSA downstream of RM 8 is densely populated and, although few access points, parks, and waterfront residences currently exist, those that do are likely to be heavily used and many waterfront communities along the lower 8 miles of the river have plans to expand riverfront access.

9	Several areas of concern are highlighted below as these relate to appropriately capturing ongoing sediment bed sources of contamination to this system: -RM 12 and above – A greater emphasis is needed to better identify all areas of fine silt (potential sediment bed contaminant source areas) and extent of same. -Throughout the report there is an emphasis on the burial of "maximum" contaminant levels over time. However, starkly missing from the RI Report is the fact that nearly all surface sediment concentrations for 2,3,7,8-TCDD remain at concentrations that are several orders of magnitude greater than levels considered safe for exposure by human and ecological receptors. The fact that even higher levels exist at depth is important for remedial alternative planning, but this situation should not be used to diminish the severity of the surface sediment conditions. This concern applies to other key contaminants too, but to a lesser extent, as their magnitudes relative to benchmarks (risk-based or background) tend to be lower. -Evolution of the Sediment Bed – Separate from large time-scale "net" analyses, there is a need to look at river features where data suggest sedimentation is not reliably continual. Under significant event conditions (above average precipitation or extreme storms), sediment scour is known or suspected to occur. The CPG should investigate the potential for erosion followed by subsequent deposition within a storm event resulting in a small net change in bed elevation relative to the maximum erosion depth.

10	The datasets used to generate the various figures and tables throughout the Draft RI Report need to be more clearly defined. Each figure and table should be accompanied by a summary table listing the samples that make up that particular figure or table. Even in those instances where a rather clear set of criteria is used to define the sample set, such as that presented in Appendix J, Section 1.1: Data Treatments, there are still sufficient nuances within the body of collected data for the Passaic River that lead the reviewer to question the omission of particular data. It is to the benefit of the CPG to develop a way to succinctly capture, at a minimum, the identification of each location and sample used for each set of figures and tables. A table similar to Table 3-2 in the Draft BHHRA Report, with additional information indicating which compound group(s) is represented by a particular sample, would be helpful. There are also instances in the Draft RI Report where figures (for example, Figures 4-6a through 4-6d) presenting total concentrations could not be reproduced from the data in EPA's Passaic River database. These discrepancies could be due to updates to the calculated totals based on validation or, as mentioned above, discrepancies in the datasets used to generate the figures. Please provide an updated data submittal containing the totaled results for polychlorinated biphenyls (PCBs), low molecular weight (LMW) polycyclic aromatic hydrocarbons (PAHs), high molecular weight (HMW) PAHs, and dichlorodiphenyltrichloroethane (DDT) and its breakdown products (DDx). This submittal should also include the calculated combined sample/field duplicate results from the CPG's database, if available. This information, together with the more detailed description of datasets mentioned above, will improve EPA's ability to evaluate future deliverables.

No.	General Comments – Executive Summary
11	The text presents the theme that contaminant patterns are explainable and predictable, but doesn't recognize that there are exceptions to the patterns cited, making estimates in un-sampled areas uncertain. Please revise the text to present a more balanced discussion.
12	Throughout this section, qualitative terms are used, such as "largely stable," "moderate erosion," "relatively low concentrations," and "moderate contaminant concentrations." Please revise the text to include quantitative examples that provide context to the qualitative terms. For example, it is not clear how "moderate concentrations" compare to risk levels.
13	Statements that sediments in depositional areas are stable ignore the possibility that changes in depositional areas could occur in the future. The explanation that areas of high concentration are the result of historically depositional areas becoming erosional back to the elevations of the mid-1960s indicates that erosional and depositional areas can change over time. Please revise the text to discuss how alternate episodes of erosion and deposition contribute to the internal cycling of contaminated sediments within the LPRSA and may expose contaminated sediments while maintaining a quasi-steady state bathymetric condition.

No.	Page No.	Specific Comments – Executive Summary
14	1ES, General 5	The Executive Summary will need to be revised in the next draft to reflect any changes made to the rest of the report.
15	Page ES-1, first 1paragraph, fourth 6sentence	The contamination in the sediment, water column, and biological tissue do not always follow predictable spatial and temporal patterns. There are exceptions, so please insert the word "generally" before "predicable" and the phrase "at many locations after "patterns."
16	Page ES-2, Section ES.1, first paragraph (continued from page ES-1)	Please revise the last sentence of this paragraph to read: "Infilling and trapping of sediment-bound contaminants within the navigation channel has occurred to varying degrees since the cessation of maintenance dredging." In addition, please revise this paragraph to note that the filling of the navigation channel through deposition was initially rapid (up to 10 centimeters [cm] per year) and has since slowed.
17	Page ES-2, Section ES.1, first full paragraph, last sentence	Please revise this sentence to state, "Approximately 30 percent of this portion of the LPR consists of non-contiguous areas of shoreline mudflat habitat."
18	Page ES-2, Section ES.1, second full paragraph	Use of the upper 2 centimeters of the sediment bed as the benthic exposure zone is currently in the dispute resolution process. Depending on the resolution of the dispute on this topic, revisions to the text may be required to account for the decision.
19	Page ES-3, Section ES.1, bullet	Please revise the bullet to clarify that the river bed is dominated by silt downstream of RM 8, with the exception of a reach of coarser-grained materials between RM 5.5 and RM 6.

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20	Page ES-3, Section ES.1, three paragraphs after bullet	Missing from the characterization of sediment movement (dredging histories, depositional conditions) are the significant storm events that periodically occur and present greater than normal water volumes and velocities that redistribute both recently deposited and legacy sediments through scour, re-deposition, and migration out of the river. The paragraph describes erosion as "generally modest." Please provide the basis for this statement, such as the percent of the LPRSA that is subject to erosion.
21	Page ES-3, Section ES.1, second full paragraph after bullet	This paragraph is confusing as written. Please revise it, keeping the following in mind: -Avoid the use of subjective terms such as "largely" and "typically," unless they are quantitatively defined prior to use. -Provide an explanation of the term "quasi-equilibrium."

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22	Page ES-4 to ES-5, Section ES.2, Surface Sediment Contaminant Concentration Patterns	The following information should be taken into account in this subsection: -The first paragraph states "High surface sediment 2,3,7,8-TCDD concentrations are rare upstream of RM 12…." What are high concentrations? How is this defined? Similarly, how are low and intermediate concentrations defined? -Please indicate how recent deposition is defined and how much higher concentrations are in general when comparing fine grained sediments to coarse sediments. -Note that fine surface sediments are likely to move to other areas, and deposition of fines will have variable results on sediment quality. -First paragraph of section: High concentrations of 2,3,7,8-TCDD (792 nanograms per kilogram [ng/kg]) were found at RM 14.57. The frequency of transport from the lower river to the section upstream of RM 14 should be discussed, and whether it is sufficient to explain this high concentration of 2,3,7,8-TCDD. -Second paragraph of section: Does the third sentence refer to 2,3,7,8,-TCDD concentrations? If so, this should be stated. -Third paragraph of section: Please revise this paragraph to note that higher concentrations of 2,3,7,8-TCDD are present in the center channel than in the nearshore areas in a number of locations (e.g., just upstream of RM 5 as shown in Figure 4-1i; just upstream of RM 4 and at approximately RM 3.5 as shown in Figure 4-1j; downstream of RM 2 as shown in Figure 4-1l; and downstream of RM 1 as shown in Figure 4-1m). -The heterogeneity of sediment concentrations cited here, and their relationship by RM, makes the approach of calibrating the bioaccumulation model using river-wide averages of sediment concentrations as compared to river-wide averages of tissue concentrations questionable. This is further discussed in subsequent sections.
23	Page ES-6, Section ES.2, first full paragraph	Please clarify what is meant by "the relative mass fraction in the RM 2 to RM 4 bin is much higher."

24	Page ES-6, Section ES.2, last two paragraphs	Please revise this paragraph as follows: -In first sentence of the last paragraph, the word "recovery" is inappropriate here. Please replace the term "recovery" with "differences" or similar unbiased language. -Revise the sixth sentence of the last paragraph to read: "Finally, no recovery is inferred if all data are grouped together." More evaluation of the data is needed in order to infer that this is a false conclusion. The section does not discuss the proportion of depositional areas to erosional and/or neutral areas, nor any temporal patterns in the size and/or location of the erosional and depositional areas. -In the last sentence (continued on page ES-7), provide justification or revise the statement to read: "Lower rates of recovery for contaminants such as HMW PAHs and LMW PAHs could potentially be due to ongoing sources."
25	Page ES-7, Section ES.2, first paragraph (continued from page ES-6), last sentence	Please revise this sentence to clarify whether it is referencing a decline in "surface sediments" or in "contaminant concentrations in surface sediments."

26	Page ES-7, Section ES.2, second and third full paragraphs, impact of background sources and ongoing point sources	-These two paragraphs require revision for improved perspective. Although the presence of other contaminants in background sources must be accounted for, in-river sediment sources of all (or at least most) contaminants are also important. -The first sentence of the 1st paragraph incorrectly asserts that in the absence of remediation, "contaminant sources outside the boundaries of the LPR dictate recovery." There are many conditions within the LPRSA that could influence recovery. Please delete the phrase "dictate recovery in the absence of remediation and" from this sentence. -The second sentence of the 1st paragraph states that all contaminants except for 2,3,7,8-TCDD have contributions from the UPR and tributaries. Add the phrase "to some extent" between "exist" and "for all the contaminants." Also, remove the phrase after the comma ("as evidenced by…"). This phrase is not clearly supported by Figure ES-8. Figure ES-8 is a misleading presentation of data as the scale of the y-axis on Figure ES-8 minimizes statistically significant differences in surficial sediment concentrations between LPR and UPR or Newark Bay for PCBs, DDT and mercury. Please revise accordingly. -Provide additional explanation for the last sentence of the first paragraph. -The paragraph about CSO/SWOs is a selective presentation of the discussion in the paragraph on the bottom of page 51/top of page 52 in the draft RI. Please revise to present a more balanced view of the CSO/SOW consistent with the discussion on page 51/52.
27	Pages ES-7-ES-8, Section ES.3	This section will need to be revised for consistency with the revised draft BHHRA and revised draft BERA.
28	Page ES-7, Section ES.3, first paragraph, second sentence	Please change the word "target" to "NCP" in this sentence.

29	Page ES-8, Section ES.3, first paragraph (continued from page ES-7)	Please revise this paragraph as follows: -Insert the following sentence before the first full sentence: "Under Reasonable Maximum Exposure (RME) assumptions, a diet of any fish from the LPRSA will result in risks in excess of NCP risk levels." -Delete the end of this paragraph, everything after "…a diet that includes carp…." -The text presented needs to concentrate on the risks to the RME individuals i.e., total fish diet including carp and crab consumption including muscle hepatopancreas.
30	Page ES-8, Section ES.3, first full paragraph	Please revise this paragraph as follows: -In the second sentence, replace the word "overestimated" with the phrase "more likely to be overestimated than underestimated" and remove the word "However" at the start of the sentence. -Delete the 3rd and 4th sentences of this paragraph.
31	Page ES-8, Section ES.3, second full paragraph	This paragraph needs to be completely revised for consistency with the revised BERA.
32	Page ES-8-ES-9, Section ES.4,	Section ES.4 – please delete this entire section. It is not appropriate for the RI report. Rather, it is a topic for the FS.
33	Figure ES-4	The actual contaminant concentrations should be plotted rather than the interpolated ranges. A figure like this already exists. Please revise/replace the existing figure ES-4 accordingly.

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34	Figures ES-7	For improved understanding of the how the river is represented by this figure, the core locations and associated surface sediment data that comprise the corings for each category (erosional areas, depositional areas, no measurable change areas) should be presented in an associated table and map. For example, in a table, per category, list each data point by core identification number, concentration, and geomorphic zone; these should be identified on an associated map which displays shoal and channel zones. The associated table and map can either be included here in the Executive Summary, or later in the report. If included later in the report, it should at least be referred to on Figure ES-7.

No.	**Page No.**	**Specific Comments – Section 1**
35	Page 1, Section 1.1	a. The focus of this section (and the report) should be on the CERCLA RI/FS process, not the LPRRP. Please review the entire report for this issue. Specifically for this page, in the second to last sentence on the page, change "(CPG)-led LPRRP RI…." to "CPG-led LPRSA RI…." In addition, please change the last sentence on the page as follows (quoting the AOC): It presents knowledge gained that will serve as the basis for identifying and evaluating remedial ~~options that~~ alternatives to prevent, mitigate or otherwise respond to or remedy the release or threat of release of hazardous substances at or from the LPRSA, and can achieve the goals of the LPRRP. b. In the first bullet of the box on this page, change "levels" to "concentrations".

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36	Pages 2 to 3, Section 1.2.1	Missing from this section is a description of the viable ecological habitats and the numerous public parks that exist (and are planned) within and along the LPSRA, such as shoreline mudflats and riverbank open space parks (both active and passive use). Please use language similar to that used in Section 1.1 of the Risk Analysis and Risk Characterization Plan (Oct. 2013): "Adjacent land use is predominantly industrial in the lower River Miles [RMs] (near Newark Bay) and starts to become more commercial, residential, and recreational near RM 4. Land use is increasingly residential and recreational above RM 8." And: "The upper portion of the LPRSA riverbank (from RM 7 to RM 17.4) is primarily comprised of bulkhead and/or riprap with overhanging vegetation. Many municipalities and counties along the Lower Passaic River (LPR) have published master plans that call for the expansion and improvement of parks and open space along the river, which, if implemented, will lead to greater access to the river and improved ecological habitat in the future (Borough of Rutherford and CMX 2007; City of Newark 2010; City of Newark et al. 2004; Clarke Caton Hintz and Ehrenkrantz Eckstut & Kuhn 1999, 2004; Heyer Gruel 2002, 2003). The shift in the use of the waterfront, with increased public access and recreational use, will be upstream of Sherwin Williams (approximately at RM 3.6). RM 0 to RM 2 will remain active for commercial use into the future, and the stretch from RM 2 to 3.6 will likely be developed into Portfields/Brownfields."
37	Page 2, Section 1.2.1	Approximately 30% of the portion of the LPR above RM 8 consists of non-contiguous areas of shoreline mudflat habitat. Please incorporate this information into the last paragraph on this page.
38	Page 3, Section 1.2.1, first full paragraph	a. The first sentence states that the LPR "exhibits…higher frequency of flash floods, elevated nutrient levels, altered stream morphology, increased amounts of tolerant species, decreased amounts of sensitive species, and an overall decreased diversity." Please revise the text to state the basis of comparison (e.g., higher frequency of flash floods than what?). b. The summary presented in this paragraph is biased toward non-chemical stressors (e.g., hypoxia and nutrient loading). Please revise this paragraph to state that it is likely that contaminant and other stressors are limiting the ecological value and habitat suitability of the LPR.

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39	Page 3, Section 1.2.2, last paragraph, first sentence	The text states: "Dated sediment cores show peak loading for most major contaminants occurred from the 1950s through the 1960s." Please revise the text to note that this period coincided with the cessation of maintenance and rapid filling of the navigation channel, allowing contaminants to be deposited at high concentrations within the LPR.
40	Page 6, Section 1.2.2.2	Please make the following edit to the second sentence on this page: "In 1987, USEPA selected an interim remedy for the Lister Avenue property. The remedial actions included construction of a slurry wall and floodwall around the properties, capping of the properties, and installation of a groundwater treatment system to reduce contaminated groundwater migration."
41	Page 7, Section 1.2.2.3, footnote 3, last sentence	Please revise the text to indicate how the extent and timing of dredging events derived from "bathymetric information and channel history" compare to the estimates reported in Iannuzzi et al. (2002) and USACE (2010).
42	FFigure	Another figure should be added to this section showing the LPRSA and key features such as locations of other sites and other relevant features.

No.	General Comments – Section 2
43	All data sets used in the Draft RI should be listed in Section 2, Tables 2-1 through 2-5, and each of the data sets listed on these tables should be listed in Appendix E.

No.	Page No.	Specific Comments – Section 2
44	Page 9, Section 2.1	Please edit the 5th sentence on this page as follows: "Datasets collected in 2000 and later (post 2000) were generally developed under a consistent set of objectives/protocols and provide greater spatial coverage throughout the LPR, though some earlier datasets are also relevant to the RI/FS and are incorporated into the analyses." The third to last sentence on this page is confusing. We suggest editing as, "As with the pre-2000 datasets, it should be noted that some of the post-2000 datasets noted in Tables 2-1 through 2-5 were not collected by the CPG."

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45	Page 9, Section 2.1, sixth sentence, and Tables 2-1 through 2-5	The text states: "The available datasets were reviewed to determine their usability in this RI; the studies deemed acceptable are summarized in the following sections and by media in Tables 2-1 (sediments), 2-2 (water), 2-3 (biota tissue), 2-4 (biological communities and habitats), and 2-5 (bathymetry and physical characteristics)." Please also include in these tables the datasets that were reviewed for usability in the RI and deemed unacceptable. This can be done by adding two columns to each table: one to indicate whether the data were used in the analyses (Yes or No), and a second to indicate the rationale for inclusion or exclusion of the dataset. In this second column, please provide the criteria used to determine which datasets were <u>not</u> acceptable. The datasets used for the risk assessment, in particular, must meet the requirements of the LPRSA Human Health and Ecological Risk Assessment Streamlined 2009 Problem Formulation (problem formulation document) (CPG 2009) and the Data Usability and Data Evaluation Plan (CPG 2014). Please include a statement in the tables indicating whether the risk assessment datasets met or did not meet these requirements.
46	Page 10, Section 2.2.2	Missing from the record of previous investigations is the *Passaic River Sediment Study*, March 1986, prepared by IT Corporation on behalf of the Diamond Shamrock Chemicals Company. Although the dioxin analytical method used was considered state of the science at the time (and used nation-wide for most dioxin investigations during that time), the analysis was limited to just 2,3,7,8-TCDD, with a detection limit of 1 ppb. However, the study provides the first significant record of serious dioxin river sediment contamination and warrants inclusion by reference and assessment in this RI.
47	Page 10, Section 2.2.2, last sentence, and Tables 2-1 through 2-5	Please revise the sentence to clarify whether studies with incomplete documentation will or will not be used for a formal risk assessment, as the phrase "may not be used" is ambiguous. In addition, please revise the text and tables to clearly indicate which datasets were "used to describe the nature and extent of contaminants in the LPRSA and to inform the CSM," but not used for risk assessment.

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48	Page 11, Section 2.4.1, second paragraph, third sentence	The text states that "historical bathymetry surfaces were generated after digitizing point data from survey maps." Please add a brief discussion of the accuracy of the methods/technologies used to generate these bathymetric datasets and the confidence in the calculated differences between historical and recent bathymetry data, given the method resolution(s). For example, how accurate are the 1949 datasets? Is the accuracy of a particular method or dataset sufficient to discern appreciable differences in bed elevation?
49	Page 11, Section 2.4.1, third paragraph	Please specify what "other properties" were investigated in the studies mentioned. It is unclear whether these are sediment properties (such as grain size, which is listed) or "sediment bed properties," as mentioned at the beginning of the paragraph. The referenced Table 2-5 does not provide sufficient clarity.
50	Page 12, Section 2.4.2	a. For each of the contaminant source investigations noted in Section 2.4.2 please provide a footnote indicating the appropriate section of the RI to find the details of that investigation (e.g., the station locations and types of data collected for the SQT samples). b. Please present a quantitative analysis of each of the source types identified in this section (Dundee Dam, Newark Bay, Saddle River, Third River, Second River, CSOs/SWOs, industrial and municipal discharges) in the RI using the data sources identified in this section. c. In addition please provide a comparison of the contaminant source investigation concentration data to the values used as inputs to the model for each of the potential contaminant sources identified in Section 2.4.2.
51	Page 14, Section 2.4.3.2, first full paragraph, third sentence	This sentence contains the first reference to "fine-grained sediment" in the main text of the document. Please provide a definition of "fine-grained" as it is used in the RI.
52	Page 17, Section 2.4.5, first paragraph	Please revise the text to note that crayfish were also an initial target organism (decapod), though few were collected.

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53	Table 2-1	a. Please revise Table 2-1 to include the two additional columns, "Level of Validation" and "Known Data Issues or Limitations," shown in Tables 2-2 and 2-3. Add "Known Data Issues or Limitations" to Tables 2-4 and 2-5 as well. b. The "Depth" column of the table suggests that only the surface sediment results from the 1995 Tierra survey will be utilized. Please correct the depth interval.
54	Tables 2-2 and 2-3	The acronym "NA," used in both the "Level of Validation" and "Known Data Issues or Limitations" columns, is defined as "not applicable or not available." Because of the difference between these two definitions, a single acronym should not be used for both. Please use two separate acronyms for the two meanings and revise the tables accordingly. In addition, issues that limit the usefulness of the data should be fully described in the text. This should include descriptions of those studies for which some data are useful and others too limited, and descriptions of data that are considered to be of limited value for some uses but valuable for other uses. For example, what exactly does Large Volume and TOPS sampling mean and why is this a data limitation or issue?
55	Tables 2-1 through 2-5	Please add columns to these tables providing the rationale for inclusion of the datasets and revise per **Comment No. 45**.

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No.	General Comments – Section 3
56	Surface concentrations of contaminants (e.g., 2,3,78-TCDD, PCBs, DDx) remain elevated, even though most of the major releases ended several decades ago. Section 3 requires considerable revision to reflect this reality. Specific comments on this issue include the following: a. Sedimentation rates that were developed based on very few datable cores obtained in the system should not be broadly applied across the LPRSA (e.g., Section 3.6.1, Sedimentation Rates). For most areas that have been investigated, cores could not be dated indicating that, for the majority of the sediment bed, processes in the system prevent continual deposition. Specific examples are addressed below. b. Please include discussion of how recently hardened shorelines can affect patterns of erosion and/or deposition in the relevant RI sub-sections (e.g., Section 3.6.2, Infilling Patterns, and Section 3.7, Sediment Stability). Recently hardened shorelines can alter previously observed patterns of accretion and erosion, particularly during high flow events when they may force scour in areas that were historically depositional, exposing previously buried, highly contaminated sediments. The process of point bar formation that naturally occurs in an unhardened river system is hindered when one or more banks are hardened; under these altered conditions, during high flow, water in the river is constrained by the wall and can erode point bars and expose deeper sediment. This process may be occurring at some locations and may help explain the peak Cs-137 concentrations at or near the surface in such areas. Please revise the text accordingly. c. The resuspension, reworking, and redeposition of surface sediment that occurs during each tidal cycle in a tidal river needs to be discussed in Section 3.7, Sediment Stability. Areas of the sediment bed that have experienced no "net" bathymetric change are continually experiencing resuspension and redeposition of contaminated surface sediment, thereby preventing burial in these areas. Areas of no net bathymetric change in a tidal river system are not considered stable.
57	The bathymetry survey and side scan sonar (SSS) investigation should have provided details on anticipated debris/obstructions and utility crossings (such as sewer, water, electric, or telephone) in the LPR. This information will be valuable in the FS to determine the debris volume to be handled for each remedial alternative. Please add figures to the report showing areas of debris and any utility crossings, and please add some discussion of this information and reference to the figures in the text in Section 3.1, Physical Features.
58	Figures 3-21a through 3-21i and Table 3-2 (referenced on pages 38-39, Section 3.7) summarize erosion due to high flows during Hurricane Irene. The summaries show that erosion between 2010 and 2011 (when Hurricane Irene occurred) was laterally more extensive than in the 2007-2010 timeframe. The text suggests that the sediments are stable because the difference in areal extent of erosion was not much greater between the two time steps. This comparison does not support the claim that sediments are stable, but rather shows strong potential for erosion in some areas. In addition, this comparison is incomplete as the

	analysis fails to provide estimates of the volume of sediment eroded, which may be quite different, in spite of relatively smaller differences in the surface area eroded. The overarching statements about bed stability are highly biased toward the upstream reaches of the river, and are much less accurate for the lower 4 miles, as indicated by the content and discussion of Figures 3-21g through 3-21i. Please revise the text to balance the general characterization of bed stability with inclusion of observations of regions of eroding sediment, such as mentioned in the description of the reach downstream of RM 4 (Figures 3-21g through 3-21i). Given the general pattern of higher concentrations of contaminants in the sediment bed below the 0.5-foot surface interval compared to concentrations in the upper 0.5-foot interval, bathymetry changes smaller than 0.5 feet are significant because they can result in increased surface layer contaminant concentrations, as deeper sediments are mixed with surface sediments. Additionally, please discuss how 0.5 feet of bathymetric difference was chosen as the threshold for "measurable erosion." EPA notes that 20% of a sediment bed being eroded during an episodic event could have significant impacts on contaminant fate and transport (e.g., sediment-bound contaminant redistribution within the system and exposure of buried contaminated sediments) within the LPR.

No.	Page No.	Specific Comments – Section 3
59	Page 20, Section 3, summary box	The last three bullet points in the summary box are overly simplified and may give a biased impression to someone who has not read the entire section. In particular: -The third bullet should include downstream as well as upstream transport, i.e. "solids are routinely transported upstream and downstream within the salt wedge that typically resides within the lower 10 miles of the river". Please add either another bullet or another statement to this bullet noting that extreme flow events can cause significant downstream transport of both river inputs and scoured bottom sediments. -The fourth bullet ignores the patchiness of the sediment bed evolution as seen in the groupings described in Appendix J of the RI Report and shown on Figures 9h through 9k of that appendix. The text should be revised to give a more balanced characterization of the ability to explain erosional and depositional patterns. -Please remove the last bullet because data collected does not support this conclusion or define "generally stable."

60	Page 20, Section 3, first paragraph	a. The paragraph states that the "large urban watershed" is a source of a variety of contaminants in the system, but does not mention other key sources. The legacy contamination in the sediment bed as well as the many former industrial facilities that released or discharged contaminants to river are the primary source of COCs to the LPRSA. The paragraph should be revised to reflect this. b. Chemical contamination should clearly and more prominently be included as a stressor to the system. **c.** The characterization of the LPRSA is incomplete. Please see **Comment No. 35** and incorporate that information into this section. d. The word "extremely" should be removed from the paragraph and, overall, a more balanced description of the current use of the river should be provided. The potential for human contact with the river and sediment is not as limited as described, and the current description is not reflective of current or likely future conditions. For example, several active crew clubs currently utilize the Passaic River and several plans exist to increase usage of the river. e. Please remove "invasive and non-invasive" terms. From a human health perspective, if the fish are available for consumption it does not matter if they are invasive or not.
61	Page 20, Section 3, second paragraph, first sentence	a. The list of factors influencing water and sediment quality and affecting ecosystem health needs to include the effects of industrial discharges/chemical contamination. In addition, the text implies that organic matter (e.g., leaf litter) is a stressor. Leaf litter is a normal and often beneficial input to rivers, providing nutrients, food and cover for a wide variety of benthic invertebrates. Benthic macroinvertebrate communities are often most abundant and diverse in the presence of leaf litter. b. In the 3rd sentence, add the words "are one of the factors that" between "salinity gradients" and "affect the longitudinal distribution…." c. The CPG's premise that the benthic community in the LPR is limited to the top 2 centimeters has not been accepted by the EPA. Please revise the fourth and fifth sentences of this paragraph, as appropriate.

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62	Page 21, Section 3.1, second paragraph	a. In the third sentence, please define the term "slightly brackish." b. In the fourth sentence, the description of the change in cross-sectional area in the RM 14 to RM 8 reach should be revised to note that the area reaches approximately 4,500 ft^2, rather than the stated 3,330 ft^2. c. In the fifth sentence, please define/better describe the term "upper estuary." d. In the sixth sentence, the phrase "exponentially expanding" does not accurately describe the increase in area; please revise the text accordingly. In addition, please clarify what RM is considered "the mouth" of the river, and revise Figure 3-2 to show the cross-sectional area at RM 0.
63	Page 22, Section 3.2 last paragraph, last sentence	It is agreed that groundwater recharge into the system is not significant compared to surface water flow for the majority of the LPRSA. However, the issue of groundwater flow into and through the sediment bed should be acknowledged in the draft RI. Please include a statement that there could be localized impacts from groundwater under certain conditions. Please also re-write the last sentence as: "If present, low permeability boundaries could lessen or restrict groundwater flow upward through the sediment bed or horizontally from the surroundings. However groundwater impacts on sediment and porewater contaminant concentrations are possible in localized areas." The phrasing of the draft RI intimates that impervious boundaries are ubiquitous around the LPR, and does not consider the potential for localized impacts from groundwater.
64	Page 22, Section 3.3, first paragraph, first sentence	a. Please delete the phrase "wave-induced" from this sentence. The storm surges in the Atlantic Ocean are not wave-induced, and the resulting oscillatory response of the New York-New Jersey Harbor system has nothing to do with surface waves, which is how the sentence will be interpreted. a. The last full sentence on this page says "River inflow enters over Dundee Dam and from several minor tributaries." Please remove the word minor.
65	Page 23, Section 3.3, paragraph below numbered list, last sentence	The phrase "impacts within the river" is vague. Please provide some discussion of the impacts observed along with appropriate references.

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66	Page 23, Section 3.3, last paragraph, third sentence	The pressure gradient discussed in this sentence should be referred to as the "baroclinic pressure gradient." In addition, the boundary between up-estuary and down-estuary flow does not necessarily occur at mid-depth, as the phrase "upper half of the water column" implies. Please revise the text to be more general, replacing "half" with layer.
67	Page 24, Section 3.3, first full paragraph, second sentence	Similar to the comment above, please delete the phrase "wave-induced" from this sentence.
68	Page 24, Section 3.3, second full paragraph, first sentence	Please clarify why the analysis is limited to the period from 1995 to 2004, rather than including the full period of hydrodynamic results.
69	Page 24, Section 3.3, third full paragraph, first sentence	Please replace the phrase "tidal inflow" with "tidal salt front" in this sentence.
70	Page 24, Section 3.3, third full paragraph, last sentence	The statement that extreme droughts can result in "extensive upstream migration of contaminated sediments from the lower portion of the LPR" is speculative, unless model simulations of historical periods are used to support the statement. Please revise the sentence to either support the word "extensive" or to remove it.
71	Page 25, Section 3.4.1, first paragraph, first two sentences	Please refer to **Comment No. 66** and make the same revisions to this paragraph.

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72	Page 25, Section 3.4.1, second paragraph	The description of the dynamics of the estuarine turbidity maximum (ETM) does not represent current understanding. The ETM results from a combination of re-suspension of bottom sediments by tidal current stresses and the convergence of bottom water transport at the limit of salt intrusion (Sanford et al. 2001). Flocculation of dissolved material as it comes in contact with the salt wedge is negligible; rather, the ETM collects flocculated material that settles at intermediate speeds, typically about 1 millimeter per second (Geyer 1993). The reasons for flocculation are many and varied, but changes in salinity are now seen as a minor factor. Please revise the text accordingly.
73	Page 25, Section 3.4.1, third paragraph	The elevated solids upstream of the salt front in the March 2010 dataset are not generated by the estuarine circulation dynamics discussed as the cause of an ETM. Please revise the text to tie explanation of the elevated solids upstream of the salt front to the effect of river flow on the transitions between tidal river, fluvial estuary and upper estuary.
74	Page 26, Section 3.4.1, first full paragraph	The estuarine circulation process described in this paragraph exists most of the time, under low to moderate flow conditions, but can be disrupted by extreme, high flow events. Please revise the text to clarify the conditions under which the estuarine circulation process exists and the factors that disrupt this behavior. This will also provide a good transition to the following section.
75	Page 26, Section 3.4.2	Please revise the title of this section to “Tidal Asymmetry and River Flow.”

76	Page 26, Section 3.4.2, second paragraph, and Figure 3-7	The data shown on Figure 3-7, from October 16-17, 2009, should not be used to describe typical low flow conditions, as these data were collected under transient flow and tidal conditions. The flow at Dundee Dam on these days averaged 491 cubic feet per second (cfs); on the preceding day (October 15), the flow averaged 310 cfs, with a minimum of 253 cfs, and the flows for the prior 5 days (October 11-15) averaged approximately 280 cfs. Tidal stage data at Bergen Point during this time period indicate a rise in the maximum water surface elevation, well above the typical spring-neap changes. Data from a different time period should replace the data shown on Figure 3-7 and be used to describe the typical behavior of the estuary. The CPG should present physical water column monitoring (PWCM) data for a more typical flow and tidal condition, or present the PWCM data for a range of conditions, including low flow spring (Figure 3-7), low flow neap, high flow spring, and high flow neap.
77	Page 27, Section 3.4.2, first full paragraph, last sentence	Please revise the text to clarify whether a fluff layer is unique to urban settings and to explain how the creation of the fluff layer ("when various types of particles in water aggregate") is represented in the CPG's sediment transport model, which includes un-flocculated fine particles entering the LPR at Dundee Dam and not aggregating in the water or fluff layer.
78	Page 27, Section 3.4.2, last paragraph, fifth sentence	Please elaborate in the text how Figures 3-8 and 3-9 "confirm that the water column solids concentrations are dominated by the easily erodible fluff layer." For example, Figure 3-8 appears to show only limited correlation between flow rates or tidal ranges and TSS. No confirmation of this theory is provided in either figure.
79	Page 28, Section 3.4.2, second paragraph, and Figure 3-5	The discussion of the link between the flow and salt front location associated with the inflection in the direction of the net solids flux is inconsistent with the relationship between salt front location and flow shown on Figure 3-5. The discussion of Figure 3-10 mentions a flow of 1,500 cfs as the inflection point for the net solids flux at RM 1.4, but Figure 3-5 indicates that the salt front is upstream of RM 1.4 until a flow of near 6,000 cfs. Please revise the text or figure as needed to eliminate or explain this discrepancy.
80	Page 28, Section 3.4.2, third paragraph	Please revise the text to discuss the effect of each of the three processes mentioned on the redistribution of contamination within the LPRSA.

81	Page 29, Section 3.4.2, numbered list	Section 3.4.2 should provide more information on how fines in surface sediment are likely to be redistributed under each of the three "regimes" described. For example, under "regime 1" (the low flow scenario), surface sediment is resuspended, reworked, and redeposited with each tidal cycle. Please revise the description of the Regimes in accordance with the following: -Regimes 1 & 2: Under both low and moderate flow/energy conditions, add re-circulation of existing sediments as a factor in sediment transport. Sediment transport includes internal sediments too, not just the listed outside inputs. -Regime 3: Statement requires revision to more clearly convey that under future conditions, riverbed scouring may be affected by climate change. In addition, it is unclear if river-specific evidence has adequately demonstrated that scouring is limited to "specific localized areas." This phrase should be removed. Of particular concern are the transitional slope areas (particularly in riverbends, both sides) between channel bottom and mudflat top, and perhaps other bed features that may not yet be adequately accounted for through current analyses, with regard to erosion characteristics. -It would be more accurate to state that high river flows result in large transport of fine sediments downstream into Newark Bay due to a combination of large river inputs and bottom scour.
82	Page 29, Section 3.4.2, sentence after numbered list	The paragraph does not address recent channel deepening in Newark Bay that has likely increased the salinity of bottom water at the mouth of the LPR. Please revise the paragraph for clarity.
83	Pages 29-31, Section 3.5	Please add to this section some discussion of the sediment stratigraphy and characteristics such as the native sediment deposits and the overlying soft sediments. The thicknesses of these units and their bearing capacity are useful information in evaluating methods of delivering backfill and determining whether pilot studies to understand placement methodology will be required during the remedial design.

84	Page 29, Section 3.5, first paragraph, and Figure 3-21b	The RI asserts that upstream of RM 8, the navigation channel is composed primarily of coarse-grained sediments and that COPC concentrations are correspondingly low. Figure 3-21b shows relatively large depositional areas with sediment accumulation of 1-2 feet between RM 13 and RM 14 over the 2010 to 2011 time period. On page 38, Section 3.7, second paragraph, third sentence, the text states: "Most of the RM 14 to RM 12 reach (Figure 3-21b) also experienced no measurable change." On page 42, Section 4.1, last paragraph, second sentence, the text states: "The channel is characterized by low concentrations that are consistent with the coarse nature of the sediments there (Figure 3-13d)." The RI Report should include discussion of uncertainty in these apparently fine-grained deposits in the channel at RM 13-14 that accumulated more than 6 inches and up to 1 to 2 feet of sediment between 2010 and 2011. Please clarify whether these newly deposited sediments are being defined as fine- or coarse-grained sediments, and whether they have been characterized for contaminants. These same discussions should also be provided for similar depositional areas (e.g., south of Douglas O. Mead Bridge, approximately 700 ft north of RM 11, etc.), as determined by the differential bathymetric analyses."
85	Pages 29-31, Section 3.5	To supplement the discussion as related to referenced Figures 3-12 series, a paragraph should be added describing the method used to convert the raw 2005 SSS data to produce these diagrams, along with additional supporting information on how well these representations reflect current or actual conditions through later data (sediment probing) or other lines of evidence.
86	Pages 32-37, Section 3.6	In Section 3.6, there is a major inconsistency between the geochemically based estimates of deposition rates and descriptions of a system that "may be approaching a geomorphic equilibrium." This inconsistency is likely due to the fact that sedimentation rates have been highly time varying in the LPR over the past 50 years. Thus, sedimentation rates estimated from geochemical profiles may represent previous conditions well, but not current conditions. This distinction is implied, but it should be discussed explicitly. It would help to clear up some confusion. For example, the rapid infill following the Pilot Dredging Study is most consistent with a rapid, time-dependent return to equilibrium, rather than a long term-sedimentation trend. The text should be revised to address the issue of time varying sedimentation rates and qualify the characterization of rates derived from cesium dating.

87	Page 32, Section 3.6.1, first paragraph, last sentence	Section 3.6.1 discusses the sediment trapping likely to occur with sea-level rise and should also discuss the likelihood of increased incidence of high flow events predicted for this area under almost all climate change scenarios and the increased frequency of scour that is expected to occur in the LPRSA under each of these scenarios. Add a statement that in addition to onset of sea level rise, the increased intensity and frequency of storm events are also predicted to occur and describe to what extent these conditions may change sediment trapping efficiency. See **Comment No. 104**.
88	Page 32, Section 3.6.1, second paragraph, last sentence	Please provide a description of the volume of cut method used to analyze the infill rate, including its relative accuracy.
89	Page 33, Section 3.6.1, first paragraph (continued from page 32)	For the discussion on well-behaved Cs-137 profiles (RMs 0.5, 7.3 and 10.9), where net slow deposition appears to be observed in the profile, these areas are described as having "not experienced significant erosion." This may be the case; however, it is also plausible that the occurrence of significant storm events in the last decade may have removed formerly accumulated sediment and exposed older sediment in these areas (edges and top areas). This should be explored and incorporated, as needed. Re-phrase the text to acknowledge other explanations for near-surface peaks in Cs-137 and uncertainties due to the lack of additional lines of evidence. For example, differences between shorter-term consecutive bathymetry surveys or historical cesium profiles collected at several points in time.
90	Page 34, Section 3.6.2	A reference for sea level rise predictions more current than Gornitz et al. 2001 should be used.
91	Page 34, Section 3.6.2, first full paragraph, and Figure 3-17a	Please revise the text to discuss the fact that in 1989, the bed elevation near the right bank went back to its 1932 elevation. This may be related to the extreme flow in 1984.

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92	Page 34, Section 3.6.2, first full paragraph, fourth and fifth sentences	Please revise the text to discuss the relative accuracy of these assessments regarding bathymetric quasi-equilibrium, and whether relevant sediment bed elevation changes can be discerned based on these relative accuracies. As noted in footnote 17 on page 36, the 1949 dataset was digitized from paper drawings, potentially decreasing the accuracy and relevance of these measurements in determining bed elevation changes.
93	Page 35, Section 3.6.2, first paragraph (continued from page 34), third and fourth sentences	First, using the high resolution core data, clarification is needed for what percentage of the sediment bed the "well-behaved Cs-137 profiles" actually represent. For example, of the 14 high resolution cores collected in 2005 by the USEPA/MPI, only 5 were considered suitable for developing reliable contaminant chronologies. The remaining 9 cores had incomplete or interrupted radionuclide profiles, thus not useful for estimating steady deposition. Only a few cores could be used for estimating depositional rates. Second, potential ongoing erosion along the dynamic edges of the channel and shoal areas appears to be overlooked in these characterizations and needs improved evaluation and focus within the CSM. These two aspects of assessing sediment bed data require further assessment in the RI.
94	Page 35, Section 3.6.2, first paragraph (continued from page 34), fourth sentence	Please provide clarification of the subjective terms "uncommon" and "typically" as used in this sentence.
95	Page 35, Section 3.6.2, first full paragraph, and Figure 3-18	The inset plots in Figure 3-18 are not readable. Please revise the figure to ensure legibility. After revising the figure, please review the text for accuracy and revise as needed.

96	Page 35, Section 3.6.2, first full paragraph, last sentence	The text states, "In these stable areas, a slow rate of sea level rise driven accretion probably occurs, but that has not been great enough to bury the older sediments below the 6-inch layer that was sampled." Please remove "stable" from this sentence. Although accumulation related to sea level rise may be a factor, it is also important to understand the possible reasons for this and describe them herein for the CSM. One factor may include greater erosion in this and other areas in the sediment bed under significant precipitation events which cause re-working and potential release of older, more highly contaminated legacy sediments.
97	Page 36, Section 3.6.2, first full paragraph, and Figures 3-19a through 3-19d	Please add the 1989 bathymetry to the plots in Figures 3-19a through 3-19d and revise the text in this section to discuss the erosion observed at RM 4.46 (Figure 3-19b) between 1995 and 2012.
98	Page 36, Section 3.6.2, last paragraph, last sentence (continued on page 37)	Please revise the phrase "steady historical sedimentation" to clarify if the intended meaning is infilling at a constant rate, infilling never interrupted by resuspension, long-term net infilling, or something else. If the meaning is other than long-term net infilling, discuss the data used to support this characterization.
99	Pages 37-39, Section 3.7	Presentations previously given by the CPG showed that the river experienced net infilling between 2007 and 2008 and net erosion between 2008 and 2010. Despite the issue with the datum of the 2008 survey, the CPG presented an analysis to support the adjustment of the datum for 2008 and rationale for its use. Use of the 2007 to 2010 bathymetric changes in Section 3.7 ignores erosion of sediment that accumulated between 2007 and 2008. Please revise this section to remove all use of the 2007-2010 comparison.

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100	Pages 37-39, Section 3.7	Text discusses riverbed stability. However, the presentation appears to downplay the erosion potential of the riverbed. Given the presence of often significantly higher contaminant concentrations at depth and associated release of same during high flow events, greater detail is needed to identify: a. all areas/river regions which are physically prone to erosion (based on river configuration); b. areas of focus due to observed erosion greater than 6 inches; and c. areas of special focus due to several feet of erosion. Instead, this section seems to limit full consideration of all potential contaminant source areas by presenting them as a small percentage of overall riverbed surface area.
101	Page 37, Section 3.7, second paragraph	The 1.75- to 2.75-year timeframe between the pre-event and post-event surveys is potentially significant (i.e., additional episodic events affecting sediment bed elevation could have occurred in this time period). Provide a discussion of how this timeframe and any additional smaller-scale events affecting sediment bed elevation were considered when interpreting the survey results. Please provide clarification as to the relative accuracy of the bathymetric survey techniques discussed in the Draft RI Report. If a 0.3-foot (4-inch) offset is significant enough to warrant using an alternative dataset, then the relative accuracy of every bathymetric dataset must be taken into consideration when evaluating deposition or erosion of the sediment bed.
102	Page 38, Section 3.7, first paragraph and Page 39, Section 3.7, last paragraph	The information provided in these paragraphs suggests a river bed that is in dynamic equilibrium, with a mixture of erosion and redeposition of material. However, the river bed is still subject to episodic erosion and deposition during high flow events, allowing contaminated sediments to migrate. Please revise the text to provide an evaluation of short-term erosion and deposition trends that can result in the redistribution of contaminated sediments.
103	Page 39, Section 3.7, fourth paragraph, last sentence	Please quantify the term “deeper” as used in this sentence.

104	Figure 3-3a	To extract greater information for remedial planning purposes, supplemental information should be sought and presented. If possible, categorize the flow (cfs) into what may be considered as low, normal and excess flow and assign watershed precipitation data to each category. For example, for "excess flow" events (>10,000 cfs -?), identify the associated inches of precipitation, identify the storm event, and/or category of storm (designated hurricanes, tropical storms, 100-yr event, etc.). This information should be provided in a table to supplement this figure.
105	Figure 3-12b	For improved clarity in the vicinity of RM 10 – RM 11.5, figures depicting this region should display the original SSS sediment type in the RM 10.9 TCRA area, modified with hashed or diagonal lines to represent the area either covered by the cap or excavated to hardpan sediment or rock.
106	Figure 3-14	For environmental investigations, the type of color used to denote conditions of concern usually go from blue or green to orange or red, indicating lower concern to higher concern for the feature of study (be it toxicity or hazard, etc.). Therefore, since erosional areas are of prime concern in this river system, the color scheme should be switched to better reflect standard legend use (red should be erosional).
107	Figure 3-15	This figure has limited usefulness in the absence of knowing exactly what the depicted data points represent (geomorphic feature, left bank or right bank). At a minimum, each data point must be identified (so it can be map-located), along with their classification in the river (channel, shoal and type of shoal). This underlying information is necessary to place the presented net depositional rate information in perspective and to understand how representative they are of the full geomorphology at that RM.

No.	General Comments – Section 4
108	The list of contaminants discussed in Section 4 needs to be re-evaluated subsequent to the revisions of the two risk assessments.
109	This section requires significant expansion to describe in greater detail the full extent of contamination in the LPRSA. Currently, this section focuses on only the top 0-6 sediment interval and on 5 contaminants or categories of same: 2,3,7,8-TCDD, PCBs, PAHs, DDx and Mercury. This under-describes the scope of river sediment contamination that must be considered for effective remedial action planning.

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	Given the years of study and thousands of samples collected, a more comprehensive description of the extent of contamination within the various geomorphologic features of the river is needed. Starting at Dundee Dam and moving downstream (perhaps on 1/2 , 1, or 2 mile increments depending on the size and shape of the specific geomorphic feature in a particular segment), a description of the key findings of contaminant levels at the surface and through the sediment bed to the vertical extent of contamination per geomorphic feature of the river is needed, presenting in full what the collected data have revealed. b. At a minimum, maps depicting sample-location plotted data for manageable segments of the river for display and interpretation are needed for sediments at depths of 0-6 in., 0.5 – 1.5 ft., and 1.5 – 2.5 ft. These maps must combine data from 2008, 2011 and 2013 and can be limited to the 5 contaminant categories listed above. However, a description of areas of deeper contamination must also be presented and illustrated for areas of significant contaminant inventory in both the channels and shoals. The subsurface sediment intervals are crucial for remedial decision-making since shallow subsurface sediment may be released into the system under adverse conditions and, even if not mobilized, these sediment conditions require special consideration during development of any remedial alternatives for this river. c. In addition, this section must be expanded to evaluate ALL contaminants tested for and their status relative to ecological screening criteria. This is necessary to identify any other potential contaminants of concern for either the river as a whole, or for specific regions or features within the river. Please access NJDEP Sediment Ecological Screening Levels at http://www.nj.gov/dep/srp/guidance/ecoscreening/esc_table.pdf. In addition, please refer to the Project-specific table of recommended ecological screening levels provided in a letter to USEPA from NJDEP, dated March 17, 2014. For the purposes of this RI, data exceeding sediment ecological screening criteria must be highlighted for a meaningful presentation of the collected information. For those contaminant categories exhibiting high concentrations relative to ecological criteria, scales of > 2X, >5X, > 10x, >100x, and >1,000x should be used for appropriate perspective. d. A somewhat surprising finding was the presence of significantly elevated 2,3,7,8-TCDD concentrations in both surface (17,600 ppt) and subsurface (19,700 ppt) sediment at coring 0555, RM 12.45, given this location in the river. This condition should be explored more closely (i.e., geomorphology, sediment type, manmade structures/influences near this location) since this observation may have relevance for other potentially similar areas in the river. In addition, for both this coring and others, in which vertical delineation may not have been fully achieved, the RI report should discuss the expected extent of contamination at depth given core lithology and other factors learned from the field efforts to date. e. Several SSP2 corings indicated potentially significant inventories of highly impacted sediments based on

	review of downcore contaminant profiles (Draft LRC SSP2 Sampling Program, Oct. 2014, Figure 3-4 series) and data summary tables (Appendix I). Using Figure 3-4a (2, 3, 7, 8-TCDD) as a guide, locations of note from upstream to downstream include: 0555, 0547, 0540, 0538, 0533, 0534, 0528, 0526 and 0504. This information requires assimilation with other, similarly-located and/or impacted, cores from prior sampling programs.
110	The RI report focuses on surface sediment contamination within the 0- to 6-inch depth interval. Given the amount of contaminant mass within the buried sediment, the potential for deeper contamination to be exposed and redistributed should be discussed. The RI report should characterize the nature and extent of contamination throughout the LPRSA, not solely those areas theorized to be the primary risk drivers. The RI report should evaluate the nature and extent of subsurface contamination in the same manner as surface sediment contamination, focusing on the potential for future exposure to subsurface sediment contamination through physical migration (e.g., erosion and advective groundwater flux) or anthropogenic processes (e.g., prop wash and dredging). Please revise this section accordingly.
111	Vertical profiles of cesium are used to estimate the age of sediment and identify early 1950s- and 1963-era sediments. The highest cesium activity is assumed to represent 1963 deposits, regardless of the magnitude of the activity. In cases where the highest cesium activity is in the surface sample, it is assumed that the sediment was deposited no later than the mid-1960s. The relative magnitudes of the peak cesium activity should be analyzed to assess whether peak values from different cores provide a consistent picture of sediment deposition at that time. Time histories of bathymetry, including single beam surveys from 1989 and 1995-2004 and multibeam surveys from 2007-2012, should be used to verify the assumption of the age of the surface sediments. Considering the high flow event in 1984, assumptions about bed evolution based strictly on the 1996 and 2011 data are questionable. Please revise this section to provide these requested evaluations.
112	The conclusion drawn from the comparisons of cumulative frequency distributions of contaminants in areas that experienced different bathymetric changes between 1949, 1966 and 2011 is that the concentrations are clearly different in the different areas. The separation between the concentrations from the different groupings is typically small compared to the variability in concentrations within the groupings. In the three groups where net deposition occurred since 1949, 60 to over 70 percent of the data fall in the range of 200 to 1,000 ppt, regardless of the subsequent changes after 1966. Based on these comparisons, the similarities among the different groupings should be presented in a manner that is balanced with the discussion of their differences. Please revise this section accordingly.

No.	Page No.	Specific Comments – Section 4

113	Page 40, Section 4, summary box	Please delete the second, third, and fourth bullets in the summary box. Response to these topics were previously addressed in the June 10, 2015 CoPC mapping white paper. Please revise the fifth bullet to clarify that contaminants can be transported to the Dundee Dam at RM 17.4 (not just to RM 14).
114	Page 40, Section 4, second paragraph, second sentence	While the conceptual site model can help explain the distribution of sediment contamination within the LPSRA, it should be acknowledged that there is uncertainty associated with these interpretations. Data presented in Section 4 suggest that 2,3,7,8-TCDD sediment concentrations are lower in depositional areas and that the incoming load of 2,3,7,8-TCDD from the upper reaches of the river (above Dundee Dam) is negligible. However, because elevated levels of contamination are present in surface and subsurface sediments in both depositional and erosional areas, it is likely that internal sources of contamination within the LPRSA are inhibiting natural recovery through deposition. Please revise the text accordingly. In addition, as a general overarching comment, the RI Report should consider and discuss other potential contaminant transport pathways (e.g., contaminated porewater/ groundwater transport from deeper sediments to surface sediments). The RI report should provide discussion of any detailed assessments that could preclude these other potential exposure pathways (e.g., a seepage assessment that discusses observed seepage velocities throughout the LPRSA).
115	Pages 41-44, Section 4.1	Related to **Comment No. 33** above, to aid viewer evaluation of discussion in this section, please supply maps which depict the actual surface sediment 2,3,7,8-TCDD concentrations at each sample location, along with illustration of whether the sample point is in the channel, shoal or the region between these two features (transitional slope).
116	Page 41, Section 4.1, first bullet	This bullet discusses the distribution of 2,3,7,8-TCDD contamination relative to a 250 nanogram per kilogram (ng/kg) threshold. As a point of reference, please refer to the remediation goal for 2,3,7,8-TCDD selected for use in the Lower 8 Mile ROD (EPA 2016). The distribution of contamination relative to the various risk thresholds should be referenced during the discussion of the nature and extent of contamination.

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117	Page 41, Section 4.1, last paragraph	In order to avoid giving the impression that elevated concentrations of 2,3,7,8-TCDD haven't been measured upstream of RM 14, please revise the text to note that one sample from RM 14.57 had a 2,3,7,8-TCDD concentration of 792 ng/kg.
118	Page 42, Section 4.1, first paragraph (continued from page 41), last sentence, and Figure 4-3	Please replace the word "low" with "lower" in the phrase "coarse sediments typically have low contaminant concentrations." In addition, please revise Figure 4-3, referenced in this sentence, to include a legend.
119	Page 42, Section 4.1, second full paragraph	To accompany the text noting that high surface sediment concentrations are indicative of 1950s- to 1960s-era sediments and that those areas with newly deposited sediments are cleaner, please reference and include a figure presenting surface to subsurface sediment concentration ratios as a way of understanding deposition patterns within the LPRSA.
120	Page 42, Section 4.1, first full paragraph, third sentence	The rationale for selection of 500 ppt as "high concentration" for 2,3,7,8-TCDD is not presented. Instead, for environmental perspective, any levels in the realm of 1 - 10 ppt (and lower) may be indicative of background conditions (based on review of several project data sets from across the country). Ecological screening criteria of approximately 1 - 3 ppt have been identified using various ecological receptors (USFWS, 2007; NOAA – SQuiRTS; USEPA, 8-Mile FFS, 2014). Therefore, ecologically-based levels of concern for 2,3,7,8-TCDD in sediment are less than 10 ppt and in the realm of 1 – 3 ppt. With this in mind, levels of 100 ppt are considered quite significant.
121	Page 42, Section 4.1, last paragraph, first sentence	Please revise this sentence to be more quantitative. Some of the concentrations along the edge of the channel were in the range of 251 to 500 ppt.

122	Page 43, Section 4.1, first full paragraph	This paragraph states that the channel is characterized by sediment concentrations that are generally lower than the nearshore areas. This pattern is clearly observed at RM 10.9, where there is a marked drop-off in surface sediment concentrations moving out into the channel, resulting from the deposition of fine-grained material inside of the bend in the river. However, the higher sampling density within the RM 10.9 removal area also revealed considerable variation in sediment concentrations over a short distance. In addition, there are numerous areas where channel sediments are more contaminated than those near shore (for example, at RM 12, as shown in Figure 4-1c). Please revise this paragraph to include discussion of the uncertainty associated with the assumption that channel sediments are less contaminated.
123	Page 43, Section 4.1, first full paragraph, and Table 4-1	Please correct the first sentence in this paragraph, which states that "the channel continues to contain only low concentrations," as several samples collected near RM 6.5 (Figure 4-1h) had concentrations above 500 ppt and one sample had a concentration greater than 1,350 ppt. In addition, while the discussion about the relationship between high concentrations of 2,3,7,8-TCDD and fine-grained sediment is supported by data presented in Table 4-1, the data in Table 4-1 are limited to results greater than 1,000 ppt. Please revise the table, and the discussion in the text, to expand the concentration range to include elevated concentrations (i.e., greater than the median) less than 1,000 ppt.
124	Page 44, Section 4.1, second paragraph	Please revise the discussion regarding the "contrary high concentration on an outer bend" to contrast this information with the contaminant distribution at RM 10.9. Based on the discussion in the RI report, at RM 4.6, higher concentrations are present at the outside bend due to the erosion into buried sediments, while at RM 10.9, higher concentrations are present because they are associated with fine-grained sediments that have settled out. In reality, sediments are likely eroded and re-deposited in a dynamic system influenced by high flows and tidal reversals and the resulting movement of sediments.
125	Page 44, Section 4.1, third paragraph	The discussion of the sample within the channel at RM 3.6 where higher concentrations were exposed due to a scour event demonstrates the dynamic nature of the LPRSA. The RI Report should note that scour events of this type have the potential to erode and redistribute highly contaminated sediments buried within the sediment bed, thus limiting natural recovery processes within the LPRSA.

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126	Page 44, Section 4.1, footnote 27	Please revise the footnote to clarify that sediment accumulation occurred primarily between 1949 and 1966, and no appreciable amount of sediments has accumulated since 1966.
127	Page 46-48, Section 4.3	a. Although important, there appears to be an excess focus on what are considered the "1960's" sediments, and the depths at which they are found. Although the dated-1960's sediments may represent the highest contaminant levels, the non-1960's sediments (i.e., non-peak concentrations) are equally important as continuing sources of unacceptable contaminant levels to this river ecosystem. Locations and release of lesser contaminant levels also require careful evaluation. Please revise the text accordingly. b. Provide additional detail on the physical conditions that produce the observed patterns of contamination. The RI Report should note that multiple processes within the LPRSA work together to determine the movement and distribution of contaminants including cycling of legacy sediment contamination within the river.
128	Page 46, Section 4.3, second bullet	Please revise this bullet to clarify that sediment accumulation occurred primarily between 1949 and 1966, and erosion or no net deposition occurred since 1966.
129	Page 46, Section 4.3, footnote 28	Please provide the reasoning for using a different bathymetry change cutoff than used for contaminant mapping in Appendix J, where a cutoff of 0.4 feet of erosion was used for the 1949 to 2001 period and 0.5 feet of deposition was used for the 1966 to 2011 period.

130	Page 47, Section 4.3, first paragraph after bullets	As noted in the Lower 8 Mile ROD (EPA 2016) and the CoPC mapping white paper provided in June 2015 and written in response to Appendix J, the CPG's grouping analysis fails to properly account for the uncertainty. Footnotes 17, 18, 28 and 29 discuss the uncertainty in the horizontal location and elevation of the data points associated with the 1949 bathymetric survey as well as the limited spatial extent, but do not account for the uncertainty in the interpolated values between those points. The analysis also fails to account for potential erosion below the 1949 elevation and subsequent deposition which could not be identified by the available bathymetric data alone. The analysis presented in Appendix J largely disregards the uncertainty associated with the bathymetric difference maps and only uses the uncertainty as a justification for shifting the cut offs between groups away from zero. The analysis presented in Appendix J also fails to recognize that in many places the bathymetric difference between 1949 and the time at which a sample was collected is a function of the hydrodynamic conditions preceding the collection of the sample (see the Lower 8 Mile ROD, Figure II.D.1.10 – 3). The description of Figures 4-12a-f suggests that an attempt was made to pair the data with the most appropriate recent bathymetry, although it is not clear which sediment chemistry datasets were paired with which bathymetric datasets. In Appendix J the analysis only used the difference between the 2011 surface and the 1949 surface regardless of when the chemistry sample was taken. Treating bathymetry change as static in time does not account for the temporal dynamics of sediment accumulation in the system. Although sediments deposited prior to substantial discharges of COPCs should have the lowest concentrations, the ability to identify those sediments and predict where they will occur in the horizontal and vertical directions is uncertain due to the limitations of the available data. Whether those pre-1949 sediments are at the surface or buried is dependent on both long term and recent hydrodynamic conditions. The chemistry data falling into the CPG's no deposition since 1949 group is very limited and varies across analyses (5 points on Figure 4-12, 10 points on Appendix J, Figure 1, and 4 points on Appendix J, Figure 3). In the CPG's mapping analysis (Appendix J) this is the most poorly characterized group with one chemistry sample for every 4.73 acres. Please add additional text to describe the limitations of both the bathymetric and chemistry data and the temporally dynamic nature of the groupings.

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131	Page 47, Section 4.3, last paragraph	The uncertainty in the bathymetric data, the interpolated surfaces generated from those data, and the differences between those surfaces noted in **Comment No. 130** also apply to the 1966 bathymetric data, however the 1966 interpolated surface has even greater uncertainty due to the greater spacing between bathymetry data points (Footnotes 17 and 18). Each of the three depositional groups presented contain data ranging from less than 200 ng/kg to more than 2000 ng/kg, each varies over more than two orders of magnitude, and each has at least an order of magnitude overlap with the other groups. Although sediments deposited during the peak discharges of COPCs should have the highest concentrations, the ability to identify those sediments and predict where they will occur in the horizontal and vertical directions is uncertain due to the limitations of the available data. Whether those post-1960 sediments are at the surface or buried is dependent on both long term and recent hydrodynamic conditions. Please add additional text to describe the limitations of both the bathymetric and chemistry data and the temporally dynamic nature of the groupings.
132	Page 48, Section 4.3, second paragraph, second sentence	Please revise this sentence to avoid the use of subjective terms such as “low” and “high” concentrations, and instead focus on presentation of ranges of sediment concentrations.
133	Page 48, Section 4.3, second paragraph, and Figures 4-12a through 4-12f	Please revise this paragraph to provide a more detailed explanation for the two points with elevated concentrations in the group with bathymetry change of less than 1 foot since 1946, which appear for each contaminant in Figures 4-12a through 4-12f. For example, are the two points co-located? Using the symbols from Figure 4-12 in Figure 4-6 would help the reader evaluate this question.
134	Page 48, Section 4.4, first paragraph, second sentence	Please revise this paragraph to indicate the frequency of upstream transport upstream of RM 12, if only qualitatively, because the discussion gives the impression that transport to RM 14 occurs continually.

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135	Page 49, Section 4.4, first full paragraph, first sentence	Rather than speculate about historical transport, please provide model simulation results of historical periods that account for both bathymetry changes in Newark Bay and the LPR, or revise text to acknowledge uncertainty.
136	Page 49, Section 4.4, first full paragraph	Many statements presented in Section 4 are hypotheses and should be supported using quantitative descriptions of ongoing contaminant sources. For example, the discussion regarding upstream/downstream transport and potential ongoing sources of contamination presented in Section 4.4. Please revise the text accordingly. In addition, the discussion in Section 4.4 should note that atmospheric deposition, groundwater discharge and industrial point sources of contaminants currently are not significant contributors of COCs. Finally, Section 4.4 should discuss the relative contribution of resuspended sediments to the mass of recently deposited sediments within the LPRSA.
137	Page 50, Section 4.4, second full paragraph, and Figures 4-13a through 4-13f	The discussion of the distribution of DDx and PCB sediment contamination, which suggests that it is indicative of other sources, should be supported by other lines of evidence, such as incoming sediment particle concentrations. This is particularly true for PCBs, given that the PCB contaminant distribution is similar to that of TCDD. Please revise the paragraph to provide additional evidence. In addition, the description of the distribution of DDx (Figure 4-13e) should acknowledge that, although variable, the concentrations tend to decline with distance upstream of RM 11 and downstream of RM 3. Finally, the statement about watershed contributions to LPR contaminants should be supported with data and qualified with a statement about the relative importance of the watershed loads. The data presented in Figures 4-13a through 4-13f are limited to OC-normalized data. The RI Report should discuss in greater detail how OC-normalization of the data impacts the interpretation. In addition, maps and figures presenting upstream concentrations should include both OC- and non-OC-normalized data.
138	Page 50, Section 4.4, last paragraph, first sentence	Please revise this sentence to provide statistical measures of the differences in concentration between various RMs so that a quantitative assessment can be made. Qualitative terms such as “generally higher” and “comparable” should be quantitatively defined prior to use.

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139	Page 51, Section 4.4, first paragraph (continued from page 50), last sentence	The tributaries have a hydrologic connection to the LPR, and contamination may have been introduced from the river into the tributaries. Please revise the text to include discussion of the tributaries' physical characteristics, contaminant nature and extent, contaminant fate and transport, and potential for natural recovery.
140	Page 51, Section 4.4, second full paragraph, fourth sentence	Please revise the discussion of recontamination to include a statement about the effect of sediment remediation to reduce the recontamination potential associated with the resuspension of contaminated sediments within the LPRSA.
141	Page 51, Section 4.4, last paragraph (continued on page 52)	Please revise the first sentence to clarify whether the industrial and municipal discharges referenced are within or outside the LPR. The effect of those discharges outside the LPR should be reflected in the boundary inputs discussed previously on pages 50 and 51. In addition, this paragraph cites studies suggesting that CSOs are a source of contaminants to the LPR, but then states that targeted sampling indicates that "CSOs and SWOs are not an important source for key contaminants." Please revise this paragraph to clarify what conclusion is being made regarding the importance of CSOs as current and historical sources of contamination to the LPRSA.
142	Figures 4-1a through 4-1m	To better illustrate the contaminant patterns using 2,3,7,8-TCDD, the actual contaminant concentrations should be plotted at the sampling locations shown. Please see **Comment No. 115**.
143	Figures 4-4a and 4-4b	Please revise these figures to identify the depths of peak contaminant concentration as an interval, not a single point.
144	Figures 4-12a through 4-12f	Figure 4-12 series should be supplemented with river mile illustrations to identify areas of observed erosion between bathymetry surveys. Areas of "Net" erosion or deposition comprise only one line of riverbed characterization evidence. Occurrences of interspersed and periodic bed elevation changes are also important to identify and evaluate. Table 2-5 lists all of the bathymetry studies conducted from 1949 to present. However, missing from the RI is a more comprehensive analysis of the changes observed between each significant survey (i.e., those providing greatest river-wide data coverage).

145	Figure 4-14	Figure 4-14 is intended to show the ratio of contaminant concentrations in the LPR relative to those in Newark Bay and upstream of Dundee Dam, but the ratios for all contaminants except 2,3,7,8-TCDD are unreadable. Please revise the figure as follows: -Add a reference line at 1.0. -Provide confidence limits for the ratios to judge their significance relative to the null hypothesis of a ratio of 1.0. -Present the y-axis on a logarithmic scale since the ratios span three orders of magnitude.

No.	General Comments – Section 5
146	Based on the title of this section, contaminant concentrations in biota need to be put in context by providing risk estimates or comparing measured concentrations in biota to appropriate toxicity reference values (TRVs). Discussing detected concentrations in biota without any context provides little useful information. Please revise this section accordingly.
147	The ecology of the LPR has been impaired at least in part by chemical contamination, yet there is no mention of this primary stressor. Please revise the entire section to remove this bias.

No.	Page No.	Specific Comments – Section 5
148	Page 53, Section 5, summary box, second bullet	Please revise this bullet to include chemical contamination as an influence on the LPR and its ecological community.
149	Page 53, Section 5, summary box, third bullet	Use of the upper 2 centimeters of the sediment bed as the benthic exposure zone is currently in the dispute resolution process. Depending on the resolution of the dispute on this topic, revisions to the text may be required to account for the decision.
150	Page 53, Section 5, summary box, fourth and sixth bullets	Please eliminate the fourth and sixth bullets as there is no basis for either statement; exposure of species present in the system is not restricted to the top 2 cm of sediment (Bullet 4); no data exist to suggest that the top 2 cm of sediment are less contaminated than the top 6 inches of sediment (Bullet 6).

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151	Page 53, Section 5, summary box, fourth bullet	This statement is biased since use of shallow sediments by the benthic community may also result from avoidance of chemical contamination in deeper sediments. BMI also may not be tolerant of contaminant concentrations associated with deeper sediments, hence the low abundance and diversity of deeper sediments. It is likely that contamination plays a greater role in the benthic exposure depth than external organic inputs. Please revise this bullet to include all likely contributors to BMI exposure depth or eliminate the bullet.
152	Page 53, Section 5, summary box, fifth bullet	The abundance of carp is indicative of conditions suitable for or tolerated by carp. Carp are unlikely to substantially affect LPR ecology, as carp are often found in areas with high diversity and abundance of fish as long as conditions are suitable (i.e., generally shallow, turbid, low energy environments). Please revise the bullet accordingly.
153	Page 53, Section 5, summary box, sixth bullet	The definition of the ecological exposure areas as “the upper strata of surficial deposits” is controversial, is not fully supported by the existing data, and fails to consider that ecological exposure may be suitable under conditions of reduced chemical contamination. In addition, the contaminant concentration data from the 2008 finely segmented cores should be discussed as part of the assessment of the relationship between contaminant concentrations in the top 2 centimeters and the top 15 centimeters. Please revise this bullet to include potential future exposures or remove the bullet.
154	Page 54, Section 5.1, first paragraph, last sentence	The observation that “the prevalence of degraded habitat adversely affects the health, abundance, diversity, and reproductive success of biological populations in the system” is overstated as compared to Figures 5-1 and 5-2. The figures show over half of the study area as having “mixed vegetation” and “mixed forest and shrub/scrub” as opposed to bulkhead or riprap, especially above RM 8. Please revise this paragraph in the context of the information presented in Figures 5-1 and 5-2. In addition, please define the term “health” as used in this sentence or eliminate it altogether.
155	Pages 55-62, Section 5.2	Comparisons of the biological communities to “urban estuarine environments” throughout Section 5.2 should present data from applicable reference locations.

156	Page 55, Section 5.2, first paragraph	The summary of ecological stressors presented here is biased, as chemical contamination is absent from the discussion. Please revise this paragraph to include chemical contamination as a stressor.
157	Page 56, Section 5.2.1, second to last bullet, last sentence	Please remove the word “non-chemical” from this sentence. Chemical stressors should be explicitly included in the list of factors that shape the benthic community in the LPR.
158	Page 57, Section 5.2.1, first full paragraph	The focus of this paragraph is appropriately on current conditions, but some discussion should be included of potential exposure to deeper sediments in the absence of chemical contamination (i.e., what would the exposure zone be if chemical contamination was reduced or eliminated?). Please revise the paragraph accordingly.
159	Page 57, Section 5.2.1, second full paragraph, and Figure 5-8	The report states that detritivores make up the majority of the benthic invertebrate community by biomass and references Figure 5-8. However, the derivation of the estimates of biomass in Figure 5-8 is not clear. This figure is potentially inconsistent with Figure 5-3, which shows oligochaetes (deposit feeders by most definitions) to be dominant over the majority of the LPR. In addition, the report does not define the difference between “detritivores” and “deposit feeders,” which do not have standard definitions among benthic ecologists. Detritus is generally defined as organic matter, usually in the sediment bed; in other words, indistinct from “deposits.” Please revise the text and Figure 5-8 to provide clear definitions of the different classifications of benthic organisms and to indicate which LPR organisms have been placed in which category. In addition, please revise the text and Figure 5-8 as appropriate to ensure that the assumptions and analysis supporting the figure are transparent.
160	Page 58, Section 5.2.1, first paragraph (continued from page 57)	This discussion implies that natural organic matter in the form of leaf litter has a major and adverse effect on downstream waters. However, organic inputs such as leaf litter can be an important and positive source of nutrients and cover. Furthermore, leaf litter is often associated with abundant and diverse benthic macroinvertebrate (BMI) communities, including pollution-sensitive EPT taxa in freshwater systems. Please revise the discussion to be more balanced.

161	Page 58, Section 5.2.1, first paragraph (continued from page 57)	"The high levels of organic inputs into the LPR are part of the ongoing urban condition and are not expected to change." High levels of certain types of organic inputs (e.g., leaf litter) may not change significantly over time. However, other types of organic inputs (e.g., CSO discharges) may be reduced as system improvements are implemented. Please revise this statement to reflect the uncertainty in predicting future levels of organic inputs.
162	Page 59, Section 5.2.2, first paragraph (continued from page 58)	Please revise the text to indicate that crayfish were target organisms in freshwater reaches, but were not found to be abundant.
163	Page 59, Section 5.2.1, first paragraph, first sentence	Attempts should be made to estimate the role of leaf litter as a source of carbon to the system, since the role of leaf litter is mentioned multiple times in the document. Alternatively, revise statements about leaf litter to reflect the fact that leaf litter can have both positive and potentially negative impacts on the system, and is just one of several sources of organic input.
164	Page 59, Section 5.2.3, last paragraph, second bullet	The channel catfish diet in the draft bioaccumulation model presented to EPA is not consistent with the feeding habits of channel catfish shown in FishBase (http://www.fishbase.org/TrophicEco/DietCompoList.php?ID=290&GenusName=Ictalurus&SpeciesName=punctatus&fc=129&StockCode=304). The FishBase link lists zooplankton as the primary food source, followed by zoobenthos and nekton. The draft model bioaccumulation model uses small forage fish (nekton) as the primary food source, followed by two zoobenthos compartments, with minimal feeding on zooplankton and minimal feeding on deposit feeders. Please revise the text to clarify the inconsistencies between the RI report, the draft bioaccumulation model and FishBase. Fish should be added to the list of prey items in this bullet, since larger channel catfish can be primarily piscivorous. Alternatively, add channel catfish to the fourth bullet as an invertivore/piscivore.

165	Page 59, Section 5.2.3, last paragraph, third bullet	The menhaden diet is characterized as excluding benthos. However, one FishBase study found that menhaden primarily consume zoobenthos (http://www.fishbase.org/TrophicEco/DietCompoList.php?ID=1592&GenusName=Brevoortia&SpeciesName=tyrannus&fc=43&StockCode=1785). Table B-16 of the study referenced (Bowman et al. 2000) shows benthic sand and animal remains are important parts of the Atlantic menhaden diet (50% of stomach content weight over 32 samples).Therefore, please add benthos and benthic detritus to the menhaden diet discussed in this bullet.
166	Page 60, Section 5.2.3, first paragraph	The classification is not consistent with the dietary preferences of bass in the draft bioaccumulation model presented to EPA. In that model, bass are set to consume an equal amount of planktivores as small forage fish (40% of their overall diet) whereas from these data there are 11 times as many forage fish as planktivores (8% vs. 88%). Please revise classification of bass to reflect dietary preferences presented in the bioaccumulation model presented to EPA. The description of the LPR fish community as "primarily a benthic-dominated food chain" is not reflected in the food preferences specified for bass in the draft bioaccumulation model presented to EPA. Finally, in the last sentence of this paragraph, please clarify how impervious surfaces can be a source of settling solids.
167	Page 60, Section 5.2.3, last paragraph	Carp can affect microhabitats, as noted, but carp are also well adapted to the conditions observed in the LPR. Please revise this paragraph to provide a more balanced discussion, noting that the conditions in the LPR support tolerant fish species, such as carp.
168	Page 61, Section 5.2.5, first paragraph	Please revise this paragraph as follows: -In the first sentence, change the term "aquatic mammalian surveys" to "surveys of water-associated mammals." -In the second sentence, delete the word "chipmunks," as chipmunks are not necessarily urban-dwelling mammals. -In the third and fourth sentences, change "aquatic mammalian species" to "mammals."

169	Page 62, Section 5.3, first paragraph	Please revise this paragraph as follows: -Delete the word "overall" in the first sentence. -In the second sentence, note that increased inputs of contaminants contribute to toxicity, not just to "diminished habitat quality, complexity, or availability." -Provide a more balanced discussion of ecological stressors, including chemical contamination. As currently written, the text is biased toward discussion of physical stressors. -Delete the reference to the upper 2 centimeters of sediment as the benthic exposure zone, as this approach is controversial and not accepted by EPA.
170	Page 63, Section 5.3, first full paragraph	Please delete the word "overall" in the first sentence. In addition, the characterization of the fish community in the LPR presented in this paragraph is not consistent with the draft bioaccumulation model presented to EPA, which has bass feeding heavily on filter-feeding fish. Please revise text to follow bioaccumulation model presented to EPA.
171	Page 63, Section 5.4, first paragraph	In the baseline predictions from the draft bioaccumulation model, benthic invertebrates are predicted to have concentrations of 420 ng/g 2,3,7,8-TCDD. This level is well above the observed data shown in Table 1a of Appendix F. This table also does not support the predicted concentration of 80 ng/g for the benthic detritivores. The prediction of 420 ng/g is greater even than the predicted body burden in carp (predicted to be the most contaminated fish), and does not seem appropriate given observed data presented here. The CPG must remedy this benthic invertebrate prediction with an alternative calibration.

172	Page 64, Section 5.4.1, first bullet	The highest 2,3,7,8-TCDD concentrations were measured in whole-body carp, yet these data are not fully evaluated in the BERA. These data must be fully evaluated in the BERA as carp represent the most highly contaminated benthic fish species. These summaries need to be placed in the context of risk. The mean 2,3,7,8-TCDD concentration for carp (0.41 µg/kg) and the maximum 2,3,7,8-TCDD concentration in fish (1.4 µg/kg) exceed recommended dietary TRVs for mammals exposed to 2,3,7,8-TCDD. For example, the Great Lakes Water Quality Initiative Criteria Documents for the Protection of Wildlife (EPA-820-8-95-008, March 1995) and Sample et al. (Toxicological Benchmarks for Wildlife: 1996 Revision. Risk Assessment Program. Health Sciences Research Division. Oak Ridge, TN)) both selected dietary TRVs for mammals based on a three-generation rat study of Murray et al. (Three generation reproduction study of rats given 2,3,7,8-TCDD in the diet. Toxicology and Applied Pharmacology. 50:241-252. 1979). This study derived a dose LOAEL of 0.01 µg/kg-d, which equates to a food LOAEL of about 0.125 µg/kg ww based on rat IR=0.028 kg/d and BW=0.35 kg.
173	Page 64, Section 5.4.1, third bullet	Please revise this bullet to include discussion of the exposure duration for worms and whether comparisons to fish and crabs are based on organisms collected over the same reach. In addition, the significant contaminant differences observed between worms from estuarine locations and those from freshwater locations suggest that an estuarine-wide bioaccumulation model calibration, based on a single comparison of the model to the data (as delivered to EPA), is not appropriate.

174	Page 65, Section 5.4.2, first bullet	The highest PCB concentration in fish is stated to be in whole body carp (4,100 µg/kg). This finding again supports the requirement that whole body carp be fully evaluated in the BERA. These summaries need to be placed in the context of risk. Total PCB dietary thresholds for mink generally fall in the range of 0.5 to 1 mg/kg (500 to 1,000 µg/kg). The mean value for carp (4.1 mg/kg) and the maximum concentration in fish (15 mg/kg) exceed recommended dietary TRVs for mammals exposed to PCBs. For example, the Great Lakes Water Quality Initiative Criteria Documents for the Protection of Wildlife (EPA 1995) selected dietary TRVs for mammals based on Auerlich and Ringer (Current status of PCB toxicity, including reproduction in mink. Archives of Environmental Contaminant Toxicology. 6: 279. 1977). This study derived a dietary LOAEL of 2 mg/kg. EPA Region 5 (J. Chapman. 2003. EPA Region 5 Recommended Avian and Mink PCB Toxicity Reference Values. Appendix D. Final Revised BERA. Allied Paper, Inc. / Portage Creek / Kalamazoo River Superfund Site. Michigan DEQ. April.) derived a dietary NOAEL of 0.5 mg/kg and dietary LOAEL of 0.6 mg/kg for the protection of piscivorous mammals, based on extensive review of mink feeding-based toxicity studies.
175	Pages 65-66, Section 5.4.2, paragraph after bullets	The natural histories of these fish species suggests that those most closely linked to bottom sediments have higher exposures in the LPRSA, while mostly non-benthic taxa have similar exposures in the UPR and the LPRSA. Please revise the text to note this relationship.
176	Page 67, Section 5.4.4, first bullet	These summaries of fish tissue concentrations need to be placed in the context of risk. The mean DDx concentration in whole body carp (0.51 mg/kg ww) and the maximum concentration in fish (1.6 mg/kg ww) exceed recommended dietary thresholds for birds exposed to DDx. Sample et al. (1996) and the Great Lakes Water Quality Initiative Criteria Documents for the Protection of Wildlife (EPA 1995) both selected a dietary TRV for birds based on Anderson et al. 1975 (Brown pelicans: improved reproduction off the southern California coast. Science 190: 806-808). This dose TRV (0.027 mg/kg-d) equates to a diet of 0.15 mg/kg (150 µg/kg ww) where whole body DDx concentrations can represent diet.
177	Page 68, Section 5.4.4, paragraph after bullets	Please provide a discussion of DDx concentrations in carp, since carp are an exception to the summary provided, as indicated.

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178	Page 68, Section 5.4.5, first bullet	These summaries of fish tissue concentrations need to be placed in the context of risk. The maximum mercury concentration in fish (0.99 mg/kg ww) approaches the recommended dietary NOAEL for mammals exposed to mercury. The Great Lakes Water Quality Initiative Criteria Documents for the Protection of Wildlife (EPA 1995) selected dietary TRVs for mammals based on Wobeser et al. 1976 (Mercury and mink II. Experimental methyl mercury intoxication. Canadian Journal of Comp. Medicine. 34-45). This study derived a dietary NOAEL and LOAEL of 1.1 and 1.8 mg/kg ww, respectively. In addition, please revise the text to indicate that the higher concentrations in white catfish are not unexpected since fish can make up a large portion of the diet for white catfish.
179	Page 69, Section 5.4.6, first paragraph	If the highest concentrations of the most hazardous and bioaccumulative chemicals are found in carp, then carp should be a major focus of the BERA. Contaminant concentrations in carp should be compared to tissue residue-based effects levels and to dietary thresholds for piscivorous birds and mammals. It should be made clear that carp are likely the most highly exposed freshwater fish species and represent large, long-lived, fatty, benthic omnivorous fish. Therefore, protection of carp should provide protection for nearly all other fish species, including those not collected and those for which toxicity data are lacking.
180	Page 70, Section 5.4.6, first paragraph	The biologically active layer of sediment may be deeper than 2 centimeters. Please revise the phrase "Lower chemical concentrations in the biologically active shallow (top 2 cm) sediment layer of the LPR…" to include supporting data or acknowledgement that it is an assumption. In addition, high mHg concentrations in larger piscivorous fish contradict the assumption of a simple food chain in which fish feed predominately on invertebrates. Piscivores, not invertivores, are likely the most highly exposed receptors. Please revise this paragraph accordingly.
181	Pages 70-71, Section 5.5	The current discussion of key findings is biased, with a focus on urbanization and other non-chemical stressors and little mention of chemical contamination. In addition, arguments regarding the upper 2 centimeters of sediment as the BAZ are not fully supported. This entire section needs to be thoroughly revised.

182	Page 70, Section 5.5, fifth bullet	Please revise this bullet to acknowledge the role of the UPR TMDL (NJDEP. 2008) as a factor that could result in a reduction in carbon loading over Dundee Dam in the future.
183	Page 71, Section 5.5, first bullet	Carp likely have little effect on the ecology of the LPR except on a temporary/localized scale. Carp occur nationwide in freshwater environments with abundant and diverse aquatic receptors. Please revise this bullet accordingly.
184	Figure 5-11	This diagram should include all or none of the CFT processes. As presented, partitioning to dissolved contaminants is not included for resuspended and fluff layer particulates. Erosion and diffusion of fluff layer sediments should be shown in the same way as the BAZ bedded sediment. In addition, dissolved contaminants should be shown as a source of exposure to fish. Please revise the figure accordingly.

No.	General Comments – Section 6
185	Please revise this to include an evaluation of surface water quality samples in comparison to New Jersey Surface Water Quality Standards (SWQS), N.J.A.C. 7:9B and Federal Ambient Water Quality Criteria.
186	Section 6 would benefit from a reach-by-reach discussion of suspended sediment particles, contaminant loading and trapping efficiencies within the various reaches of the LPR. This information can be used to determine the degree to which contaminants are transported within various reaches of the LPR and to evaluate natural recovery processes within the LPRSA. Please revise the text to include reach-specific discussions of suspended sediment particles, contaminant loading and trapping efficiencies.

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187	Section 6 includes a number of broad statements characterizing relationships and mechanisms driving the fate and transport of contaminants in the LPR. However, the associated figures do not provide evidence of the strength of these relationships. Conclusions appear to be drawn based on general expectations of how rivers behave rather than the site-specific data displayed in the figures that, at times, appear to contradict the descriptions provided in the text. For example, at the bottom of page 73 and the top of page 74 in Section 6.1.2, the following statements are made: "This means that exchange between sorbed and dissolved phases is limited during resuspension events, and most contaminant transport will track the transport of solids. The overall dominance of the particulate phase is supported by the strong correlations between contaminant concentrations and suspended solids concentrations within the LPR (Figure 6-2)." There are two problems with this statement. First, correlations between contaminant concentrations and the suspended solids load do not provide any indication of the contaminant load in the dissolved form. Second, as shown in Figure 6-2, the strength of the relationship between chemical concentration and suspended solids load varies substantially among the different contaminants. Further discussion of these two items, and associated direction for revision of the RI report, is provided in Attachment 1. Please revise the text accordingly.

No.	Page No.	Specific Comments – Section 6
188	Page 72, Section 6, summary box, second bullet, second sentence	Please revise this bullet to either state that "upstream transport above RM 12 appears limited" or quantify what is meant by "limited" under both current and historical conditions.
189	Page 72, Section 6, summary box, third bullet, third sub-bullet	Please provide additional detail to clarify how fluff layer-parent bed interactions are "important."
190	Page 72, Section 6.1.1, first paragraph, first sentence	Please revise this paragraph to include discussion of the relative importance of sorption of contaminants to organic versus inorganic particles.
191	Page 72, Section 6.1.1, first paragraph, fourth sentence	Please delete the phrase "erosion and deposition at the sediment-water interface" as erosion (re-suspension) and deposition (settling) are listed previously in the same sentence.
192	Page 72, Section 6.1.1, first paragraph, fifth sentence (continued on page 73)	Please revise this sentence to read "The LPR flow transports dissolved and sorbed contaminants within and through the river and potentially its tributaries", if accurate. Please also include a discussion of the potential for contaminant transport between the river and its tributaries.
193	Page 73, Section 6.1.1, first paragraph (continued from page 72), third full sentence	Please provide additional discussion and/or data to support the assertion that incorporation of fluff solids into the parent bed is a slow process.

194	Page 73, Section 6.1.1, first paragraph (continued from page 72), fifth full sentence	Please clarify whether the reference to dissolved contaminant transport in sediment due to diffusion and groundwater flow is meant to apply to freely dissolved contaminants as well as those in the DOC/colloidal phase.
195	Page 73, Section 6.1.2, second paragraph, second sentence	Please provide the calculations referenced in this sentence in either a footnote or an appendix.
196	Page 73, Section 6.1.2, second paragraph, last sentence (continued on page 74)	Please provide a summary of surface water data and associated discussion to support the assertion that "exchange between sorbed and dissolved phases is limited during re-suspension events." Please also describe the impact of the estuarine turbidity maximum and salt front on these fate and transport processes.
197	Page 74, Section 6.1.2, first bullet	The Draft RI Report states that during low flow conditions, sediment particles are trapped within the system. Please revise the text to provide quantitative estimates of the contaminant loading of fined-grained sediment particles throughout the LPRSA under a range of flow conditions. This information can be used to estimate changes in contaminant loading and trapping efficiency for various reaches of the LPRSA and thus facilitate identification of sources and sinks of contamination. In addition, please clarify the terms "horizontal" (i.e., upstream/downstream or bank-to-bank) and "net solids flux" as used in the third sentence in this bullet.
198	Page 74, Section 6.1.2, second bullet	The Draft RI Report states that during moderate flow conditions, contaminants are flushed toward Newark Bay. Please revise the text to provide quantitative estimates of the degree that contaminated sediments are eroded into the water column and then transported. In addition, discuss how this process changes as flows increase, presumably entraining particles, and then decrease, presumably allowing particles to drop out of suspension and deposit on the sediment bed. These questions could potentially be answered by developing contaminant and sediment loading and trapping efficiencies for various reaches of the LPR under a range of flow conditions.

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199	Page 74, Section 6.1.2, third bullet, first sentence	Please revise this bullet as follows: -In the first sentence, replace the phrase "at specific locations" with "in some areas," as "specific locations" implies that the locations are known. -If accurate, revise the second sentence to read: "Sediments entering the LPR during high flow are either transported through the system (predominantly fine-grained sediments) to Newark Bay or deposited within the LPR and its tributaries (predominantly coarse-grained sediments), depending on flows and tidal range." In addition, clarify whether the description of the fate of fine- and coarse-grained sediments entering the river during high flow conditions is based on data, model simulation results or opinion. -Revise the last sentence to read: "The net contaminant flux during high river flows is likely in the downstream direction, but also likely varies in magnitude by contaminant depending on its distribution within the sediment bed and boundary contaminant loadings." -Include discussion of trapping efficiency during high river flow events; whether the LPR is a source of contaminants during such events (with suspended material moving through the river and other material being eroded, with minimal deposition); and how these processes change as flows increase and then decrease. As noted in **Comment No. 186**, these questions could potentially be answered by developing contaminant and sediment loading and trapping efficiencies for various reaches of the LPR under a range of flow conditions.
200	Page 74, Section 6.1.2, footnote 48	Please provide clarification of how spring tide conditions relate to Regime 3 and what type of set-up/set-down condition would cause Regime 3 behavior. In addition, please delete references to wave events, as the storm surges in the Atlantic Ocean are not wave-induced, and the resulting oscillatory response of the New York-New Jersey Harbor system is not correlated with surface waves.

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201	Page 75, Section 6.1.2, last paragraph	EPA notes that with the exception of a zone of coarser grained materials between RM 5.5 and 6 (and some smaller areas), the lower 8 miles of the LPR primarily consists of fine-grained sediments with high concentrations of 2,3,7,8-TCDD and other contaminants. For example, as shown in Figure 4-5d, higher 2,3,7,8-TCDD concentrations were detected in gravels and sands adjacent to the channel than detected in fine-grained sediments within the channel. Please include a set of figures similar to Figures 4-5a through 4-5g for the entire LPRSA.
202	Page 75, Section 6.1.2, first paragraph, last sentence	Please revise this statement as follows: "This redistribution process allows areas of elevated surface concentration, and potentially elevated subsurface concentration, to act as contaminant sources to lower concentration areas."
203	Page 75, Section 6.2, second paragraph, second sentence	Please revise this statement as follows: "As such, 2,3,7,8-TCDD is useful for interpreting contaminant dynamics within the LPR for those sediments contaminated by the 2,3,7,8-TCDD source."

204	Page 76, Section 6.2.1	Section 6.2.1 discusses Figure 6-3a as it relates to the importance of tidal re-suspension and deposition. The analysis proceeds by plotting cumulative distribution function (CDF) plots for concentrations per unit volume and then again for concentration normalized to suspended solids. The discussion asserts that there are meaningful differences in concentrations between slack tide and mid-tide conditions that, when normalized to suspended solids, disappear. This apparent dependence on solids concentrations leads to the conclusion that "tidal re-suspension/deposition is generally a driving factor for water column contaminant levels." This analysis seems to lack sufficient rigor to draw such a conclusion. First, the CDF plots exhibit a great deal of overlap and are too small to judge even qualitatively whether there are differences in concentrations at various points in the tide cycle. Second, without clearly establishing that there are in fact differences greater than what might occur by chance, it is difficult to determine how the relative differences in TSS-normalized concentrations compare to each other and subsequently tie this to the very broad conclusion. Importantly, the result is reversed for LMW PAHs; differences are striking for the normalized concentrations, whereas there is a great deal of overlap in the distributions for the un-normalized concentrations (Figure 6-3b). It is also important to note that these plots potentially conflate spatial variation with variation that is associated with the tide cycle. Plots of water column concentration versus RM provided in the next figures (e.g., Figure 6-4) indicate that concentrations vary by over an order of magnitude by RM. Please revise the RI Report to include a more complete analysis of the aforementioned relationships, and include a multiple regression that includes both the tide cycle and RM as independent variables in order to identify the sources of variation driving the apparent marginal (i.e., single predictor) relationships. In addition, please include a discussion of the quantification of the strength of the hypothesized relationships.
205	Page 76, Section 6.2.1, first paragraph, fourth sentence	Please modify the description of Figures 6-3b to 6-3f to note the change in the relative concentration in bottom-slack and surface-mid-tide data at the upper tail of the distribution for PCBs and mercury.

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206	Pages 76-77, Section 6.2.2, and Figures 6-4 through 6-6	Please revise this section (and any related sections) to distinguish between surface and bottom chemical water column monitoring (CWCM) data. In addition, please discuss data collected during different portions of the tidal cycle, and provide an evaluation of whether contaminant data are consistent with the transport processes described in Section 3. Please also discuss how the presence and/or movement of the salt front and ETM may influence water column contaminant concentrations, if appropriate. Please revise Figures 6-4 through 6-6 as appropriate to reflect these changes in the text. In addition, please revise this section to provide a discussion of alternative methods that could be used to estimate the location of the 2 ppt salinity intrusion location, and revise the associated text as appropriate. The current estimated intrusion locations are inconsistent with actual salinity data in some cases (e.g., downstream limit for August 2011) and unreasonable in other cases (e.g., extent of salt front translation in December 2012). Comments such as "Volumetric 2,3,7,8-TCDD concentrations (Figures 6-4a) are typically highest within or somewhat upstream of the salt front…" cannot be evaluated because it is not clear from the data presentation where the salt front was located at the time of measurement.
207	Page 77, Section 6.2.2, first paragraph, last sentence	Please revise this statement as follows: "Similar observations generally apply to the other contaminants (Figures 6-4b to 6-4f), although the distributions are flatter to varying degrees and most notably for LMW PAHs, possibly indicative of a strong boundary influence."
208	Pages 77-78, Section 6.2.3	Section 6.2.3 includes a discussion of water column contaminant concentrations versus river flow and tidal ranges (Figures 6-7a through 6-7f). Water column concentrations would likely vary more between flow and tidal regimes than they would vary during a single regime. Please revise this section to discuss the CWCM program data and the flow and tidal conditions during each of the sampling events in the context of the transitions between the three regimes described in Section 6.1.2.
209	Page 77, Section 6.2.3, first sentence	Figures 6-4 and 6-5a through 6-5f demonstrate the complex pattern of contaminant transport within the LPSRA. Please revise the text in Section 6.2.3 associated with these figures to note that as maximum water column concentration varies between RM 2 and RM 10 based on flow and tidal conditions, water column transport of contamination represents a potential significant mechanism for contaminant redistribution within the LPRSA.

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210	Page 78, Section 6.2.3, last paragraph	Please revise the text to note that the time lag between Hurricane Irene and subsequent sampling events was approximately 6 months, and that this duration is potentially significant when evaluating chemical fate and transport from surface sediments to the water column.
211	Pages 78-80, Section 6.2.4	In Section 6.2.4, please provide a comparison of the water column and sediment bed data where the sediment data are limited to or weighted by areas where intra-tidal re-suspension is expected. In addition, please provide a discussion of the spatial distribution, and how the presence and/or movement of the salt front and ETM may influence water column contaminant concentrations of the sediment sampling locations versus the water column monitoring locations. Such a discussion will aid in the interpretation of the contaminant distributions in water and surface sediments, as it is important to know whether there is a bias in the samples in each medium with distance along the river.
212	Page 79, Section 6.2.4	Figure 6-8a compares surface sediment contaminant concentrations to water column contaminant concentrations. Please revise the associated text to note that, based on a review of these figures, the data suggest that redistribution of sediment contamination through re-suspension and subsequent deposition is a key contributor to the distribution of contamination within the LPRSA.

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213	Pages 80-82, Section 6.3.1	Section 6.3.1 includes a discussion of historical upstream contaminant transport. On pages 81-82, the statement is made that the salt front "…may have extended somewhat further upstream and with greater frequency during the time of peak 2,3,7,8-TCDD loading." This statement implies that if the salt front extended farther upstream, upstream transport of contaminants would have been greater. Please revise this section to provide an assessment of transport under historical conditions (e.g., simulations of periods that include historical bathymetry in both Newark Bay and the Passaic River). Shallower depths in the Newark Bay navigation channels and deeper depths in the Passaic River would have affected salinity at the mouth of the Passaic River and shear stresses in the Passaic River. The net effect on upstream solids transport could be assessed through comparison of simulations with current and historical bathymetries. The hydrodynamic simulation (Cañizares et al. 2009) referenced in footnote 63 on page 82 is described as including only bathymetry changes in the Passaic River. The baroclinic pressure gradient in the Passaic River during the periods considered in Cañizares et al. 2009 would have would have been affected by the Newark Bay channel depths at that time, and it appears that this consideration was not included in the simulations described in Cañizares, et al. 2009.
214	Page 80, Section 6.3.1, footnote 57 and Figure 6-9	The blue line described as indicating "total mass integrated longitudinally" in Figure 6-9 is missing from the figure. Please add this line to the figure.
215	Page 81, Section 6.3.1, footnote 58	Footnote 58 refers to and discusses figures in Israelsson et al. 2014. Given the length of this discussion, please include the relevant figures, or versions of these figures updated with more complete data, in the report, rather than only referring to them in the footnote.
216	Page 83, Section 6.3.2, first full paragraph	Please revise this paragraph to include a statement regarding whether the patterns described suggest a local source in the vicinity of RM 5 when discussing the spatial distribution of LMW PAHs shown on Figure 6-11c.
217	Figure 6-1	Please revise this figure to include re-suspension of the parent bed to the water column.

218	Figures 6-3 through 6-8	Please revise these figures to include the New Jersey Surface Water Quality Standards (SWQS), N.J.A.C. 7:9B and/or Federal Ambient Water Quality Criteria for those contaminants/contaminant categories for which these benchmarks exist. This is necessary for appropriate perspective of environmentally-relevant conditions as observed through these RI data.

No.	Page No.	Specific Comments – Section 8
219	Section 8, page 85, summary box, fourth, fifth, sixth, and eighth bullet	The fourth bullet should be revised to state that potential risk to RME anglers (e.g. children and adults) consuming fish or crabs exceed the cancer risk range (10^{-4} to 10^{-6}) and the goal of protection of an HI-1. In the fifth bullet, please remove the bullet that includes information on the carp. In the sixth bullet, please include the calculated risks from the dermal contact/ingestion of sediment between RM6 to RM9. The eighth bullet lists specific chemicals that "also contribute to human health risks but to a lesser extent." All chemicals fit this description as written. Please revise the bullet to read "also pose potential human health risks above the National Contingency Plan (NCP) risk range and the goal of protection of HI of 1, but to a lesser extent."
220	Section 8, page 85, summary box, tenth bullet	This bullet incorrectly states that, for all COPCs besides 2,3,7,8-TCDD, the background risks "are significant," when risks/hazards for many of the COPCs in background are actually below NCP thresholds. Revise the bullet to: "For many COPCs (except 2,3,7,8-TCDD), background risks are comparable to LPRSA risks."
221	Section 8.1.1, page 86	Please clarify in the text that the data met appropriate QA/QC, QAPP requirements.
222	Section 8.1.3, page 87, first paragraph	Consistent with updated information presented in Section 3.1.1 (pages 3-2 to 3-3) of the Revised Draft BHHRA (December 2015), make the following revisions: In the first sentence, change "…six sampling events between 2008 and 2012…" to "…seven sampling events between 2008 and 2013…" In the last sentence, change "…143 accessible surface sediment samples..." to "180 accessible surface sediment samples…"

223	Section 8.1.4, Page 87	Clarify that the determination of skin-on and skin-off is consistent with EPA guidance, and include the reference (e.g., USEPA 2000 EPA 823-B-00-007). The following statement "a limited number of crab hepatopancreas tissue samples were analyzed for informational purposes" should be revised to account for the fact that these tissue samples were incorporated into the HHRA to evaluate the RME individual.
224	Section 8.1.5, pages 88 to 89	In paragraph 2, please remove the following editorial statement, "conservative screening levels" from the text. Also, please remove the statement "For added conservatism" since the text indicates the values for non-cancer were divided by a factor of 10. In paragraph 3, please remove "conservatism" before screening level. Update the bullets to be consistent with the bullets presented on page 3-11 of the Revised Draft BHHRA (December 2015). In paragraph 4, please move the discussion regarding "background" to the risk characterization/uncertainty section (8.4) consistent with EPA guidance.
225	Section 8.2, page 90, first full paragraph	Please remove "thereby limiting direct access to the river" as this discussion fails to indicate the future land use where more access to the river is anticipated. Consistent with updates to the Revised Draft BHHRA (December 2015), reference to information collected in the creel/angler survey (CAS), "AECOM 2014c," should be qualified to note that observations were made under current conditions, in the presence of a consumption advisory. Change the last sentence in the paragraph to: "Little crabbing has been observed in the LPRSA (AECOM 2014c), where consumption advisories are in place."

226	Section 8.2.2, page 92, first paragraph	The RME scenario is not intended to represent a specific percentile within the range of exposures. In addition, the third sentence is too broad in characterizing the RME as "above the average case but still within the range of possible exposures." The RME is defined as "the highest exposure that is reasonably expected to occur at a site" (USEPA 1989, RAGS Part A, p. 6-5). Please revise the text to provide this definition in place of the first and second sentences of this paragraph. Further, the text after the 5th sentence should be revised to clarify that the basis for the decision is the RME individual. Discussion of the CTE should be included in the risk characterization section and not throughout the Section. Additional information should be provided here about the fish and crab ingestion rates applied in the BHHRA. Replace the last sentence of this paragraph with "These include conservative estimates of fish tissue and crab consumption rates that were developed by USEPA Region 2, independently of CPG, based on consideration of a wide range of creel-angler surveys (USEPA 2012a). The ingestion rates were based on two published surveys conducted in the New York/New Jersey Harbor estuary with enough information to calculate statistical distributions of ingestion rates for anglers who consume their catch (Burger 2002 for fish and crab ingestion, Connelly et al. 1992 for fish ingestion)."
227	Section 8.2.2, Page 92, Footnote 66	Please revise the footnote to reflect the changes in exposure assumptions in the 2014 update to the Standard Default Exposure Assumptions and newer data on cooking loss.
228	Section 8.2.2, Page 93	Please indicate the version of ProUCL
229	Section 8.2.2, page 95, second paragraph	Update the summary of the fish mixed diet exposure point concentrations (EPCs) to be consistent with the RME diet evaluated in the Revised Draft BHHRA (December 2015), which includes five species.

230	Section 8.2.2.1, pages 95-96	This section is entirely about the CAS conducted by the PRPs. The section contains a greater level of detail about the study than is appropriate for the RI summary of the BHHRA, especially in comparison to the extremely abbreviated summary provided in Section 8.2.2 about exposure parameters that were used in the BHHRA. Accordingly, this section should either be removed completely or should be cut down significantly and replaced with the following: "Over a year-long period in 2011 and 2012, the CPG conducted a creel/angler survey (CAS) in the LPRSA to collect site-specific data on anglers who fish and/or crab in the 17.4-mile Study Area. It should be noted that the results represent current baseline fish and crab consumption patterns for the LPRSA, where consumption advisories are currently in place. The survey was completed without USEPA oversight or review, and the findings have not been confirmed by Region 2. Nevertheless, the study provides some information about angling behavior in the LPRSA, including angler demographics, popular angling sites on the river, species and cooking preferences, and awareness of the consumption advisories. More details about the CAS are provided in Section 2.3.1.1 of the BHHRA."
231	Section 8.3, page 97, last paragraph	Update the discussion of PCBs in this section to be consistent with Section ES.2.3 (page ES-6) of the Revised Draft BHHRA (December 2015).
232	Section 8.4, Page 98	Paragraph 1: The text in the first paragraph suggests that we are predicting non-cancer health effects. This is incorrect. The text regarding non-cancer should be revised to read: The result is a quantitative estimate of the non-cancer hazard quotient (HQ) with the goal of protection of an HQ = 1. Paragraph 2: Remove "target" from the first sentence, changing the phrase to "…USEPA's risk range of …" The discussion of "Chemicals of Concern" needs to indicate that COC are finalized in the ROD. The discussion of non-cancer hazards should use the term "hazards" and not "risks" since risks suggests a probability of disease which is not the case for non-cancer assessments. For non-cancer hazards use the term "goal of protection of an HQ/HI = 1". The discussion of COCs is confusing. The COCs are defined previously as exceeding 10-4 or an HI = 1 yet here it suggests that another approach is being used. The text should be clear regarding the criteria used. Paragraph 3: The discussion of lead should also indicate that CDC has modified the recommendation for blood lead levels from 10 to 5 ug/dl which EPA is currently re-evaluating.

233	Sections 8.4.1 and 8.4.2, pages 99-101	This section should present numerical cancer risk and noncancer hazard estimates and not simply identify whether the potential risk or hazard index was greater than NCP guidelines. Replace the bullet list on page 99 with the summary tables from pages 6-26 to 6-29 of the Revised Draft BHHRA (December 2015). In addition, identify the noncancer target endpoints for which the hazard index exceeded unity. As indicated previously, the appropriate term for non-cancer effects is hazards and not risks since the Hazard Quotient does not represent a probability of disease. Also, remove the term "target". The following statement requires clarification since it may appear that the contributions may total more than 100%, "Of the other COPCs that contribute to potential risks from fish and crab consumption, PCBs contributes less than 10% to approximately 50%, pesticides contribute less than 1% to approximately 5%, and methylmercury contributes approximately 1% to 9%." Further, these calculated values will need to be updated to reflect the updated exposure assumptions and the statement should clarify whether the percentages apply to cancer risk or non-cancer hazard. The statements regarding the carp diet need to explain there is evidence that individuals consume carp; state the calculated risks for diets with and without carp that still exceed the risk range and goal of protection of an HI = 1; and that these diets still support the need for remedial action. The discussion of crab consumption should also clarify that evidence exists that support individuals consume both muscle and hepatopancreas and the associated cancer risks and non-cancer health hazards associated with both exposure scenarios. The discussion of COCs in Section 8.4.2 should clarify the basis for selecting the various chemicals listed e.g., > 10-4, greater than an HI = 1, etc. The last paragraph of Section 8.4.2 is confusing since the role of the risk assessment is to establish the COCs in the various media. The current text suggests that the risk assessment will be re-evaluated in the Feasibility Study which is not consistent with EPA guidance. The appropriate location to evaluate the "robustness of the toxicity information" is in the risk assessment and not the FS. The statement regarding the need to further evaluate whether chemicals are identified in the CTE analysis is also inappropriate since the basis for decisions in the risk assessment is the RME scenario. This text should be removed from the document.

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234	Section 8.4.2.1, pages 101 to 102	In paragraph 2, change "identified COCs" to "identified potential COCs," consistent with edits made in the Revised Draft BHHRA (December 2015). In addition, please remove the phrase "risks that contribute significantly to overall site risks" because risks estimated for receptors in one area do not necessarily contribute to risks to receptors in another area. This sentence should be replaced with the following: "Further, contaminant levels in background media pose risks that, in some cases (e.g., fish and crab consumption), exceed the NCP risk range and goal of protection of HI=1. Contaminant levels in background may contribute to levels observed in the LPRSA and to risks estimated for LPRSA receptors." Please add text to refer the reader to the detailed analysis of background data in Appendix L of the Revised Draft BHHRA (December 2015). In paragraph 3, please remove the statement regarding analysis of COCs as part of the FS.
235	Section 8.4.3, page 102, first paragraph	The section should not be listed as "Risk Management" but as "Uncertainties in the BHHRA." The presentation of this issue should provide more information regarding underestimation of risks (e.g., lack of toxicity information for many chemicals found in the LPRSA) in addition to the overestimates outlined. Further, the text should note that many of the default exposure assumptions identified in the calculation of risks/hazards are used consistently by risk assessors with the Superfund program across the Agency. Please revise the eighth and ninth sentences in the first paragraph to note that "the 30 years the angler is assumed to eat LPRSA fish" applies to the estimation of cancer risk. Noncancer hazard estimates in the BHHRA are equally relevant to chronic exposures that can be shorter (e.g., seven years) than the full exposure duration for cancer risk. Also, please revise the text here to use the updated exposure duration for residents (i.e., 26 years rather than 30 years).
236	Section 8.4.3, page 103, first full paragraph	The exposure assumptions and toxicity values used in the BHHRA are a mixture of high-end and average values, not "upper-bounds" as stated in the first sentence of this paragraph. The third sentence, which references an alternate human health risk assessment that the CPG provided with their comments on the FFS, should be removed. Please revise the paragraph accordingly.

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No.	General Comments – Section 9
237	Very little attention is given to spatial variation in contaminant concentrations in biota tissue, even though, for instance, 2,3,7,8-TCDD concentrations vary substantially with location in the river. Please revise this section to address spatial variation in contaminant concentrations.
238	Chemical contamination should be evaluated in all fish species collected, not just a subset of those species.

No.	Page No.	Specific Comments – Section 9
239	Page 104, Section 9, summary box	Please revise the bullets in the summary box after comments on the Section 9 text have been addressed.
240	Page 105, Section 9.1, third bullet	Chemical contamination should be evaluated in all fish species collected, not just a subset of those species. Carp is notably absent from the list of fish species evaluated in this bullet.
241	Pages 108-109, Section 9.1.3, second paragraph, last sentence	The statement that "fish and crab communities generally use the river regardless of salinity" contradicts a statement at the end of the first paragraph in Section 5.2.3 on page 59 ("Freshwater fish in the LPR…are excluded from certain portions of the LPR because of the salinity gradient"). Please revise the text to clarify this discrepancy.
242	Page 109, Section 9.1.3, first full paragraph	Please revise this paragraph as follows: -Clarify the fifth sentence, as it could be interpreted to mean that the salt wedge itself is the largest external source, exceeding the source from re-suspension and external loads. -Revise the reference to a "simple, short food chain" in the sixth sentence. The food chain is not uniquely short or simple. The fish community is diverse, encompassing a wide range of trophic levels. Also, several upper trophic level wildlife receptors are present or could be present under possible future conditions, even if they are not abundant.

243	Page 109, Section 9.1.3, second full paragraph	EPA and CPG are currently in the dispute resolution process regarding the appropriate exposure depth. Depending on the resolution of the dispute on this topic, revisions to the text may be required to account for the decision. Please revise this paragraph as follows: -Note that local BMI taxa would likely utilize deeper sediments if those sediments were not contaminated, based on reported depths of sediments utilized in "clean" ecosystems. -Revise the last sentence to note that fish will receive total contaminant dose via prey, surface water ingestion and ingestion of particulates. Contaminants in BMI serving as prey are not the only source of accumulation in fish tissue.
244	Page 110, Section 9.3, second paragraph	EPA identifies unacceptable risk as HQ ≥ 1, not just HQ > 1. Please revise this paragraph accordingly.
245	Page 111, Section 9.3, second full paragraph	Because "population" is difficult to define on a spatial scale relevant to this investigation, please revise this paragraph to use the term "local population" when discussing population-level effects.
246	Page 112, Section 9.3.1	Please add the following text at the end of this section: "The UCL on the mean is a statistic that estimates the mean concentration with a specified degree of confidence, and accounts for variability in the sampling data. [paragraph break] EPCs for fish species selected as representative prey of avian and mammalian receptors were based on a "generic fish" that incorporated several species. The majority of fish samples included in the EPC were species that range throughout the entire 17-mile LPRSA area. Even if some fish species have a more limited range, individual wildlife may focus their foraging activities in areas where the fish taxa with limited range occur."
247	Page 112, Section 9.3.2, First paragraph	Please include additional text regarding the selection of TRVs and SSDs in the BERA. Please add the following text after the first paragraph: "The identification of toxicological values focused on conservative but realistic effect threshold levels. Rather than derive toxicological benchmarks representative of the broad range of literature values, the BERA used best available conservative values. In cases where the most appropriate toxicological study failed to report a NOAEL estimate, the BERA used extrapolation factors to estimate a no-effect threshold dose or concentration."

248	Page 112, Section 9.3.3, first paragraph	As noted in **Comment No. 244**, EPA identifies unacceptable risk as HQ ≥ 1, not just HQ > 1. Please revise this paragraph accordingly.
249	Page 114, Section 9.4.1, first paragraph (continued from page 113) and first full paragraph	While Jamaica Bay as a whole was selected as a reference area, data evaluation for this area suggests that some localized areas of elevated contamination are present and these areas should be excluded from use as reference. Inclusion of data from these "hot spots" in Jamaica Bay substantially confounds data interpretation for the LPRSA. Also, comparisons of reference BMI data to site BMI data using the minimum values to conclude little or no difference in abundance and diversity metrics (or "not impacted") is inappropriate. Such comparisons should be more rigorous than simple comparison of minimums or ranges of values. Comparisons of means and medians, for example, supported by appropriate statistical tests, would reveal substantial differences in BMI metrics between the LPRSA and reference areas. These two paragraphs will need to be updated following revisions to the statistical evaluations in the BERA.
250	Page 114, Section 9.4.1, second full paragraph, second sentence	The uncertainty admitted within this statement is not consistent with the sediment feeding model, presented tautologically throughout this document that suggests that chemical stressors should be explicitly or implicitly excluded from any effect on benthic invertebrate impairment (e.g., page 20, bottom paragraph; page 57, second to last bullet; chemical stressors omitted from section 5.2.1 completely). Please revise this and associated statements to reflect potential contaminant-related effects on BMI.
251	Page 115, Section 9.4.1, third bullet	Please revise this bullet to provide supporting information for the low confidence in the selenium tissue-based TRV.
252	Page 116, Section 9.4.2, second bullet	Please revise this bullet to provide supporting information for the low confidence in the selenium tissue-based TRV.
253	Page 116, Section 9.5, first paragraph, first sentence	This text suggests that carp are not considered benthic omnivores because they are not included in the benthic omnivore category. Please add carp to this category.

254	Page 118, Section 9.5, first full paragraph	The evaluation described in this paragraph should be applied to all fish species collected.
255	Page 118, Section 9.5, last paragraph (continued on page 119)	The conclusion of relatively low HQs is based on limited and biased evaluation of available data. The evaluation needs to be expanded to include all fish tissue data. For example, at approximately RM 7, whole body carp contained 2,3,7,8-TCDD concentrations of 550 and 1400 pg/g. Tissue TRVs for carp, based on multiple adverse effects, range from approximately 370 to over 1,000 pg/g (ACOE ERED database: http://el.erdc.usace.army.mil/ered/), resulting in elevated HQs based on these residue TRVs for carp. Treating whole body carp from RM 7 as diet for mink also results in elevated HQs (11 to 28). These HQs are based on an estimated dietary LOAEL for mink of approximately 50 pg/g (0.00005 mg/kg) (Sample, et al. 1996). Sediment 2,3,7,8-TCDD concentrations between RM 6.5 and RM 7.5 ranged from 320 to 6,500 pg/g, suggesting high concentrations in sediment may be linked to high concentrations in whole body carp despite the assumptions of fish mobility and weak linear relationships between COPEC concentrations in fish tissue and sediment.
256	Page 119, Section 9.6, first paragraph, first sentence	Risks should be estimated for receptors represented by selected taxa. The BERA should not be assessing risks to these three bird species, but should be assessing risks to all birds represented by these selected species (representative of key trophic levels). This is an important difference.
257	Page 119, Section 9.6, second paragraph	While the focus on LOAEL HQs is appropriate, consideration should be given to elevated NOAEL HQs to provide a margin of safety for taxa not evaluated. NOAEL HQs that exceed 1 may indicate the potential for adverse effects for sensitive non-evaluated species. Simply eliminating risks based on LOAEL HQ < 1 may not be sufficiently protective of all other taxa that are not evaluated. The potential for adverse effects when HQs > 1 are based on the range of concentrations between the NOAEL and LOAEL TRVs should at least be mentioned. Please revise this paragraph and the underlying analysis to evaluate HQs for a range of values between the LOAEL and the NOAEL.

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258	Page 120, Section 9.7, second paragraph	Please revise this paragraph and the underlying analysis to evaluate HQs for a range of values between the LOAEL and the NOAEL. Note that when whole body carp is assumed as mink diet (e.g. at RM 9, the mean 2,3,7,8-TCDD concentration in whole body carp was 460 pg/g), LOAEL to NOAEL HQs range from about 10 to about 90. The low HQs described in the following paragraph are based on limited use of fish tissue data and do not reflect the upper range of dietary exposures.
259	Page 120, Section 9.7, third paragraph	The statement that "river otters have not been observed in the LPRSA" fails to recognize that otters represent all piscivorous mammals that may have similar life histories. Furthermore, the presence and abundance of mink and otter could increase in the future if conditions in the LPRSA are improved. A component of such improved conditions is reduced concentrations of contaminants in dietary items. Please revise the text to clarify that presence or absence of a particular species does not preclude current or future use by other species with similar trophic status, or future use by a particular species or similar species.
260	Page 121, Section 9.9, first paragraph, first sentence	Reptiles and amphibians can also be exposed to contaminants in water and sediment via ingestion of prey. Although this exposure route cannot be reliably quantified, it should be mentioned as a likely route of exposure. Please revise this paragraph to note this important exposure pathway for reptiles and amphibians.
261	Page 122, Section 9.10, second paragraph	Given the high uncertainty using soil/terrestrial plant data, sediments should be eliminated as a primary exposure medium for aquatic plants and text should focus on surface water COPEC concentrations compared to surface water ESLs relevant to aquatic plants (including algae and macrophytes).
262	Page 122, Section 9.11, first bullet	Risks to carp and consumers of carp (e.g., mink) would likely fall within the unacceptable range if carp were fully evaluated as recommended. Please fully evaluate risks to carp and consumers of carp and revise summary bullet based on the full evaluation.
263	Page 123, Section 9.11, second bullet	Impact to 20% of the study area is significant and may be associated with population-level impacts. Reference area data need to be evaluated appropriately (i.e., not using ranges or minimum values but using a more rigorous statistical method) and in detail to ensure that highly contaminated locations are not included in the reference areas (e.g., Jamaica Bay).

264	Page 123, Section 9.11, first paragraph after first bullet	This conclusion would likely change if all fish taxa collected were evaluated. Please revise the bullet following full evaluation of all fish taxa collected.
265	Page 123, Section 9.11, third bullet, last sentence	This sentence is biased and inaccurate and needs to be revised to reflect the following information: Clear relationships among stressors or clear evidence of toxicological impact are rarely apparent since there are numerous chemical and non-chemical stressors on the system. A primary goal of the BERA is to determine whether there is reasonable potential for site-related chemical contamination to significantly contribute to risk. Given the elevated concentrations of several COPECs in sediment, it is clear that site-related chemical contamination has substantial potential to contribute to impairment in BMI and possibly other communities. For example, concentrations of 2,3,7,8-TCDD in sediment (mean nearly 600 pg/g; max 16,000 pg/g) greatly exceed multiple thresholds for adverse effects in BMI (most range from about 3 to 10 pg/g, with the site-specific sediment PRG set at 1.1 pg/g) throughout the LPRSA.
266	Page 123, Section 9.11, last two paragraphs	It is likely that BMI would utilize deeper sediments if contamination levels were reduced. In addition, please revise the text to explain how the dynamics of the fluff layer are “separate and distinct from those of the underlying bedded sediment.” An explanation should also be provided as to how natural recovery is occurring in such a thin layer (approximately 1 mm) that can be periodically swept away by high energy conditions.
267	Page 124, Section 9.11, first paragraph, second sentence	Please revise the reference to a “simple, short food chain” in this sentence. Forty-six fish species were collected, including all trophic levels expected in an aquatic system (including piscivores). As noted in previous comments, the food chain cannot accurately be described as simple and short.
268	Page 124, Section 9.12, first sentence	Please change “identified COCs” to “identified potential COCs,” consistent with edits made in the Revised Draft BHHRA (December 2015).
269	Page 124, Section 9.12, first sentence after bullets	The conclusion of low HQs is based on evaluation of only a subset of the data. Higher HQs are calculated when fully evaluating all the data and exposure pathways. Please provide a more complete summary following full evaluation of all data collected (e.g., all fish tissue data).

270	Figure 9-2	Please define the term "HBI," which is used in this figure.

No.	General Comments – Section 10
271	The RI Report includes an approach to mapping COPCs that relies on correlation between COPC concentrations and physical characteristics of the sediment. This relationship was used to support the evaluation of apparent temporal trends presented in Section 10 and elsewhere within the Draft RI Report. However, this conclusion is largely an artifact of the definition of erosional and depositional groupings, which were defined based on breaks in analytical concentrations (see Appendix J, footnote 8). This method of using analytical data to define groups followed by testing for differences in these groups is circular and not based on sound statistical principles. Figure 10-4 and the associated text discuss temporal trends in surface sediments and assert that sediment concentrations are increasing in erosional areas and decreasing in depositional areas within the lower 7 miles of the river. The figure, however, shows that uncertainty in estimated means is much greater than the temporal differences that are discussed in the text. It is clear that the overall averages are virtually identical in 1995 and 2010. The trends inferred for the erosional area are not statistically significant, and the pattern is simply an artifact of the extreme level of segregation of high and low concentrations based on arbitrary selection of erosional and depositional groups whose definitions were based on the concentrations themselves. Section 10 and Appendix J should be revised to account for the revised mapping analyses that CPG and EPA are currently discussing.
272	Comparisons between tissue datasets must include control for differences in methods, design, species, tissue types, locations, and sampling seasons (as stated in Section 10). Even the most simplistic efforts (e.g., seasonality) were not made to control for any of these differences. The comparisons presented in Section 10 and in Figures 10-16 through 10-19 must be revised to account for these differences in the datasets and the results re-evaluated.

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273	Section 10 presents an evaluation of natural recovery within the LPRSA. This evaluation concludes that contaminant concentrations are declining in areas subject to net deposition and that recovery is inhibited by higher surface concentrations in areas subject to erosion. EPA acknowledges that some limited natural recovery is occurring in depositional areas as evidenced by Figure 10.3; however, the data also suggest that natural recovery is not occurring over large portions of the LPRSA. Further, it is unclear whether natural recovery processes within depositional areas are sufficient to meet remedial goals. For example, analysis conducted by EPA suggests that over the past 20 years, surface sediment concentrations in lower 8 miles of the LPRSA are declining at an almost imperceptible rate. A regression line was plotted for data from 1995 to 2007 and shows that there was no trend between concentrations and year of deposition, with a slope of -0.0012. This slope is not statistically different from zero. Further evaluation is required to identify areas where MNR may and may not be occurring. This analysis should use multiple lines of empirical evidence such as presentation of surface to subsurface sediment concentration ratios across the LPRSA, subsurface sediment profiles presented in conjunction with sediment type, evaluation of suspended sediment particles within various reaches of the LPRSA under various flow conditions and additional evaluation of trends in fish tissue concentrations. This information can be used in conjunction with modeling to understand where and to what degree natural recovery is occurring and to facilitate the development of remedial strategies in the FS.
274	Comparisons of 1995 and "2010" contaminant concentrations in surface sediments and biota should include a discussion of factors contributing to uncertainty in the comparisons. Only a limited number of colocated stations are included in the "2010" and 1995 datasets. Conclusions about declines in exposure concentrations are made based on changes in sub-areas based on bathymetric changes between 1995 and 2011; however, the changes in biota concentrations do not correlate well with the changes in surface sediment concentrations. For instance, between 1995 and "2010," average surface sediment concentrations of 2,3,7,8-TCDD and total PCBs are characterized as decreasing in only net depositional areas, which represent 36% of the surface area, and increasing in the remaining two groups and over the entire area. Biota tissue concentrations, however, are characterized as decreasing in each of the eel, fish and crab comparisons. Revise the discussion to address how the size and sampling locations of the biota could affect the comparisons and include information on the spatial distribution of sediment sampling stations in the two periods.

No.	Page No.	Specific Comments – Section 10
275	Page 125, Section 10, first paragraph, first two sentences	Please revise these sentences as follows: "Natural recovery occurs when natural processes cause a decline in contaminant concentrations. Within the LPRSA, natural recovery may be occurring in surface (0- to 6-inch) sediments limited in areas subject to net deposition. However, over the past 20 years, surface sediment concentrations in lower 8 miles of the LPRSA are declining at an almost imperceptible rate."

276	Page 125, Section 10.1, second paragraph	Please revise this paragraph as follows: -Revise the first sentence to note that the extent of natural recovery is also location-dependent, and some areas of the LPRSA may recover more quickly based on the distribution of contamination, sources and physical transport characteristics while other areas, such as the lower 8 miles of the LPRSA, are declining at an almost imperceptible rate. -The second sentence should be supported by a quantified estimate of ongoing contaminant sources to the system. In addition, the statement that "the recovery will mirror the decline of the external sources" implies a direct link in the response time of the system, which has not been defined. This statement should be modified or deleted. -Note that natural recovery will be aided by controlling both external (e.g., stormwater loading) and internal (e.g., contaminated sediment source areas) sources.

277	Page 126, Section 10.1, first full paragraph	Please revise this paragraph as follows: -The first sentence states that "Deposition and erosion are strongest during high energy conditions when solids fluxes are highest." While this may be true, it should be noted that high energy events can result in an initial period of erosion that increases the suspended sediment concentration (rising limb) followed by a period of deposition as flows decline (falling limb). Please revise the text accordingly. -For contaminants such as 2,3,7,8-TCDD and PCBs, deposition of cleaner material is likely the primary recovery mechanism. If it is assumed that deposition has occurred, one of the key factors that will inhibit natural recovery is episodic erosion of this newly deposited material. Please revise this paragraph to discuss the importance of episodic erosion events and potential limitation of natural recovery within the system. -Delete the reference to "wave-induced" water level fluctuations, as offshore wave-induced fluctuations are not expected to have a significant impact on deposition and erosion. -Clarify whether the last sentence is intended to mean that areas subject to infilling under low energy conditions will retain the deposited sediments under higher energy periods, potentially resulting in net recovery.
278	Page 126, Section 10.1, second full paragraph	Please revise this paragraph to provide a discussion of any studies quantifying contaminant load in porewater seepage and its relative importance.

279	Page 126, Section 10.2, first paragraph	In many cases, the core data cited show that there is only a thin (6-inch) surficial sediment layer overlying much more contaminated sediment at depth, for example: Appendix I, Figure 8a, 205, RM 1.23; 208, RM 1.46; 211B, RM 1.68; 213, RM 1.93; 214, RM 1.93; 217, RM 2.19; 223, RM 2.61; and 238, RM 3.75. The text in this paragraph is technically true, but misleading in terms of the likelihood that these sediments will stay safely buried and that these locations have been long-term depositional. In addition, there are elevated surface sediment concentrations and estimates of incoming suspended sediment concentrations from the upper watershed. As a result, it seems likely that subsurface sediments represent an internal source of sediment contamination that is inhibiting natural recovery of the LPRSA. Please revise this paragraph accordingly. In addition, please provide a table and associated discussion of the depth intervals where the highest contaminant concentrations are found. For example, for the 114 core profiles mentioned, the RI Report should identify the numbers of the cores where the highest 2,3,7,8-TCDD concentrations were found in the 6- to 12 inch depth interval, 12- to 24-inch depth interval, etc.
280	Page 126, Section 10.2, footnote 81	In the evaluated cores (those with a definitive Cs-137 peak), the highest 2,3,7,8-TCDD concentrations are found in buried sediments. However, for many of the sediment cores, mixing processes associated with erosion, deposition and reworking of the sediment prevented identification of a clear Cs-137 peak. These data indicate that reworking of the sediment bed through erosion and subsequent deposition is occurring within the LPRSA. Revise the RI Report to discuss the effect of this reworking on the distribution of contamination and transport of contaminants within the LPRSA.
281	Page 127, Section 10.2, first paragraph after numbered bullets, first two sentences	Please revise this paragraph to provide additional lines of evidence supporting these statements.

282	Page 128, Section 10.2, Figure 10.3	The Draft RI Report states in Section 4 and elsewhere that areas that were depositional from 1949 to 1966 but experienced erosion from 1966 to 2011 exhibit the highest surface concentrations. It is likely that fine-grained sediments that accumulated between 1949 and 1966 but are now erosional represent a significant internal source of sediment contamination within the LPRSA. Data presented in Appendix J (Figure 8) and Section 10 (Figure 10-3) show that while 2,3,7,8-TCCD sediment concentrations are generally highest within sediments classified as silts, they are generally lower in depositional areas. Since fine-grained sediments are typically associated with low energy, depositional areas (which exhibit lower concentrations as shown in Figure 10-3), the fact that concentrations are highest in fine-grained sediments indicates that fine-grained sediments in non-depositional areas may represent significant sources that are not declining and that may serve as an internal contaminant source. The evaluation of natural recovery in the RI Report should recognize the degree to which these fine-grained sediments represent sources of sediment contamination to surrounding areas, thus inhibiting natural recovery within the LPRSA.

283	Page 128, Section 10.2, last paragraph	Bathymetry changes between 1995 and 2010 were used to divide the river into three depositional categories. Analyses conducted by EPA show that erosional and depositional areas vary depending on the timeframe over which bathymetric changes were evaluated. This variability would change the estimated means per group, and would change the effect of erosion depending on the time period under consideration. In addition, this definition of erosion differs from that used for mapping in Appendix J. Please revise the text to explain the reason for this difference in the definitions of erosion used. In addition, the analysis should be repeated using bathymetry at the time of sampling rather than bathymetry changes between 1995 and 2010. In addition, the text asserts that estimating temporal trends based on all data is "incorrect." This statement over-generalizes and is not applicable to estimating changes in risk, which is generally expected to be proportional to overall average concentrations. If the net change in sediment concentrations across erosional and depositional areas is not changing, then the correct conclusion would be that contaminant exposures by broad-ranging receptors are not declining within the LPRSA. The RI Report should evaluate changes in sediment concentration as they relate to estimates of risk reduction. Finally, please revise the last sentence to clarify whether it is intended to mean that eliminating high concentration areas subject to erosion will enhance the average recovery rate, or the recovery rate in both depositional areas and those areas with no bathymetry change.
284	Page 128, Section 10.2, last paragraph, and Figures 10-3 and 10-4	Figures 10-3 and 10-4 depict comparisons between the 1995-1999 datasets and the 2005-2013 datasets. Although the CFDs for the depositional areas show that the contaminant concentrations have declined, there is no appreciable difference between the two datasets for the entire LPRSA and for areas where no change in sediment bed elevation was observed. In addition, in erosional areas, the concentrations in the 2005-2013 datasets are slightly higher than the older datasets. This suggests that the LPRSA as a whole is not recovering, although there are depositional areas where concentrations are declining. The RI Report should note that exposure of higher concentrations in areas subject to erosion inhibits recovery not only in these erosional areas, but also throughout the LPRSA.

285	Page 130, Section 10.4, last sentence (continued on page 131)	While it is acknowledged that PAHs are readily metabolized in biota, comparisons of the concentrations in biota should be included for qualitative analysis. Please revise this section to provide these data.
286	Pages 131-132, Section 10.4, Figure 10-16, and Table 10-2	The comparison of historical to current American eel data apparently compares skinned fillets (historical) to skin-off fillets (present). Based on the original datasets, it seems that no conversion factor was used to convert these data before plotting and comparing. No conversion is mentioned in the text. Skinned fillets contain more lipids and often more contamination, making this comparison misleading and potentially significantly overstating natural recovery for this organism. Please revise the comparison or revise the text to explicitly state what conversion process was used.
287	Pages 131-132, Section 10.4, and Figure 10-16	Figure 2-11a of the Data Evaluation Report No. 6 presented in Appendix A of the FFS shows that, for eels, lipid-normalizing data results in an increase in body concentrations of 2,3,7,8-TCDD and total PCBs as measured year to year over time. For lipophilic chemicals such as these, lipid-normalized comparisons are more relevant comparisons of tissue trends. This would run counter to the presented narrative of natural recovery for this species. The RI Report should evaluate trends in tissue concentrations for lipophilic chemicals using lipid-normalized data.
288	Pages 131-132, Section 10.4, and Figure 10-16	The location of eel tissue samples is not spatially synoptic for this comparison. Data collected in 2001 were all taken between RM 6 and RM 7, whereas data from 2009 were all collected between RM 1 and RM 5. Furthermore, Figures 4-1a through 4-1m in the Draft RI Report show declines in 2,3,7,8-TCDD moving to lower RMs, with negligible red polygons (>10,000 ng/kg) below RM 4. Current eel data show a trend of decline from RM 10 to 1. This makes the temporal comparison in Figure 10-16 likely to be biased. The RI Report should present the eel tissue results in a manner that takes into account differences in sampling location and discuss the uncertainty in the temporal comparison due to differences in sampling location.

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289	Pages 131-132, Section 10.4, Figure 10-16, and Table 10-2	The calculation of a 56% decline in 2,3,7,8-TCDD in mummichog is influenced by the manner of binning data and three significant outliers detected in 1999. The 1999 outliners were collected just 1 month after the flooding from Tropical Storm Floyd, raising the possibility that sediment contamination can be mobilized by a large storm and made to be bioavailable. The RI Report should evaluate the data with and without the 1999 outliers and discuss the potential impact of Tropical Storm Floyd on contaminant bioavailability.
290	Pages 131-132, Section 10.4, and Figure 10-16	Figure 2-9a of the Data Evaluation Report No. 6 presented in Appendix A of the FFS shows that, for mummichog, lipid-normalizing data results in flat observations of body concentrations of 2,3,7,8-TCDD and significant increases in observed total PCBs from 1999 to present. For lipophilic chemicals such as these, lipid-normalized comparisons are more relevant comparisons of tissue trends. This would run counter to the presented narrative of natural recovery for this species. The RI Report should evaluate trends in tissue concentrations for lipophilic chemicals using lipid-normalized data.
291	Pages 131-132, Section 10.4, Figure 10-16, and Table 10-2	The white perch historical data are based on fillets without skin, while current data are based on fillets with skin. If fillets with skin contain more lipids and contaminants, it is possible that this decline is actually understated. This raises the question of the comparability of historical and contemporary data. For white perch especially, the age of the organism can have a large effect on the degree of bioaccumulation, and this does not appear to have been accounted for in this analysis. The RI Report should evaluate trends in tissue concentrations for lipophilic chemicals using lipid-normalized data to help account for differences in skin-on and skin-off tissue samples. In addition, the evaluation should take into account the age of the organism. Finally, the RI Report should acknowledge the uncertainty associated with any comparison between skin-on and skin-off tissue sample results even if they are lipid-normalized.
292	Pages 131-132, Section 10.4, and Figure 10-16	Figure 2-7b of the Data Evaluation Report No. 6 presented in Appendix A of the FFS shows that, for white perch, lipid contents are lower in post-2005 than pre-2005 samples. While Figure 2-10a of Data Evaluation Report No. 6 does suggest that lipid-normalized concentrations have fallen over time, percent declines in tissue concentrations cannot be estimated visually from that figure. Please recalculate white perch trends on a lipid-normalized basis, as this is more indicative of natural recovery trends than changes in fish lipid contents over time.

293	Pages 131-132, Section 10.4, and Figure 10-16	Figure 2-8a of the Data Evaluation Report No. 6 presented in Appendix A of the FFS shows that, for blue crab, lipid-normalizing data results in increasing observations of body concentrations of 2,3,7,8-TCDD and temporally variable, but probably decreasing, observations of total PCBs from 1999 to present. For lipophilic chemicals such as these, lipid-normalized comparisons are more relevant comparisons of tissue trends. The 2,3,7,8-TCDD results run counter to the presented narrative of natural recovery for this species. The RI Report should evaluate trends in tissue concentrations for lipophilic chemicals using lipid-normalized data.
294	Figure 10-2	Figure 10-2 shows the relationship between deposition rate, the depth of 2,3,7,8-TCDD sediment contamination and the ratio between surface and subsurface sediment concentrations. Please provide an additional figure that depicts surface to subsurface sediment concentration ratios across the LPRSA to help identify areas where MNR may or may not be occurring.
295	Figure 10-16	Please revise Figure 10-16 to depict the number of fish tissue samples that were included in each of the compared datasets. In addition, please revise this figure to report the data on both a total and lipid-normalized basis, even though there may be uncertainty in the percent lipid results. The observed increase in mercury concentrations presented in Figure 10-19 suggests that a reduction in lipid content may be partially responsible for the observed decline, since mercury tends to accumulate in muscle tissue rather than fat tissue.
296	Figures 10-16 through 10-19	Figures 10-16 through 10-19 present temporal reductions in tissue concentrations for a range of species, with the notable exception of carp, one of the most exposed and contaminated organisms and one which is known to be consumed by local populations. Please develop and provide a similar figure for carp that presents both wet weight and lipid-normalized results to further evaluate the potential for natural recovery processes to reduce tissue concentrations within the LPRSA.

No.	General Comments – Section 11
297	This Section should be revised following revision of the previous sections as per comments herein and revisions to associated RI documents (e.g. the BHHRA).
298	Throughout this section, qualitative terms such as “largely stable,” “moderate erosion,” “relatively low

	concentrations," and "moderate contaminant concentrations" are used. Please revise the text to include quantitative examples to provide context to the qualitative terms. It is not clear how "moderate concentrations" compare to risk levels.

No.	Page No.	Specific Comments – Section 11
299	Page 133, Section 11, second paragraph, first sentence	Please revise this paragraph to note that the LPR is a highly modified river system and that sources and transport mechanisms have resulted in a complex distribution of contamination. The interplay between tidal exchange, the salt front, freshwater flows, CSO and stormwater discharges and anthropogenic influences has resulted in a complex pattern of contamination within the LPRSA.
300	Page 133, Section 11.1, second paragraph, first sentence	Please define the term "upper estuary."
301	Page 134, Section 11.1, first full paragraph	Please revise this paragraph as follows: -The fourth sentence states that "the LPR has been an effective sediment and contaminant trap for more than 60 years." Please revise this paragraph to describe the degree to which these trapped contaminants represent an ongoing source of contamination within the LPRSA and how this "trapping" generally varies by reach and/or river feature. -The Draft RI Report has not shown conclusively that the sediments (and contaminants) that have accumulated in the LPR are "largely stable, even under extreme flow events," as stated in the seventh sentence. Please remove this conclusion from the text. -Clarify the meanings of "moderate erosion" and "high flow" in the last sentence.

302	Page 134, Section 11.1, last paragraph	Please revise this paragraph as follows: -Note that the municipalities within the LPRSA have published master plans calling for the expansion and improvement of parks and open space along the river, which may lead to increased public access and habitat improvements, particularly upstream of RM 3.6. -Revise the third sentence to acknowledge that, as stated in EPA's comments on the draft BERA, the low abundance and diversity of the benthic community is likely influenced by sediment contamination. EPA recognizes the influence of other, non-chemical stressors, but chemical contamination must be considered a likely major contributor to these findings. -In the last sentence, acknowledge that higher concentrations of contaminants in deeper sediments support the need to consider those deeper sediments as a future exposure medium (post-remediation). Furthermore, the relationship between contaminant concentrations in the top 2 cm of the bed and deeper sediments (i.e., 15 cm) is not supported by data. The basis for this statement should be provided. The evaluation of the relative concentration on resuspending particles (the fluff layer) versus the top 15 cm of the bed (Section 6.2.4) should be repeated using concentrations in the sediment bed from the channel, where higher shear stresses occur and where more of the intra-tidal re-suspension occurs, compared to the shoals. -The last two sentences should be revised to reflect EPA's position that the upper 2 cm do not represent the complete exposure area for benthic invertebrates (BMI). As stated in several previous comments, BMI do use deeper sediments within the study area, and BMI abundance in deeper sediments may be due to contaminant avoidance.
303	Page 135, Section 11.2, first paragraph, fifth sentence	Please clarify what is meant by "moderate scour" and "specific locations."

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304	Page 135, Section 11.2, second paragraph	Please revise this paragraph as follows: -The first sentence in this paragraph has not been proven. Areas with higher density data collection activities, such as the RM 10.9 removal area, show significant variability in contaminant concentrations. It is agreed that, in general, contaminant levels are highest in nearshore, fine-gained sediments upstream of RM 8. However, given the lower data density across much of the LPRSA, it is not clear that "pockets" of contamination are small or that they have all been identified. Redistribution of contamination through erosion and deposition has likely resulted in a smear of contamination with small-scale variability as evidenced by the distribution of contamination within the RM 10.9 removal area. Please remove this statement from the text or thoroughly revise it to acknowledge the degree of uncertainty. -Revise the second sentence to read: "The highest concentrations in surface sediments primarily occur where sediments laid down in the 1950s and 1960s are exposed or redistributed due to erosion or lack of burial since that era."
305	Page 136, Section 11.2, first paragraph (continued from page 135)	Please revise this paragraph as follows: -Revise the first complete sentence to state that recovery is inhibited by erosion that results in exposure of higher concentrations of contaminants at the sediment surface. -Revise the second complete sentence to discuss the proven ongoing PAH sources to the LPR. Alternatively, revise the statement to read: "Lower rates of recovery for contaminants such as HMW PAHs and LMW PAHs may be due to ongoing sources." -Statements about apparent recovery are incomplete or do not account for other possibilities. For example, there is no recognition of the pattern seen in mercury contamination of biological tissues (increasing, decreasing or little change, depending on species). Expand the discussion in this paragraph to include other possibilities.
306	Page 136, Section 11.2, first full paragraph, first sentence	Please revise this sentence for clarity. It is unclear how can sources outside the LPR can "dictate recovery." There are many conditions within the LPRSA that could influence recovery. Please delete the phrase "dictate recovery in the absence of remediation and" from this sentence.

307	Page 136, Section 11.3, second paragraph, fourth sentence	Please delete this sentence, which refers to an alternate human health risk assessment that was submitted with the CPG's comments on the FFS. The referenced document has not been approved by EPA. Please modify the following text that begins "It should be noted that, consistent with USEPA guidance....of the computed risk." Please replace with "The risk assessment was performed consistent with EPA guidance where assumptions were made to ensure public health is protected. There are potential overestimates and underestimates in the calculated risks and non-cancer health hazards."
308	Page 137, Section 11.3, first paragraph	Please revise this summary to address the numerous relevant comments on previous sections and the draft BERA (e.g., to include a more thorough evaluation of all data). The lack of a representative receptor within the LPRSA is unimportant from two perspectives. First, otter (or mink) represent carnivorous/piscivorous mammals, which can include species that are present, such as raccoon. Second, the conclusion that there is low risk because a receptor is not present is inappropriate, and fails to consider future (post-remediation) use of the LPR. Please revise this text to provide a better understanding of use of representative receptors as surrogates for non-selected species.
309	Pages 136 and 137, Section 11.3, last two paragraphs of the section.	The first paragraph includes biased conclusions based on limited data evaluation. If contaminant concentrations in carp tissues were included in the evaluations as recommended, risks to several piscivorous receptors would be substantially increased. The second paragraph is also biased and requires revision to reflect the EPA's position on the upper 2 cm serving as the primary exposure area for BMI. Further, as written the text ignores potential (and likely) avoidance of deeper sediments by BMI because of chemical contamination. Please refer to the numerous previous comments regarding exposures in the upper 2 centimeters.

310	Page 137, Section 11.4, second paragraph	Mapping of contaminant distribution is identified as a key uncertainty in the RI. The mapping presented in the RI uses interpolation between measured locations using assumptions about the evolution of the contaminated sediment deposits and the nature of the spatial correlation with a goal of approximately identifying areas of the river where concentrations are high and recovery is not occurring, as well as areas where recovery is ongoing. As a result of low sampling density within the LPR, the uncertainty in contaminant distribution is large and must be taken into account during the development of remedial strategies for the LPRSA. Please revise the text to acknowledge the high uncertainty in the interpolations used to describe the distribution of the contamination in the RI and take this uncertainty into account going forward as remedial strategies are developed in the FS. Updates to this section need to reflect the information presented in EPA's white paper "*Review of the Cooperating Parties Group Approach to Mapping Contaminants of Potential Concern*" and the ongoing collaborative CoPC mapping work initiated in December 2015.
311	Page 138; Section 11.4; first complete paragraph on this page.	Revise this entire summary paragraph of the risk assessments to address EPA comments on the draft risk assessments and the RI. Remove the discussion of, and reference to, the alternative BHHRA (CPG 2014). As written, the first few sentences of this paragraph are not accurate. The draft BERA as currently written is NOT biased towards the worst case condition, and instead consistently minimizes risk, provides incomplete evaluation of existing data, and is overly biased in concluding little or no significant risk. The HHRA represents an exposure scenario within the realistic range of exposures at the LPRSA, since the goal of the Superfund program is to protect against high-end, not average, exposures i.e., 90th percentile or above. The text should be revised.
312	Pages 138-139, Section 11.5	Please remove Section 11.5 from the RI Report and consider uncertainty in the extent of contamination more fully in the FS. It is expected that further characterization in conjunction with an adaptive management strategy will be required.

No.	General Comments – Section 12
313	In reviewing the references listed in Section 12, only the citations in text submitted with Section 12 (i.e., Sections 1 through 6 and Sections 8 through 11) were checked. Section 7 was submitted separately with a separate list of references, which was checked against the Section 7 text. Similarly, references and text in Appendices A, F, G, H, I, and J were reviewed as standalone documents. Based on this review, Section 12,

	References, contains a number of documents that are not cited in the text. These documents include: -Adams, D.H. and R. Paperno, 2012. -AECOM, 2013. -Aqua Survey, Inc., 2006. -Battelle, 2005. -Belton, T.J., R. Hazen, B.E. Ruppel, K. Lockwood, R. Mueller, E. Stevenson, and J.J. Post, 1985. -Burger, J., 2002. Consumption patterns and why people fish. Environ. Res. A. 90:125-135. -CARP (Contaminant Assessment and Reduction Project), 2007. -Horwitz, R., J. Ashley, P. Overbeck, D. Velinsky, and L. Zadoudeh, 2006. -Horwitz, R., J. Ashley, P. Overbeck, and D. Velinsky, 2005. -HQI (HydroQual, Inc.), 2006. -HQI, 2007. -Lillienfeld, D.E. and M.A. Gallo, 1989. -Maa, J.P.Y., L. Sanford, and J.P. Halka, 1988. -McIntyre, J.K. and D.A. Beauchamp, 2007. -NJDEP, 1990. -NJDEP, 1993. -NJDEP, 2004. -PREmis (Passaic River Estuary Management Information System), 2006. -Sea Engineering, HDR|HydroQual, 2011. -Stehlik, L., S. Wilk, R. Pikanowski, D. McMillan, and E. MacHaffie, 2005. -TAMS and Malcolm Pirnie, Inc., 2005. -The Louis Berger Group (LBG), 2012. -TSI, 2003. -TSI, 2004. -USACE (U.S. Army Corps of Engineers), 1987.

	USACE, 2007. -USACE, 2014a. -USACE, 2014b. -USEPA (U.S. Environmental Protection Agency), 1988. -USGS, 2014. -Van Kessel, T., J. Vanlede, and J. Kok, 2011. -Windward, 2010d. In some cases, it is likely that the reference should have been cited in the text (for example: CARP [Contaminant Assessment and Reduction Project], 2007). In other cases it is possible that the date of the reference in the citation or in Section 12 is incorrect. Please correct the errors in both the text and Section 12. Please remove any references from Section 12 that are not cited in the text.

No.	Page No.	Specific Comments – Section 12
314	Page 14, Section 2.4.3.2, second full paragraph, third sentence	Please revise "(Addendum A of the RM 10.9 Characterization Program)" to reference "(AECOM 2012a)."
315	Page 20, Section 3, last paragraph, fourth sentence	There is no reference in Section 12 for "(Germano 2005)." Please add this reference to Section 12.
316	Page 24, Section 3.3, first full paragraph, last sentence, and footnote 12	There is no reference in Section 12 for "(SEI and HQI 2011)." Please add this reference to Section 12.

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317	Page 27, Section 3.4.2, first full paragraph, first sentence	There is no reference in Section 12 for "(Maa et al. 1998)." There is a reference for "Maa et al. 1988" in Section 12. Please correct the text citation, Section 12, or both accordingly. Similarly, there is no reference in Section 12 for "(Van Kessel et al. 2007)." There is a reference for "Van Kessel et al. 2011" in Section 12. Please correct the text citation, Section 12, or both accordingly.
318	Page 33, Section 3.6.2, first paragraph	There is no reference in Section 12 for "(Dalrymple and Choi 2006)," which is cited twice in the same paragraph in Section 3.6.2. There is a reference for "Dalrymple and Choi 2007" in Section 12. Please correct the text citation, Section 12, or both accordingly.
319	Page 81, footnote 62	There is no reference in Section 12 for "(SEI and HQI 2011)." Please add this reference to Section 12.
320	Page 103, Section 8.4.3, first full paragraph, first sentence	There is no reference in Section 12 for "(Viscusi et al. 1997)." Please add this reference to Section 12.
321	Page 118, footnote 79	There is no reference in Section 12 for "(Sandheinrich and Wiener 2011)." Please add this reference to Section 12.
322	Page 134, Section 11.1, first paragraph (continued from page 133), first full sentence	There is no reference in Section 12 for "(SEI and HQI 2011)." Please add this reference to Section 12.
323	Page 138, footnote 92	Please edit the reference, "(AECOM 2014)," to specify which 2014 document is being referenced.

No.	**General Comments – Appendix A**

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324	Please include information in Appendix A from the latest controlling depth report, dated April 30, 2014. This report can be found at: http://www.nan.usace.army.mil/Portals/37/docs/civilworks/ConDep/CDR_2014/Apr14/Newark%20Bay%20(Passaic%20River)%20CDR%202013.pdf
325	Section 1 of Appendix A is titled "Federally Authorized Navigational Channels and Dredging History." The appendix includes information about the navigational channel, but nothing about the dredging history. The USACE 2010 report referenced in the appendix documents this information. Please include information about the dredging history in the appendix.

No.	General Comments – Appendix D
326	Comments on Appendix D were submitted previously as comments on the BERA and HHRA documents.

No.	General Comments – Appendix E
327	The datasets listed in Appendix E are not consistent with the datasets listed for use in the 2009 Problem Formulation Document. It is understood that the PFD lists only those datasets available prior to 2009. Please revise Appendix E to include a listing of all datasets cited in the PFD, Draft RI Report, Draft BERA Report and Draft BHHRA Report, indicating which dataset is used in preparation of each of these documents. Reasoning should be provided for any dataset listed in the PFD which was not used in the Draft RI Report, Draft BERA Report or Draft BHHRA Report. The post-2009 datasets should also be included in the Appendix E table, indicating which were used in the Draft RI Report, Draft BERA Report and Draft BHHRA Report. The list of datasets should also tie back to those cited in the Draft RI Report, Section 2, Tables 2-1 through 2-5 (i.e., datasets listed in Tables 2-1 through 2-5 also need to be listed in the Appendix E table).

No.	General Comments – Appendix F
328	EPA has provided extensive comments on the BERA technical approach and data analysis and the material presented in Sections 5 and Section 9 of the Draft RI Report. Adequately addressing many of these comments will necessitate significant revisions to the figures and table compiled in Appendix F. EPA has deferred review of the supporting material in this appendix until the anticipated revisions are made.

No.	General Comments – Appendix G
329	Discussion of the distribution coefficient, K_D, unnecessarily complicates the description of partitioning. The discussion would be improved if it were limited to the partitioning in the CFT model, which includes freely dissolved, POC-sorbed, and DOC-complexed phases. Figure 1 adds to the confusion by showing partitioning in terms of K_D and r, rather than K_{OC} and r_{OC} as represented in the CFT model. K_D values are tabulated in Tables 3a, 3b, 4a, and 4b; however, there is no discussion of them, nor explanation of their significance. Simplify the appendix by eliminating references to K_D and making Figure 1 consistent with the partitioning included in the CFT model.
330	Comment No. 28 on the *High Volume Chemical Water Column Monitoring Sampling Program Characterization Summary for the LPRSA, Dated February 2014* was to be addressed in this appendix to the Draft RI Report. A response to this comment cannot be identified in Appendix G. Please review and address the comment listed below:

Page Number From HV-CWCM Summary Report	Comment	CPG Response to EPA Comment
Page 3-3, Section 3.3.5 and Table 3-1	The sorption coefficient is dependent on the particulate phase concentration, which represents a converted value from the average suspended solids concentration. Please review the suspended solids concentration data for Newark Bay N10-CE05-TNNE; according to Table 3-1, the suspended solids concentration had a high standard deviation: 16.9 +/- 10.43 mg/L. Please confirm that an outlier datum is not skewing the average concentration.	The suspended solids data from N10-CE05-TNNE will be examined. Potential impacts to the sorption coefficient will be provided in the future deliverable (refer to Comment #6).

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No.	Page No.	Specific Comments – Appendix G
331	Appendix G, Page 1, Section 1, first paragraph, first sentence	Tables 1, 3, and 4 present information regarding two HV sampling events. However, the referenced sentence provides three months of sampling dates. As appropriate, please provide clarification regarding whether the December 2012 and January 2013 sampling dates are part of the same sampling event, or revise the tables to provide the information for the third missing sampling event.
332	Appendix G, Section 1	The Report states: "The sampling results were used to calculate the partitioning of polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzo-furans (PCDF) and polychlorinated biphenyls (PCBs) between particulate and dissolved phases as well as to support the LPR contaminant fate and transport (CFT) model development (AECOM 2012, 20140)." Please provide estimates of the chemical concentrations associated with the suspended particulate phase to support estimates presented in evaluation of MNR as discussed in Section 6 of this report.
333	Appendix G, Page 1, Section 2, item number 4	Please discuss the results from the two "breakthrough" samples and identify the stations.
334	Appendix G, Page 1, Section 2, second paragraph, second sentence	Please provide clarification regarding how flow rates were calculated to ensure sufficient sorption time was allowed and discuss any verification procedures taken to ensure that the time was sufficient to allow for complete sorption of the dissolved chemicals to the polyurethane foam (PUF) filters.
335	Appendix G, Page 1, Section 2, second paragraph, third sentence	Please clarify whether the volumes listed are the volumes sampled through the apparatus in bullets 1 through 3, and not just the PUF.
336	Appendix G, Page 2, Section 3, first paragraph, third sentence	Please replace the word "particulate" in this sentence with "POC."

337	Appendix G, Page 3, equation number 3, second part	Please remove the extra parenthesis from the units.
338	Appendix G, Page 3, footnote 1	Please clarify what is meant by "the actual mass value of the chemical."
339	Appendix G, Page 4, text introducing equation number 6	Please add a note to indicate that a porosity of 1.0 is assumed.
340	Appendix G, Page 5, equation number 11	Please delete "C_d =." Total dissolved is not equal to freely dissolved.
341	Appendix G, Tables 5a and 5b	Please clarify how average log-partition coefficients were calculated (i.e., log of average of individual values, or average of individual log-values?).In addition to the summary of results presented in Table 5, please add a comparison to K_{ow} and the partition coefficient results from Ghosh (2011) conducted as part of the 2008 LRC program.

No.	General Comments – Appendix H
342	The importance of estuarine circulation and tidal asymmetry on contaminant transport is stressed in Section 3; however, the CWCM data presentation in Appendix H does not allow longitudinal and vertical patterns to be evaluated directly. Of the five sets of figures, only the first set separately distinguishes data from surface and bottom samples, but these are presented as cumulative frequency distributions, and therefore it is not possible to identify the surface sample paired with a particular bottom sample. After showing that there are differences in the cumulative frequency distributions of surface and bottom data, the surface and bottom data are combined in plots through the remainder of the appendix. With the exception of box-and-whisker plots of concentration versus flow or tidal range, the remainder of the data presentations are cumulative frequency distributions, which eliminates the opportunity to understand relationships among samples collected during the same condition, such as low flow slack versus high flow slack, or low flow slack versus low flow mid-tide conditions. Conclusions are drawn from cumulative frequency distributions of salinity and contaminant concentrations, but it is not clear how they relate since the paired values can't be identified from the two frequency distributions. At a minimum, the interpretation of the relationships between flow, tidal range, salinity and contaminant concentration should be supported with data from individual events,

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	distinguishing surface and bottom data, data from different tidal conditions, and data from different locations. It is not possible to evaluate whether the contaminant data are consistent with the transport processes described in section 3, because the contaminant data are aggregated over time and over space to look for relationships with river flow and tidal range. The CWCM data should be used to more fully test for consistency with the transport processes described in section 3.

No.	Page No.	Specific Comments – Appendix H
343	Appendix H, page 3, Section 3, general	Please revise the discussion of the influence of flow and tidal forcing to mention dilution as a factor affecting concentration differences.
344	Appendix H, Figures 4a-4e	Please add a legend to the box-and-whisker plots.
345	Appendix H, Figure 5h	It appears that each data point is plotted twice. Please review the information presented on this figure and revise as needed.

No.	General Comments – Appendix I
346	The first two sentences of Section 1.2 of Appendix I state: "To perform analyses involving peak concentrations, the first step was to identify suitable cores. Only cores where the concentration peak was clearly identified were considered suitable for use in peak concentration analyses." While it is true that a clear peak is necessary to estimate deposition rates, the lack of a clear 1963 peak is also informative, indicating a sediment bed that undergoes regular erosion, deposition, and mixing. In addition, some cores are reported as not having clear peaks when, in fact, a clear peak can be identified (e.g., Core 204). Finally, other cores may be used to identify the first appearance of Cesium 137 (e.g., Cores 205, 210, and 211B) even though there is not a clear 1963 peak. Core 11B-0349 shows a clear 1953 first appearance and a double Cs-137 peak between approximately 25 and 40 cm. Core HRC-02H shows a clear 1953 first appearance and a 1963 double peak maximum at approximately 200 cm. Overall, there are many cores with clearly defined 1963 peaks and indications of the first significant appearance of Cesium 137 corresponding to 1953. These data indicate that there is a wide range of sediment deposition rates throughout the LPRSA. These data may be used to evaluate the influence of dredging activities that took place after 1963 on estimated deposition rates to determine the influence of dredging activities on deposition rates.

	Figures 2a through 2w show that the peak sediment concentrations are often associated with sediments deposited between 1960 and 1980. However, it should be recognized that the evaluation focused on cores with clear peaks. The RI Report should further evaluate the distribution of surface and subsurface sediment contamination with respect to the distribution of sediment cores without clear 1963 peaks to understand the influence of sediment bed mixing on the distribution of sediment contamination within the LPRSA.
347	Since the purpose of this evaluation is to demonstrate the relationship between sediment cesium 137 profiles and contaminants by depth, using the same units for depth will make the information easier to interpret. The depth intervals displayed on all figures depicting depth as a relationship variable should be expressed in the same units (either centimeters or feet).

No.	Page No.	Specific Comments – Appendix I
348	Appendix I, page 1, Section 1.2 last line on page	Please explain the rationale for requiring a surface segment for identification of a peak concentration.
349	Appendix I, page 1, Section 1.2	A criterion needs to be established for a minimum Cs-137 peak concentration to be considered as a marker for sediment deposition date.
350	Appendix I, page 2, Section 1.2, criterion “c”	Please explain whether criterion “c” is different from criterion “a,” or delete if redundant.
351	Appendix I, page 2, Section 1.2, first paragraph following criteria	Please correct references to the criteria (e.g., the length criterion is “d,” not “b”).
352	Appendix I, page 2, Section 1.2, second paragraph following criteria	The correct reference to criteria throughout this paragraph is “f” (e.g., “The three additional requirements (f)...” and “The first criterion (f.i) selected for...”). Please correct the references as required.
353	Appendix I, page 3, Section 1.3, second paragraph	Criteria “c” and “d” are identical to “a” and “b.” Please delete the repeated criteria.

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354	Appendix I, page 4, Section 1.3, last line, and continuing onto page4	The correct reference to criteria throughout this paragraph is "e" (e.g., "The three additional requirements (e)..." and "The first criterion (e.i) selected for…"). Please correct the references as required.
355	Appendix I, page 5, Section 1.4, second paragraph	Please clarify whether the specific gravity used to calculate dry bulk density is from data or an assumed value.
356	Appendix I, page 5, Section 1.4.1, second paragraph	The document states that "Within the LPR, the interpolation groupings developed for surface concentration mapping were used (Figure 13a to 13m); see Section 1.2 of Appendix J." The method of interpolation used in Appendix J is currently under review. Therefore, any conclusion drawn based upon this interpolation method may need to be revised once the EPA and CPG agree on an appropriate method to use for evaluating the LPRSA.

No.	General Comments – Appendix J
357	Refer to the White Paper for review of Appendix J, Mapping of Contaminant Concentrations in the Lower Passaic River Surface Sediments.

No.	Page No.	Specific Comments – Appendix J
358	Appendix J, page 1, Section 1.1,first Paragraph, second sentence	The "2010 dataset" referenced in this section should be forwarded as a separate attachment and included with either Appendix E or as an attachment to Appendix J. This would allow for a more thorough review of the data used to prepare Figures 4-1.
359	Appendix J, page 1, Section 1.1,first paragraph, third sentence	The report states "Only sediment grabs and cores with start depths of zero and end depths of 0.4 to 0.5 feet were used to represent the surface sediments." Please explain the reasoning for bounding the end depth between 0.4 and 0.5. This range cuts out some sediment cores; for example, the sample core G000005 from the USEPA/MPI High Resolution program ranges from 0 to 18 cm (0.59 foot). It also excludes the other high resolution cores, including the CPG 2008 high resolution cores with results for continuous segments from 0 to 0.3 foot. Also refer to **Comment No. 360a** below regarding the exclusion of high resolution cores.

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360	Appendix J, page 1, Section 1.1, first paragraph and Table 1	A review and comparison of the data counts presented in Table 1 for 2,3,7,8-TCDD and mercury results against the sample selection criteria listed in **Comment No. 359** yielded the following questions: a) Please explain why the high resolution cores with results for segments that cover the range of 0 to approximately 0.4 to 0.5 feet collected during the 2008 USEPA/MPI High Resolution program are not included in the "2010 dataset." Cores G0000014 and G0000012, from the USEPA/MPI study, have results for segments that cover a continuous range from 0 to 15 cm and 0 to 12 cm, respectively. There are eight cores from the 2008 LRCP that have results for segments that cover a continuous range from 0 to 0.3 foot. b) Concerning the CPG 2008 Low Resolution Coring Program (LRCP), the Table 1 data counts for 2,3,7,8-TCDD and mercury are listed as 90 and 91, respectively. There are six additional samples in this dataset that are located at RM 17.43. Please explain why results from this area are not included in Table 1, since the mapping range is defined as being from RM 0 to RM 17.4 and not RM 17.40. Is RM 17.43 above Dundee Dam? c) Concerning the 2009 Benthic Program Surface Sediment Sampling, the Table 1 data counts for 2,3,7,8-TCDD and mercury are listed as 110 for each. Six of these results are identified in the Passaic River database as being from the Unnamed Creek. Please review sample locations for this dataset and confirm that all the samples listed in the table are from the Passaic River.