



By Electronic and Regular Mail

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Subject: Surface Sediment Sampling Work Plan for 2016, Hudson River PCBS Superfund Site, October 2016 – Revised

The Hudson River Natural Resource Trustees – the National Oceanic and Atmospheric Administration (NOAA), the U.S. Department of the Interior, and New York State (collectively the Trustees) – continue to determine how polychlorinated biphenyls (PCBs) from the General Electric Company (GE) plants at Fort Edward and Hudson Falls, NY harm the Hudson River’s natural resources. Understanding the post-dredging recovery of the Upper Hudson sediment, water, and fish is important to the Hudson River natural resource damage assessment (NRDA). Under federal Superfund law, the General Electric Company (GE) is responsible for both the remediation -- cleanup -- of the PCB contamination, and the restoration of the natural resources harmed by PCBs. The State and Federal Hudson River Natural Resource Trustees (HRNRT) are conducting a NRDA and will seek to recover damages to restore the natural resources of the Hudson River on behalf of the public.

Our comments on the Surface Sediment Sampling Work Plan for 2016 (Plan), as a trustee and as a member of the EPA Five Year Review Team, reflect our overarching concern about the scope of the Plan and its ability to meaningfully measure concentrations and recovery of the river over time so that EPA can determine remedial effectiveness and protectiveness. Post-dredging sediment conditions, including sediment PCB concentrations and recovery rates, represent critical data to us. As a natural resource agency we utilize this and other study results to inform our NRDA so that the public can ultimately be compensated for injuries to natural resources resulting from the releases of PCBs from the Hudson River PCBs Superfund Site.

Defining post-dredging baseline surface sediment concentrations represents a critical first step in evaluating the effectiveness of the remedy and the rate of recovery of the river and its natural resources. EPA has a responsibility as the regulatory agency to ensure that the design of the sediment Operations, Maintenance and Monitoring (OMM) program is based on sound science consistent with the expectations of the Record of Decision (ROD) to monitor the natural attenuation/recovery of contaminants left in place. Collection of baseline data is a one-time opportunity that creates the foundation for all future data collection efforts. Ideally, the OMM program for sediments, fish and water should have been developed at the same time to ensure that the programs are coherent, consistent and comprehensive. NOAA recommends that the sediment OMM Plan be comparable to EPA’s most robust pre-dredge monitoring that occurred under the Sediment Sampling and Analysis Program (SSAP). The SSAP dataset, which successfully conveyed the much greater degree and extent of contamination, established a pre-dredge baseline that was used to design the remedy.

The proposed sediment OMM plan is not adequate to provide critical information needed to evaluate remedy effectiveness and protectiveness and should as an alternative be viewed as an effort to obtain data to fill a data gap for the 2017 five year review, thus allowing for development of a comprehensive sediment, water and fish OMM program in 2017.

Our major concerns and recommendations with the proposed sediment OMM Plan are as follows:

- The current sampling design results in insufficient characterization of surface PCB concentration and PCB mass (in terms of sample design and number of samples) of the highly contaminated unremediated areas (cohesive sediments) outside the River Section 2 and River Section 3 (RS2 and RS3) dredge prisms. For example, less than 1 sample per river mile will be collected in the more contaminated cohesive sediments of RS3.
- Cohesive sediments represent the primary source of exposure to the benthic food web and fish species, but most of the samples will be collected in non-cohesive sediment areas. These highly contaminated cohesive sediment areas should be treated as a separate stratum from the non-cohesive sediments and more samples within the cohesive areas should be added to properly characterize them.
- The sampling program was designed to determine the surface-weighted area PCB concentration (SWAC) by the much larger river sections rather than the smaller river pools (=river reach). The river pool sampling approach is essential to establishing a surface sediment baseline for evaluations of fish exposure, PCB loading to the Lower Hudson River, and the rate of recovery of the system. Resident fish tend to remain within a river pool, meaning they may integrate their exposure within pools or smaller areas, and not over much larger river sections.
- Sampling is planned of just the top 2 inches but needs to measure PCBs in the top 12 inches of sediment. Surface sediment has been defined in the ROD and in the Final Dispute Resolution (July 26, 2004) as 0-12 inches. The PCBs residing in the top 12 inches represent a more complete accounting of the PCBs biota are or may be exposed to in the future, as well as the mass that may be transported to the lower river. The current design will produce post-dredging surface sediment PCB concentrations and rate of recovery that have a high degree of uncertainty and could provide misleading results. Having the various existing sediment data collection efforts differ in scope, design, depth, and analytical methods makes it very difficult to compare sediment contamination over time and space. NOAA believes that if EPA implements the OMM sediment monitoring as currently described, it will yield another dataset that is different from the various datasets collected before, including the dataset used for the modeling. These differing datasets will continue to impede EPA's ability to clearly demonstrate for the public the effectiveness and protectiveness of the remedy.

The October 2016 Plan was transmitted to the FYR team on October 17, 2016 and the October 2016 – Revised Plan was provided to NOAA on October 28, 2016. Since sampling was supposed to commence today, Oct 31, 2016, it is unclear how EPA plans to consider and incorporate input from members of the Five Year Review team to address significant technical concerns with this Plan and the implications for evaluation of the effectiveness and protectiveness of the dredging and Monitored Natural Recovery portions of the remedy. Our detailed comments follow.

Sampling Design

According to the data quality objectives for the OMM sampling, data collected under this Plan "... will be used to quantify post-remedial average TPCB concentration in sediment, to quantify changes in sediment concentration over time and to support investigation of relationships between fish, water and sediment during the post remedial monitoring time period." Both EPA's and GE's bioaccumulation modeling recognized that fine-grained (cohesive) sediments were a major source of exposure for PCBs entering the food web. For example, the EPA bioaccumulation modeling assumed that fish were primarily exposed to cohesive sediment (75%) while in GE's bioaccumulation models, PCB concentrations in the food web

were based entirely on exposure to cohesive sediments. Most vegetation in the Upper Hudson is found associated with fine-grained sediments.

The proposed OMM sediment sampling design collects data from within (Certification Units or CUs) and outside of remediated river bottom in an effort to calculate a SWAC. The study design is area-weighted without any consideration for quantifying the post-remedial highly contaminated areas (in terms of surface sediment and inventory) immediately outside of and surrounding the dredge areas (primarily cohesive sediment) that are being addressed under the MNA component of the remedy. As a consequence, the random sample design framework essentially guarantees that areas of most concern--the highly contaminated areas in RS2 & RS3 immediately surrounding the dredged areas---will not be sampled to any meaningful degree. Cohesive sediments, which were the focus of the SSAP in RS2 and RS3, will have minimal representation in a post-remedial SWAC because fine grain sediments outside of dredge areas in RS2 and RS3 represent less than 40% and 20% (excluding rocky areas), respectively. To ensure that the highly contaminated sediment surrounding the dredge areas in RS2 & RS3 are well-characterized for MNA, cohesive sediment should be included as a separate stratum in the design. This bias in the current Plan will result in a much greater preponderance of samples in non-cohesive sediments, which tend to be less contaminated. For example, in the random design for RS3, less than 1 sample per river mile will be collected from cohesive sediment and a greater number collected from sediment classified as "gravel/cobble". Because of this sampling bias, the proposed design has the strong potential to underestimate the exposure to fish and other biota that feed in habitat associated with the more cohesive sediments.

While NOAA commends EPA for adopting a probability-based design for sediment sampling within and outside dredged areas, characterizing the SWAC of entire river sections (RS 2 and RS3 made up of two and five pools, respectively) rather than a Plan designed to develop SWACs for each river reach (pool) results in minimal characterization of the 8 reaches, 7 of which are in River Sections 2 & 3, where the high concentrations of PCBs left behind will be addressed only by monitored natural attenuation (MNA). Developing a separate SWAC for cohesive sediment and non-cohesive sediment in each reach would be much more relevant and useful for estimating fish recovery, since fish are unlikely to integrate exposure over multiple pools and cohesive sediments represent the primary source of exposure to fish. The number of samples proposed in the sediment OMM Plan is inadequate to develop reach-specific SWACs.

GE proposes to create a 25 foot buffer exclusion zone around dredge areas and areas behind dams, which would result in a major gap in the SWAC and likely an underestimation of the SWAC. Similarly, excluding capped areas also results in a gap in estimation of the SWAC. NOAA recommends including the 25 foot area around the dredged areas, areas behind dams, the cohesive sediment outside of dredge areas, and the capped areas in the statistical design.

NOAA also recommends that the samples be collected as cores, rather than grabs, as stated in the 2010 OMM Scope and for direct comparability to the SSAP standard sampling method. The SSAP data provide a robust baseline data for comparison to the pre-dredge concentrations in cohesive sediments established in the SSAP. The sampling plan, stratified based on sediment type, should have sufficient power to develop separate surface average concentrations for cohesive and non-cohesive sediment within each reach. This degree of spatial resolution would allow for a comparison of cohesive sediment PCBs to fish PCBs by reach as these areas more closely represent habitat that serve as fish exposure areas. A more detailed discussion is provided below.

Advantages to employing the recommended more robust sampling approach include:

- Direct comparability to the SSAP comprehensive baseline sediment data from undredged areas (the only comprehensive sediment data set collected in the last 25 years).
- Cohesive sediments (nearshore, fine-grained sediment) represent the location of aquatic vegetation, the base of the aquatic benthic food web, and primary source of fish exposure in the UHR.

- Greater spatial resolution (i.e., pool by pool as recommended by NYDEC) would more accurately represent fish exposure areas and facilitate identifying any potential problem areas.

Sample Collection

Depth of sediment samples

Depth of sediment sample collection is an important consideration in any sample design. The Plan limits sampling to the top 2 inches, an approach that is inconsistent with the definition of “surface” as the top 12 inches in the ROD and confirmed in the Final Dispute Resolution (July 26, 2004). The Final Dispute Resolution, states that “EPA believes that the top 10-15 cm (4-6 inches) is a reasonable estimate of the average depth of the biologically active zone. However, EPA disagrees with GE that “there is little scientific basis to consider depths greater than 15 cm in a system such as the Hudson” (*Presentation to the Regional Administrator* at p. 16). For example, the ROD states: “*Chironomus* [a benthic organism], which is abundant in the Hudson River, can burrow as deep as 50 cm [20 inches]...Mixing of sediment by benthic organisms is likely to occur up to at least 10 cm, and some mixing may occur to much greater depths under favorable conditions.” (ROD Part 3 at p. 2-50).

Section 2.3.2.2 of the December 2010 O M M SOW indicates that non-dredge area and backfill samples shall be collected from the top 12 inches and segmented into 0-2 and 2-12 inch segments (NOAA recommended sampling 0-2, 2-6, and 6-12 inch intervals). Sampling the full 12 inches in first year post-dredging is critical for understanding the new baseline for surface sediment. The proposed 0-2, 2-6, and 6-12 inch segmentation also provides insights into the stability and mixing of the backfill and cap layer with the underlying sediments and whether clean material is depositing on top of the undredged sediments. Note that deeper cores are required for assessing whether Select Areas (unremediated areas where MPA was exceeded but covered by 2 feet of cleaner sediment) are stable, that is PCBs remain buried, and for evaluating remaining inventory.

The SSAP data represent the only recent comprehensive data set based on an unbiased grid sampling design and should be used for comparison to the proposed OMM sediment sampling. Collecting grab samples from the top 2 inches rather than cores is inconsistent with the SSAP sampling approach and Section 2.3.2.2 of the Dec 2010 SOW and does not allow for full characterization of surface sediment (top 12 inches). Failure to conduct core sampling in the baseline post-remediation year does not take advantage of robust baseline for cohesive sediment outside the dredge areas from the SSAP. The overall value of the OMM sediment plan will be diminished because EPA will not reliably be able to:

- adequately characterize PCBs in surface sediments primarily responsible for biological uptake,
- evaluate the magnitude of decline in PCB concentration in the sediment surface due to the remedial dredging, and
- quantify the rate of change in surface sediment PCB concentrations outside the dredge areas under MNA.

Sampling Gear

Collecting sediment samples as grabs (instead of cores, as prescribed in the OMM Scope) means that only the top 2 inches can be sampled. Sediment grab samples are not compatible with core samples, which means that the proposed sampling will be a new standalone study and not comparable to the results for the 4000+ cores from outside the dredge areas in the SSAP.

Number of samples

The power of the analysis to determine a difference in rate of recovery was based on data from the Downstream Deposition Study (DDS) study. Because the DDS samples for RS2 & RS3 represented composites of 2 or more samples and compositing was not taken into account in the estimate of variance, the power to detect a difference was overestimated to an unknown, but likely significant, degree. The

number of samples should be increased to account for using composite samples as the estimate of variance.

Analysis

Given the concerns that EPA and others have repeatedly raised about the uncertainties associated with Aroclor analysis, at least 25% of the samples should be analyzed as splits by Method 1668 by an independent contract lab (not NEA/Pace) with documented experience with the method. GE's Work Plan (October 2016 – Revised) requires splits of 10% of the samples with sufficient sediment volume be provided to EPA for PCB congener analysis. Additionally, NIST-certified Standard Reference Material (SRM) should be analyzed with every batch of 15-20 samples analyzed for PCB congeners or the NEA's peak method.

Grain-size (along with Total Organic Carbon should be analyzed for every sample to aid in distinguishing between backfill, cap material, and non-dredged sediment, as recommended by EPA's statistician for possible statistical adjustments due to confounding variables. GE's Work Plan (October 2016 - Revised) substitutes subjective visual observation to determine sediment type, which will not provide the level of accuracy required to use in a statistical analysis. While splits of samples with sufficient sediment will be provided to EPA for grain-size analysis, the plan does not require that all of these samples be processed.

Data Quality Objectives

The OMM plan is based on the data quality objective (DQO) of detecting an annual rate of decline of about 5% per year over 10 years. The basis for selecting a 5% decline over a 10-year monitoring period is not explained. EPA models used in the ROD projected a post-source control rate of decline of 8%. The almost 40% difference in rate of decline would result in more than a decade long difference in reaching a target concentration. In addition, the plan does not address the significance of not meeting this DQO. It is also not clear why a 10-year period was selected when the ROD expected that some remedial goals would be met within a 5 year post-dredging period.

Summary

The baseline and future OMM sediment sampling events are extremely important to EPA's ability to assess the effectiveness and protectiveness of the remedy and also to the Hudson River Trustees ability to understand how long injuries to natural resources will last into the future. The very limited characterization of surface sediments in the current OMM plan will not address major concerns over the magnitude of PCBs remaining in surface sediments or provide estimates of sediment recovery rates in cohesive sediment by reach that are directly related to recovery of fish. PCBs that remain in the Upper Hudson River sediment are a continuing source of exposure to fish and other organisms within the Upper Hudson and those PCBs will continue to be transported to, and adversely affect, the Lower Hudson River. The longer it takes for fish PCB concentrations to decline, the more significant the injury to Trustee resources and the longer the public's use of their resources will be impaired.

Sincerely,

Jay Field and Lisa Rosman
Members of EPA's Hudson River Five Year Review Team
National Oceanic and Atmospheric Administration