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Region 2, Hudson River Field Office  
187 Wolf Road, Suite 303  
Albany, NY 12205

Subject: Comments on the Remedial Action Completion Report, Hudson River PCBs Superfund Site, Revised December 2016

Dear Mr. Klawinski:

Summary: The National Oceanic and Atmospheric Administration (NOAA), as one of three Hudson River Natural Resource Trustees, recommends that before the Remedial Action Completion Report (RACR) is approved and finalized that EPA demonstrate that the remedial action is protective of human health and the environment, the habitat has been fully reconstructed and that additional documentation has been incorporated into the document. These actions will help to maximize recovery of NOAA trust resources and provide transparent and detailed documentation of remedial actions which will be useful for our damage assessment. Under federal Superfund law, the General Electric Company (GE) is responsible for both the remediation -- cleanup -- of the polychlorinated biphenyl (PCB) contamination, and the restoration of the natural resources injured by PCBs. The State and Federal Hudson River Natural Resource Trustees are conducting a natural resource damage assessment (NRDA) and will seek to recover damages to restore the natural resources of the Hudson River on behalf of the public.

Concerns re the timely achievement of the Remedial Action Objectives (RAOs): According to EPA guidance (EPA 2017), “Source remediation actions normally remain in the RA phase until their RAOs are achieved”…. Where “source material is defined as material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, to surface water, to air, or acts as a source for direct exposure. Examples include soil vapor extraction, in situ thermal treatment, and dredging of contaminated sediments.”

Recent analyses indicate that fish in the Lower Hudson River won’t achieve EPA’s protective RAO goals until decades later than predicted in the 2002 Record of Decision (ROD). This is because data collected after the 2002 ROD demonstrate that pre-remedial sediment concentrations in the Upper...
River were 2-3 times higher and decay rates were greatly overestimated relative to values generated by models used to support remedy selection. These result in 3-5 times higher estimates of post-remedy PCB sediment concentrations and Lower River fish that will remain unacceptably contaminated for decades longer. Upper river fish will also take much longer to achieve protective goals of the ROD.

Concerns re potential underestimates of PCB concentrations: More recent paired PCB congener (Method 1668) and PCB Aroclor (Method 8082) analyses on sediment samples (Anchor QEA 2017) demonstrated that the Aroclor method underestimated Total and Tri+ PCBs\(^1\) by about 2.4 times based on the geometric mean and about 2.7 times based on the arithmetic mean. This underestimation of Total and Tri+ PCBs in sediment based on recent EPA Method 1668 split-sample analysis is not addressed in the RACR. Underestimation of PCBs can result in incorrect estimates of PCB surface concentrations and mass per unit area, which could potentially lead to unremediated areas actually meeting the trigger for cleanup set forth in the 2002 ROD. Further evaluation is recommended, prior to finalizing the RACR, to assess whether the Sediment Sampling and Analysis Program (SSAP) analyses under-reported PCBs and if so what steps should be taken to address this potential low bias.

NOAA requests that EPA delay approval of the RACR to allow GE to fix the deficiencies of the report and for EPA to conduct a thorough review of new information. This new information includes more than 1600 sediment samples (top 2 inch) collected by the New York Department of Environmental Conservation (NYSDEC 2017) as well as fish samples, analyzed by Method 1668 to assess the nature and extent of contamination left behind in the Upper Hudson River following six years of dredging. These steps are necessary to ensure that the Hudson River remedy protects human health and the environment consistent with EPA’s Comprehensive Five Year Review Guidance (EPA 2001).

Concerns re lack of full documentation in the RACR: NOAA’s comments on the RACR also reflect our overarching concern that the document does not fully report and document technical components of the remedial action that will be lost if they are not included in the final document (see examples in detailed comments below).

Approving the RACR has potential implications for the Hudson River Natural Resource Damages Assessment (NRDA). GE’s PCBs have caused injury to the Hudson River. Injuries to the public’s natural resources extend for over 200 miles (from the Hudson Falls plant site to the Battery in New York City and beyond), have occurred for decades, and will continue for decades after the cleanup is completed if the remaining PCBs are not removed from the river. The Trustees seek to recover damages to restore the natural resources of the Hudson River injured by PCBs. Feasibility, cost, and efficacy are among the considerations of the Trustees in evaluating and selecting restoration alternatives. Approving the RACR could impede the Trustees' injury assessment because of inadequate and incomplete documentation and it could limit restoration options because of the amount and concentration of PCB contamination that remains bioavailable in the river.

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\(^1\) Tri+ PCBs or trichlorinated biphenyl PCBs represent the sum of the trichloro- through decachlorobiphenyl homologue groups.
Specific Comments

Section 1

Page 1-4, Top, “Further, GE considers the inspections held on November 10 and 30, 2016 (with the follow-up on December 16, 2016) as satisfying the RA Completion Pre-Final Inspection requirement of Paragraph 57.a. No additional inspections have been required.”: The 2005 Remedial Action Consent Decree states in Section XIV Para 57a:

“Within 15 days after Settling Defendant makes the preliminary determination that the Remedial Action is complete, Settling Defendant shall schedule with EPA and the State an RA Completion Pre-Final Inspection. The RA Completion Pre-Final Inspection shall consist of a walk-through inspection of all on-land properties at which sediment processing/transfer operations, habitat restoration, and other remedial activities were conducted, and an on-river inspection of the dredge areas. The purpose of the inspection is to help determine whether the Remedial Action has been completed in accordance with this Consent Decree.”

According to the text above, inspections were to cover land-based and dredge areas and as such should have included inspections of habitat reconstruction. But the focus of the inspections appears to support properties only. There is no documentation that remediated areas were inspected by NYSDEC, NYS Canal Corp or EPA and how many of these agencies agreed that backfilling, capping, and habitat reconstruction were complete, and that follow-up actions were not required. NYSDEC’s letter of November 22, 2017 identifies deficiencies in habitat reconstruction and confirms that the state does not agree that habitat reconstruction is complete.

Page 1-5 to Page 1-6: “The ROD established criteria to govern the removal of sediments. Those criteria were based on the mass per unit area (MPA) of PCBs with three or more chlorine atoms (Tri+ PCBs). They targeted removal of sediments with an MPA of 3 grams per square meter (g/m2) or greater in River Section 1 and 10 g/m2 or greater in River Section 2, and removal of selected sediments with high PCB concentrations and erosion potential in certain Hot Spots identified by NYSDEC (Hot Spots 36, 27, and the southern portion of 39) in River Section 3. In addition, EPA’s July 2004 decision in a dispute resolution proceeding relating to GE’s initial Phase 1 Dredge Area Delineation Report established additional removal criteria based on the concentrations of Tri+ PCBs in surface sediments (EPA 2004a).” This wording suggests that the ROD did not specify delineating sediments other than on mass, which is incorrect. NOAA recommends that the document be revised to more accurately reflect the record. The ROD (pp 54-55) states:

“For the active technologies (capping and removal), areas of sediment targeted for remediation were selected based on the potential for those areas to contribute PCBs to the water column and fish through the food chain. The delineation of the target areas considered a number of factors, primarily the inventory of PCBs in the sediment, but also surface sediment concentrations, sediment texture, bathymetry and depth at which the PCB contamination is found.”
Further, the July 22, 2004 Dispute Resolution, Attachment 2 (p. 2) states, “The Administrative Record contains numerous statements in key EPA documents identifying the Agency’s use of PCB concentrations in surface sediment as a separate basis for sediment removal that has its own numerical criteria.” The attachment also provides numerous examples.

Page 1-6: First Full Para: Cite directly from the ROD pp ii – iv and reiterated on pp 94-96 rather than paraphrasing components of the remedy.

Page 1-6, Last Para to Page 1-9: Cite directly from EPA Engineering Performance Standards (EPS) for Phase 1 and Phase 2 related to residual, resuspension, productivity, and quality of life standards rather than paraphrasing the Standards. Similarly the substantive water quality certification requirements should be quoted.

Page 1-10, Section 1.4: NOAA recommends that this section specify the number of samples or records collected by media per sampling program, e.g., SSAP, SEDC, BMP. This can be presented in tabular form.

Page 1-11, Second Bullet, Biological Assessment (BA): NOAA (2012) announced the designation of five distinct population segments (DPS) of Atlantic sturgeon as federally protected under the Endangered Species Act on February 6, 2012 with the final rule going into effect on April 6, 2012. Atlantic sturgeon in the Hudson River fall within the New York Bight DPS segment and were listed as a federally endangered species. The biological assessment referenced in the RACR pre-dates that determination but components of the remediation occurred post-determination. The Section 7 biological consultation for Atlantic sturgeon should also be discussed and all BA’s should be included in an appendix to the RACR.

Page 1-13 to Page 1-14, Table 1-1: Phase 1 remedial design and remedial action submittals should be added to Table 1-1 or the information should be provided in a separate table. Please provide the specific titles for each of the addenda to the Phase 2 Final Design Reports (FDR) and Remedial Action Work Plans (RAWP) under the list of annual submittals and include the full citation in the Section 10 References.

Page 1-13, Table 1-1, 2011 and 2012 Submittals; and Page 10-2, Section 10: Please check release dates of the FDRs. Based on our records it appears that the Phase 2 FDR for 2011 should be cited as Revised April 2011 and the Phase 2 FDR for 2012 as Revised May 2012. Also please list all the addenda to design reports and any memoranda reflecting modifications to the design that are not otherwise presented, in Table 1-1 and insert those citations in the Reference Section 10.

Page 1-14: The description of the Remedial Action Monitoring (RAM) Quality Assurance Project Plans (QAPP) appears incomplete as updates, such as to the Standard Operating Procedures (SOPs) were not listed. Please revise and compile all RAM QAPP documents in a table similar to Table 1-1 and include all final documents and revisions/addenda/memoranda in an appendix to the report.

Page 2.1, Section 2.1.1, ‘For Tri+ MPA, the criteria targeted removal of sediments in any area that had an MPA at or above 3 g/m2 in River Section 1 or 10 g/m2 in River Section 2, as well as
sediments with high PCB concentrations and erosion potential in certain Hot Spots in River Section 3.” EPA makes clear in Final Decision Regarding General Electric Company’s Disputes that for hot spot remediation the following criteria were established: “1. RemEDIATE sediment with a MPA greater than 10 g/m2; 2. RemEDIATE “surface” sediment concentrations greater than 30 mg/kg…” (FS at p. 3-43, emphasis added).” The RACR should be clear about how the “hot spots” were defined for the purposes of remedy implementation.

Page 2.1, Section 2.1.1, “…this process was designed to delineate areas of sufficient size exceeding the criteria (and considering the ancillary information) to warrant removal from an engineering perspective, not to identify or designate for removal every discrete location exceeding the criteria.” The RACR should specify the decision from EPA’s July 2014 Final Dispute Decision. EPA stated that “GE shall apply the 50,000 square foot criterion consistent with the ROD, as the company was directed to do in EPA’s March 25, 2004 comments. The 50,000 square foot criterion shall be applied in limited instances where there would otherwise need to be a mobilization of equipment to reach an isolated area. An area that qualifies for exclusion on the basis of the 50,000 square foot criterion shall be identified only after a local interpolation via IDW\(^2\) or some other spatial interpolator (or kriging) has been applied. Contaminated areas within reasonable proximity of one another do not constitute isolated areas. The ROD does not identify any minimum surface area for delineation of dredge areas that are not isolated. GE’s dredge area delineation reports shall identify and provide technical justification for each area that it proposes to be excluded on the basis of the 50,000 square foot criterion.”

Page 2-2, Para 2, “There are 60 CUs in River Section 2…” The sentence should read “There are 60 CUs in River Section 1.”

Page 2-3, First Full Para: In accordance with the Phase 2 CDE, in locations where the edge of the dredge area did not extend to the shoreline, the lateral limits of the dredge area were defined using stable slope extending beyond the sediments targeted for removal. In locations where dredging extended to the shoreline and there were no sediment cores along the shoreline, the design called for a sediment removal cut of two feet (vertical) at the shoreline and then extending along a stable slope until it intersected the dredge prism. For these purposes, a stable slope was defined as a slope with a maximum steepness of 3 (horizontal) to 1 (vertical), or based on the existing slope if it was steeper and stable.” As-built CAD, pdf and shape file CU polygons should include the lateral extent of the stable slope and differential between the dredge prism and the stable slope. The actual constructed slope should be specified. The most current CU shape files were released during the remedial design and may not represent the final constructed condition that includes the lateral extent of the stable slope. The design CU shape files also do not include CU-01A.

Page 2-3, Last Para: “Engineering adjustments included internal slope adjustments to ensure stability after the sediment was removed; and offsets for in-water structures, including bridges, rip-rap, and dams.” Shape files documenting offsets should be part of the RACR.

Page 2-4, Section 2.1.2: More details on tree trim and tree removal in each river pool (Phase 1 and Phase 2) should be included in the RACR. This includes tables, maps as-builts and shape files of trees trimmed and removed during the remedial action and the Tree Removal Plan developed by a

\(^{2}\) IDW or inverse distance weighting
Certified Arborist during the remedial action as required by the Final Design contract specifications. To the best of our knowledge, this information is not included in any Annual Progress Report and was not included in the Phase 1 Completion Report for shoreline trimmed/cut prior to 2009 dredging.

Page 2-7, CU 60: GE should provide shape files depicting the staging areas, access road with finger piers, and the transload station.

Page 2-7, CU 95-2 and 95-3: GE should provide shape files depicting the staging area, CU 95-2 access road with finger piers, and transload station.

Page 2-9, Table 2-2: The RACR would benefit by summarizing the Phase 1 dredge areas along with the Phase 2 dredge areas to provide context so the reader has a comprehensive picture of the remedial action without having to resort to reviewing multiple documents at the same time.

Page 2-9, Table 2-2: For Year 5, list CU-01A under the CU Completed column rather than as a table note and include the volume per cubic yard (cy) of sediment removed in CU-01A in the appropriate Sediment Removal cell.

Page 2-10, Top Para: The RACR should also tabulate the volume (cy) of sediment removed per CU, the size of the CU (acres) and the average and maximum depth of sediment removal for Phase 1 and Phase 2 as this information is not available elsewhere as the data in Appendix A of the Annual Progress Reports pools data across CUs since it is parsed by volume removed per week or 4 week period not the total dredged per CU. This table should include CU-01A as a discrete entry.

Page 2-10, Top Para: Append “of Appendix A” after references to “Table 1”, “Table 2” and “Table 3”.

Page 2-10, Table 2-3: The Target Removal Volume (cy) and the Actual Removal Volume (cy) presented in the table for Phase 2 should include the sediment dredged from CU-01A. The table should be revised to include CU-01A if it doesn’t already do so. By including CU-01A directly into Year 5 of Table 2-2 (as requested above), what is and isn’t included in Table 2-3 would become more transparent. This table should have a subsection for Phase 1 and a grand total for the entire dredging project to provide context and to be comprehensive.

Page 2-11, Table 2-4: Total and Tri+ PCB mass removed should also be reported by CU for each of Phase 1 and Phase 2. The Phase 2 Year 5 mass removed should include CU-01A, if it doesn’t already do so.

Page 2-11, Top Para: “The Annual Progress Reports also provide, in Appendix D, tables showing the mass of Total and Tri+ PCBs removed from the River in the subject year and prior years.” The tables in Appendix D do not make clear whether the PCBs removed from CU-01A are included in the mass removed (kg) tabulation. This can be clarified in the footnote. Furthermore the footnote can update the mass removed to include CU-01A if not provided in Appendix D.

Page 2-12, First Full Para with Bullets: The RACR should differentiate between the types of backfill used during Phase 1 and those used during Phase 2. This should include a listing of backfill
Types 1-5 and why changes to backfill placed during construction were made. There should also be a brief discussion of backfill tolerances so that the reader understands that a 1-foot backfill design may result in backfill thickness more or less than 12 inches thick.

Page 2-12, Table 2-5: For context and comprehensiveness, please insert a row for Phase 1 Reach 8 or add CU1-CU8 to the Reach 8 row but footnote to distinguish between backfilling under Phase 1 and Phase 2. Also add a “River Pool” column to the left of “Reach” and insert “Designated” before “Shoreline Elevation”. Also insert a separate table, summarizing the type of backfill, volume and design and constructed thickness of backfill per CU for Phase 1 and Phase 2.

Page 2-12, Bullets and Footnote 10, and Page 2-13: Please provide as-built shape files depicting areas where cap and backfill were placed (phase, year, CU, acres, cap/backfill type, design and construction thickness), any modifications from design, and include polygons for areas where dredged but no cap/backfill placed due to water depth constraints, where nearshore backfill was placed to return an area to original bathymetry, and where a habitat layer was placed over backfill or cap. These as-built shape files should include both the extent and grade of the stable slope of the backfill or cap area that extends beyond the CU dredge prism.

Page 2-13, First Full Para with Bullets: The RACR should differentiate between the types of caps constructed during Phase 1 and Phase 2. This should include a listing of all cap types and why changes to cap design were made over time. There should also be a brief discussion of cap tolerances so that the reader understands that a constructed cap may be thicker or thinner than the cap design thicknesses on a total and individual layer basis.

Page 2-13, Para 2: Any agreements reached between GE and EPA regarding placement of backfill and cap material should be summarized in a table in Section 2.3 of the RACR including changes between design and as built.

Page 2-13, Para 3, “The total area during Phase 2 that received backfill and/or cap material amounted to 493 acres with 111 of those acres receiving cap materials.”: This paragraph suggests that 111/493 acres or 22.5% of Phase 2 was capped, but 493 acres were dredged in total for the entire project. Please check that the acres dredged in Phase 1 vs Phase 2 are current and update the RACR.

Page 2-14, Table 2-6: The reader would benefit from Table 2-6 having a row for Phase 1 (2009). Also please prepare a similar table that compiles the same information supplemented with cap type, design and measured cap thickness, volume cap placed, and area capped (i.e., nodes capped, non-counted capped areas) stratified by CU for Phase 1 and Phase 2. The RACR would be a good place for this synthesized data to reside and it is not readily available elsewhere.

Page 2-14, Table 2-6, Note and First Full Para: Please define what constitutes “non-counted capping areas”.

Page 2-11 to 2-14, Section 2.3: Please include schematics of all backfill, cap types, and shoreline stabilization methods constructed during the remedial action.
Page 2-11 to 2-14, Section 2.3: Please include the result of all chemical and physical analyses itemized below from each fill source. Raw and summarized data should be provided as part of the RACR submittal. We do not believe that this information is provided in any of the remedial action documents that preceded the release of the draft RACR. Per Phase 1 and Phase 2 contract specifications, prior to delivery of aggregate to the Project Site, at least one set of chemistry analyses was required for each material type and borrow source. In addition to pre-construction tests, pre-placement samples from each fill source were tested for the presence of polychlorinated biphenyls (PCBs), pesticides, target compound list (TCL) volatile organic compound (VOCs), TCL semi-volatile organic compounds (SVOCs), herbicides, target analyte list (TAL) metals, cyanide, and Total Organic Carbon (TOC) for each 20,000 tons of materials delivered to the Project Site, or at the request of the Construction Manager. In addition, for Backfill Type 2 with TOC, Backfill Type 3 and Backfill Type 5 pre-placement samples for TOC was tested for each 5,000 tons of materials delivered to the Project Site in addition to pre-construction tests. Further correlation analyses were performed between pre-placement TOC content and post-placement TOC content and river conditions.

One gradation test was also conducted for each 5,000 tons of each gradation material delivered to the Project Site for placement, or at the direction of the Construction Manager where material characteristics were visibly different. One Diesel Range Organic and Gasoline Range Organic (DRO/GRO) was similarly conducted for every 5,000 tons of each material delivered to the Project Site, or at the request of the Construction Manager.

For top soil, physical and chemical analyses (grain-size, pH, organic matter, phosphorus, potassium, calcium, and magnesium, TCL VOCs, TCL SVOCs, Pesticide/PCBs, herbicides, TAL Metals, cyanide and TOC) was performed on one sample per 1,000 cy, or subset.

Page 2-14, Bottom to Page 2-15, Top: Please provide shape files documenting the as-built method, duration (short vs long term), location, year, areal extent (acres) and whether shoreline stabilization was implemented up to or above the designated shoreline elevation.

Section 3

Page 3-1, Para 4: Section 3.1 should tabulate the mass and volume of debris removed per CU. Woody debris and other vegetation should be differentiated from other debris.

Page 3-2, Para 2, “Following processing, the debris, coarse material and filter cake…”: Does debris include grubbed vegetation, e.g., SAV and wetland vegetation removed prior or during dredging, grubbing including tree trim and removed trees?

Page 3-2, Para 2,”The estimated volume of material processed I Phase 1 was given in Appendix A…For Phase 2, the estimated volumes of materials processed (in tons)…”; and Page 3-3 Table 3-1: Please provide the estimated volume of material processed by matrix, especially the woody debris and other debris, by year including Phase 1 and Phase 2 for comprehensiveness.

Page 3-3, Section 3.2: Please provide the number and size of rail cars that transported all debris and specifically woody debris off-site if mass or volume is not otherwise available.
Section 4

Page 4-1, Section 4, Para 2, “no replacement/reconstruction of shoreline habitats was necessary; and (c) the replacement/reconstruction of SAV and RFW habitats in Phase 1 dredge areas was performed in 2010 and 2011, consisting of the construction of SAV habitat in certain areas in CUs 3 through 8 and RFW habitat in certain areas in CUs 2, 7, and 8.”: Phase 1 habitat reconstruction appears deficient based on GE monitoring results, NYSDEC’s November 22, 2017 letter and trustee site visits.

Page 4-2, Top Para, “the installation of any shoreline replacement/reconstruction measures in Phase 2 areas, including reconstruction or repairs of disturbed areas above the shoreline elevations, was described in Section 2.4 (Shoreline Stabilization); and the OM&M of such measures is beyond the scope of this RA Completion Report.”: Section 2 should provide figures, tables, shape files and other details about disturbance to areas up or above the specified designated shoreline extent for each of the river pools. For example, live stakes were installed in CU-51 following clearing of the shoreline area prior to remediation of the fingerlike projection subarea.

Page 4-2, Section 4.1, “the placement of backfill and/or cap material, as described in Section 2.3, constituted the construction of such habitats; and the verification that the required type and thickness of backfill and cap material were successfully placed in accordance with the applicable Phase 2 design, as recorded in the Backfill/Engineered Cap Completion Approval Form (Form 2) package for each CU, met the requirement for replacement/reconstruction of UCB habitats.”: Successful placement of backfill and/or cap material per the design may still not provide suitable habitat for regrowth of aquatic vegetation beds (SAV) or riverine fringing wetlands (RFW) or be optimum for invertebrates, fish and wildlife of the Hudson River.

Page 4-2, Section 4.1 and Section 4.2: One or both of these sections should discuss placement of a habitat layer on top of backfill or cap as part of habitat reconstruction and shape files should be provided showing when, thickness, acres, and material placed in the river as habitat layer.

Page 4-2, Section 4.2,: “The Phase 2 CDE established the approach for identifying Phase 2 dredge areas where additional habitat backfill (as described in Section 2.3) would be placed to support the designation of those areas as SAV areas. That approach focused on pre-dredging SAV areas that were delineated in water depths between 2 feet and 8 feet (based on the shoreline elevations established using a design flow of 5,000 cubic feet per second [cfs] at the USGS gage in Fort Edward) and that would be in water depths greater than 8 feet after dredging and backfill placement.”: The habitat reconstruction of SAV did not reconstruct all of the SAV impacted by the remedy because: (1) dredging, backfill and capping destroyed existing SAVs and other potential SAV habitat at pre-dredge water depths between 0-2 ft and >8 ft; (2) only a portion of the impacted SAV areas would be replanted within the targeted depth zone because a significant area would be reconstructed passively through natural recolonization; (3) the total area planted or naturally recolonized was at a less than 1:1 ratio; and (4) SAV habitat reconstruction did not account for loss of functionality or time to recover of reconstructed beds.

Page 4-3, Para 3, “During Phase 2, SAV habitat was constructed by planting in 48 CUs and SAV natural recolonization areas were designated in 78 CUs.”: The total acres per CU designed vs.
constructed vs. existing stratified by each of the two construction methods (passive recolonization vs planting) should be tabulated including the West Griffin Island Area. The entire Sept 2016 habitat ledger can be updated and included in the RACR. SAV habitat reconstruction should not be deemed complete since some of the natural recolonization areas have not recolonized and some of the planted areas area also devoid of SAV. The cause of planted SAV not surviving should be investigated. Neel (2017) reports that 32 leaf samples from water celery, *Vallisneria Americana*, collected from the nursery that supplied plants for the Upper Hudson River SAV habitat reconstruction plantings were of a single genotype in contrast to the more than 400 genotypes found elsewhere in the Hudson. According to Neel, low numbers of genotypes result in lower growth and survival in seagrasses (Williams 2001, Hughes *et al.* 2009), reduced resistance to disturbance (Hughes and Stachowiz 2004) and lower growth (Engelhardt *et al.* 2014).

Page 4-4, Section 4.3, “RFW habitats were then constructed by planting and seeding with native RFW species in accordance with the applicable design specifications, as well as the requirements set forth in the pertinent RAWP sections on habitat construction for the subject year, with any modifications agreed upon by GE and EPA.” The habitat reconstruction of RFW did not reconstruct all of the RFW impacted by the remedy because: (1) dredging, backfill and capping destroyed existing RFW and other potential RFW habitat; (2) a subset of the impacted RFW reconstructed through installation of plant plugs and seeding was not generally successful; (3) the total area planted and/or seeded was at a 1:1 ratio; and (4) RFW habitat reconstruction did not account for loss of functionality or time to recover of reconstructed wetlands.

Page 4-4, Section 4.3, Para 3, “During Phase 2, RFW habitat was constructed in 41 CUs. Those constructed RFW areas are also identified by CU in Table 4-1, which shows all Phase 2 CUs in which RFW habitat was constructed and the year in which that construction was completed...” The total acres per CU designed vs. constructed vs. existing stratified by each of the three construction methods (seeding Zone A vs seeding and planting Zone A; planting + seeding wild rice Zone B) should be tabulated including the West Griffin Island Area. The entire Sept 2016 habitat ledger can be updated and included in the RACR. RFW habitat reconstruction should not be deemed complete since some of the seeded areas and some of the planted areas are devoid of or limited in emergent vegetation or have different vegetative communities or communities with different structure.

Page 4-4, Section 4.3, Footnote 15: The footnote should make clear that this approach was a modification from Phase 1 as part of adaptive management due to the poor success associated with Zone A seeding where no plant plugs were installed in Zone A.

Page 4-5, Table 4-1: Insert Phase 1 SAV and RFW construction by CU to provide context and completeness.

**Section 5**

Page 5-1 to Page 5-2, Section 5.1: This section should briefly describe any changes to routine controls and best management practices between Phase 1 and Phase 2.

Page 5-5, Section 5.2.3, Para 1: The RACR should make clear that only 1 of the 5 river reaches or pools in River Section 3 was sampled for PCBs in fish during annual baseline and remedial monitoring. PCB tissue residues were not documented for Upper and Lower Mechanicville, Waterford and Troy Pools.
Page 5-5, Section 5.2.3, Para 2 and Footnote 20: The RACR warrants a more detailed and accurate discussion of non-compliance with consent decree mandated NYS Standard Fillet (rib-in) processing vs. fish processed as non-NYS standard (rib-out) fillet. This discussion should not be primarily embedded in a footnote to the report. The RACR should make clear that results of the 2014 black bass study provide no information on what the impact of non-adherence to processing protocol had on other filleted fish including white and yellow perch, white and channel catfish, brown and yellow bullhead, and striped bass.

NOAA previously commented on the 2014 black bass study (e.g., Federal Trustee letter of 9/23/15 regarding the Phase 2 Sediment Processing Facility Demobilization and Restoration Plan, NOAA presentation to Five Year Review Team 9/15/16, Federal Trustee letter of 7/21/16) providing our interpretation of the 2014 study results. That interpretation differs from that presented in the RACR. GE, in footnote 20, relies on a letter from the 2015 EPA 2 Regional Administrator, rather than a peer reviewed data analysis and interpreted technical report.

NOAA’s evaluation of the data supports the conclusion of a consistent low bias where NYSDEC Standard Fillet samples report higher PCBs than non NYSDEC standard fillets: 40% of NYS Standard Fillet samples were ≥20% higher and 20% were ≥40% higher than non-NYS standard fillet samples on a lipid normalized basis. Total PCBs measured in these NYS Standard Fillets were ~75% higher than the non-NYS standard processed fillets on a wet weight basis. EPA in their May 2017 Proposed Second Five Year Report observed more than a 2 times difference on a wet weight basis and <20% difference on a lipid-normalized basis, although EPA’s conclusion that the non-standard fillet lipid-normalized data are useable for establishing trends is not consistent with the results.

NOAA continues to offer the following recommendations:

- EPA prepare and release a peer-reviewed data analysis and interpretation technical report of the 2014 black bass NYSDEC standard fillet vs rib-out study that they had GE conduct. The Trustees can then cite this in our NRDA documents and GE can cite this in the RACR.

- EPA require GE to conduct an additional comparative study to provide data on the differences in wet weight and lipid-normalized PCBs between NYS Standard Fillet vs non-standard fillets in up to seven additional fish species that EPA monitors at this site.

This additional data collection would:

- Provide data to reduce uncertainty in fish PCBs during pre-dredging baseline (2007-2008) and dredging years (2009 and 2011-2015); and

- Improve evaluation of modeling of time to achieve fish triggers set forth in the ROD (0.05, 0.2, 0.4 ppm PCBs) to support remedial effectiveness and Trustee injury determinations.

Page 5-5, Footnote 19: This footnote should explain why collection of black bass was discontinued at Albany/Troy and Catskill. It was due to a decline in their population downstream of the Federal Dam at Troy.
Page 5-6, Footnote 21: The delay in processing the 2015 was because the SOP for processing fish was being updated to incorporate the requirement to fillet following NYSDEC Standard Fillet protocols.

Page 5-8, Table 5-1: To provide context and improve comprehensiveness of the overall remedial action, please add a row for Phase 1 (2009) far-field stations monitored daily or weekly.

Page 5-9, First Para: Include a brief description of the similarities and/or differences in the Resuspension Standard between Phase 1 and 2.

Page 5-9: Total and Tri+ PCB mass removed and remaining as residual or inventory after backfill and/or cap should be provided per CU in the RACR as a new table.

Page 5-10, Table 5-2: To place Phase 2 in the context of Phase 1 and the full remedy, please include a row for Phase 1(2009) total and Tri+ PCB loads and percent release past Waterford.

Page 5-10, Table 5-2, Note 1: The preparation of the table is attributed to Anchor QEA, LLC but other tables do not contain a similar attribution.

Page 5-10, Table 5-2, Note 3: The minor modifications of the method mentioned in the Phase 2 EPA for calculating mass should be described.

Page 5-11, First Full Para: Exceedances should be tabulated and submitted as part of the RACR.

Page 5-12: For context and completeness, also bullet the special studies conducted during Phase 1. A summary paragraph should be provided for each bulleted special study conducted under the remedial action so the reader doesn’t have to access and review each of the separate reports.

Page 5-12, Footnote 30: Documentation should be provided supporting EPA’s concurrence that the NAPL characterization study could not and would not be completed.

Page 5-13, Black Bass Fillet Ribcage Study: EPA committed to completing a thorough analysis of the data and present the results in a formal memo or report. This is still outstanding and should be completed so that it can be referenced in the RACR.

Section 6

Page 6-3, Table 6-1: Please update table to reflect state site # for the six entries listed as “pending”.

Section 7

Page 7-3, Section 7.1.2, Para 2 to Para 4; Page 7-4, Section 7.13 Para 2 and Section 7.1.4, Para 2 and 3, and Page 7-5, First Full Para: “The post-decontamination sampling results met the criteria for unrestricted use… “, “The post-decontamination sampling results for the stormwater drainage piping and structures met the criteria for unrestricted use “: The criteria should be specified in this section of the RACR.
Page 7-7, Section 7.2, “The support areas that were used for handling PCB-containing materials, as well as the other key support areas that were used for significant project activities, were demobilized and restored through removal of equipment and temporary foundations and facilities, decontamination of equipment as necessary, grading and stabilization of the sites, and other appropriate restoration (including wetlands restoration where applicable)...” Table 7-1 should include all restoration actions including grading, stabilization and other appropriate restoration including wetlands. Shape files of the impacted areas and the scope and type of restoration should also be provided in the RACR.

Section 8

Page 8-1, Section 8.1, “All CU completion/acceptance packages, as described in Section 5.2 of the SOW, have been submitted to and approved by EPA.”: The CU completion/acceptance packages are incomplete because as-built documentation and/or as-built shape files are missing for various components of the remediation. For example, as-builts or construction impacts have not been provided for tree trim/tree removal, access dredging, road access areas with and without finger piers, rock dike construction, material loading and staging areas and processing facility and subsequent support site restoration, etc. Shape files have not been and should be provided final CU boundaries, access dredging areas, tree trim/removals, backfill/cap/habitat layer including the area extent beyond the dredge boundary for stable slope, shoreline stabilization measures and repairs, etc.

Page 8-2, Last Sentence: “Further, GE considers that the inspections held on November 10 and 30, 2016 (with the follow-up on December 16, 2016) satisfied the RA Completion Pre-Final Inspection requirement of Paragraph 57.a, given that no additional inspections have been required.”: According to the consent decree, inspections were to cover land-based and dredge areas and as such should have included inspections of habitat reconstruction. There is no documentation that habitat areas were inspected by NYSDEC, NYS Canal Corp or EPA and that they concurred that follow-up actions were not required habitat reconstruction. (See Comment to Page 1-4, Top Para, above).

Section 10

All the documents cited in the References section should be included on the external drive provided as part of the RACR submittal.

Figures

Figure 1-1: Please add Reach 8 Phase 1 CUs to the imagery and to the acreage table. Separate Phase 1 and Phase 2 acres can be supplied along with the total acres remediated in the Thompson Island Pool (Reach 8).

Figure 1-3 and Figure 1-4: Report the total number of acres remediated in Reach 4 (Upper Mechanicville Pool).

Figure 2-1 to Figure 2-31: The symbology for the navigation channel in the legend and map are not the same because the dark blue fill in the legend is missing from the figures.
Figure 5-1a to Figure F-1e and Figure 5-2a to Figure F-2e: Non-detect results should be depicted using different symbols to distinguish between detected and non-detected PCB results.

In conclusion, NOAA appreciates the opportunity to provide technical comments on the draft Remedial Action Completion Report (RACR). NOAA shares the goal of full recovery of the Hudson River from PCB contamination and cleanup construction impacts in as short a time as is practicable to minimize ongoing injury to natural resources and the services those resources provide to people and the economy. Our technical comments are intended to improve the comprehensiveness of the RACR. NOAA recommends that before the RACR is approved and finalized that EPA demonstrate that the remedial action is protective of human health and the environment, that the habitat has been fully reconstructed, and that additional technical information be incorporated into the document. Foremost in our consideration is a timely, positive outcome for the river, including the migratory and resident biota that inhabit the river, the public that enjoys and cherishes the river, and the economic benefits that are derived from the river. Please do not hesitate to contact us with any questions or comments or if you would like to discuss these recommendations further.

Sincerely,

Lisa Rosman
References


NOAA 2016. Recommendations on the Use of Available Data to Evaluate Remedy Effectiveness, Presentation to Hudson River Five Year Review Team.

Neel, M. 2017. Rise and Fall and Rise of Submerged Aquatic Vegetation in the Tidal Freshwater Hudson River, co-presentation to Hudson River Foundation, November 7, 2017,
