OFFICE OF THE COMMISSIONER

New York State Department of Environmental Conservation
625 Broadway, 14th Floor, Albany, New York 12233-1010
P: (518) 402-8545 I F: (518) 402-8541
www.dec.ny.gov

August 30, 2017

Mr. Scott Pruitt
Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Dear Administrator Pruitt:

I am sending this letter to provide the United States Environmental Protection Agency (EPA) with comments of the New York State Department of Environmental Conservation (DEC) to EPA's "Proposed Second Five Year Review Report for Hudson River PCBs Superfund Site," dated May 31, 2017.

EPA states in the proposed report that the remedy will not achieve its ultimate objective for the foreseeable future, and will only become protective "at some point" in time more than 55 years from now. This is unacceptable – a remedy that will take generations to safeguard public health and the environment is clearly not protective. It is also not what the people of the State of New York were promised when EPA announced its remedial decision for the Hudson River in 2002. At that time, EPA predicted that the dredging remedy would result in rapid reductions in PCB levels in fish so that fish consumption restrictions could be relaxed in five to ten years, as opposed to many decades as is now predicted.

Moreover, despite DEC calling for EPA to conduct additional sampling, EPA has disregarded the need for more data to determine the effectiveness of the remedy. EPA appears desperate to come to a conclusion which simply is not supported by the current conditions of the Hudson River. It is obvious that the remedy is not protective of public health and the environment.

As described in the enclosed technical commentary, and as stated in the DEC report provided during EPA's five-year review process with my December 20, 2016 letter, DEC disagrees with EPA's proposed protectiveness determination for this site. The most important criterion for evaluating protectiveness is the degree of human health and ecological risk posed by the site. EPA is fully aware that the current human health and ecological risks in both the Upper Hudson River, where the remedial work was done between Fort Edward and Troy, and the Lower Hudson River, south of the Federal Dam at Troy, are well in excess of EPA's acceptable risk range. Given the current and anticipated conditions for this site, along with EPA's own guidance on protectiveness determinations, the only reasonable conclusion that can be reached is that the remedy is "Not Protective."

EPA should follow the process laid out in the 2002 Record of Decision (ROD) for this site. The remedy selected by EPA in the ROD called for targeted environmental dredging, followed by "Monitored Natural Recovery." While EPA recognized that some PCBs would be left behind in the river, EPA erroneously estimated that a sufficient amount of contaminated sediment would be removed to allow for gradual natural processes, such as the influx of cleaner sediments into the system, to reach the remedial targets identified in the ROD for rapid reductions in human health and environmental risk.

However, because greater levels of PCBs were found in the river both during project design, and again during project implementation, significantly more PCBs were left behind than was intended when EPA selected remedy. The additional sediment sampling that DEC has nearly completed (after EPA and General Electric (GE) refused to take action) will quantify how much contamination was left behind. EPA has never considered adjusting the remedial work to take the increases in known PCB mass into account, and has not provided any satisfactory scientific rationale for dismissing such consideration. As a result, it is a near certainty that the targeted reductions in fish PCB concentrations required by the ROD will not be met throughout the Upper Hudson River in the near term. Rather, as described in EPA's previous five-year review report in 2012,[1] there will likely be delays in recovery as a result of more PCBs being left behind than anticipated.

EPA should perform the data gathering and analyses necessary to confirm the assumption being made by EPA that the amount of remedial work done to date will be sufficient to reach the remedial targets set in the ROD, the first of which is to be met in 2020. As described in the enclosed detailed comments on the proposed report, there is no valid reason for EPA to modify or abandon the targets for reductions of PCB levels in fish from the ROD. EPA's unwillingness to fulfill its commitments to New Yorkers is unacceptable.

Furthermore, if the targets are not to be met, EPA must direct that sufficient additional remedial work be done. To date, EPA's persistent refusal to collect and analyze a full array of data has run counter to EPA's original commitment to clean up the site. In order to perform the necessary evaluations, EPA should ensure the collection of sufficient water, sediment, and fish data to fully assess whether the remedy will meet the targets in the ROD, starting with the initial target of 0.4 ppm PCBs in fish by 2020. As indicated above, DEC raised the need for EPA to conduct additional sediment sampling in November of 2016. EPA formally rejected that request in December of 2016. DEC then took the necessary steps to begin taking its own sediment samples over the summer. Similarly, if EPA refuses to conduct additional fish sampling, DEC will do so.

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[1] First Five Year Report for the Hudson River PCBs Superfund Site, June 1, 2012 available at https://www3.epa.gov/hudson/plans.html

As you know, the targets in the ROD for rapid reductions in human health and ecological risk were the primary bases upon which EPA justified the dredging remedy. These same targets were the primary bases for the State to concur that the remedy would be protective of public health and the environment. EPA rejected (as the State rejected) remedial alternatives which would have resulted in delays in recovery of 10 or more years, as EPA recognized at the time of the ROD that the controls on risk, such as fish consumption advisories, provide insufficient protection to human health in the long term, and provide no protection to ecological resources. These principles are as true today as they were at the time of remedy selection. EPA should not rely on only partial controls on risk as justification for not performing any further necessary remedial work on this site.

I remain very concerned that EPA has abandoned its responsibilities under CERCLA to protect public health and the environment by failing to perform a complete Remedial Investigation for the portion of the site south of the Troy Dam. The Lower Hudson River is contaminated with PCBs from the Upper Hudson River throughout the entire Hudson River estuary south to New York Harbor. Human health and ecological risks associated with Lower Hudson River fish consumption are outside of EPA's acceptable risk range.

EPA has acknowledged in its May release of the proposed five-year review report that the remedial work conducted in the Upper Hudson River to date will not result in any significant reductions in public health and environmental risks. There is no longer any reason to delay the Lower Hudson River investigation and EPA should immediately ensure that it is undertaken.

I understand that EPA currently plans to end the public comment period on September 1. As noted above, DEC disagrees with EPA's current recommendation and finds that sufficient data exists to determine that the remedy is not protective. In addition, DEC believes that the data from the sampling we are currently conducting will further support this conclusion and will provide guidance on how to meet the goals of EPA's approved remedy. We will provide the results of this initiative this fall.

Enclosed to this letter is a set of general comments, and a set of more detailed technical comments on the proposed report and appendices. Please place this letter and attachments, my December 20, 2016 letter and attachments and any additional technical comments provided by staff, in the administrative record for this site. I look forward to receiving EPA's response to DEC's comments.

Sincerely,

Basil Seggos
Commissioner

Enclosure

NYSDEC General Comments on EPA's Proposed Hudson River Five Year Review Report

General Comment 1:

The Protectiveness Determination should be "Not Protective" for the river bottom remedy in the Hudson River between Hudson Falls and Troy (Operable Unit 2).

EPA's Five-Year Review guidance sets forth three critical questions that must be addressed for EPA to make a "Protectiveness" determination: (A) Is the remedy functioning as intended by the decision documents; (B) Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid; and (C) Has any other information come to light that could call into question the protectiveness of the remedy?

The DEC document provided to EPA on December 20, 2016 combined with these comments shows that, after answering the three critical questions above, the only appropriate protectiveness determination for this Five Year Review is "Not Protective" for the river bottom remedy being implemented by EPA for the Hudson River PCBs site. The current level of human health and ecological risk throughout the entire site is in excess of EPA's acceptable risk range, including in the Upper Hudson, which is the fundamental metric that justifies this finding.

DEC provided a detailed rationale in our December 2016 document and it is not necessary to repeat it here. Data which has become available since December 2016 (the small sediment data set gathered by GE at EPA's direction in late 2016) and the 2016 fish PCB data, do not indicate that the current conditions in the Hudson River are protective. Rather, these data – particularly the fish data, which demonstrates fish PCB concentrations which give rise to human health and ecological risks above EPA's acceptable risk range - support DEC's primary contention that the current state of the Hudson River remedy for the contaminated sediments of the Upper Hudson is "Not Protective".

It is also important to point out that, given the current PCB concentrations in sport fish in the Upper Hudson, it is extremely unlikely that the fish PCB concentrations in the Upper Hudson will achieve the ROD targets for fish PCB recovery in the Upper Hudson, the first of which was to be met within five years after dredging was completed (2020). The most recent data (from 2016) indicate that the reach and species weighted average is 1.25 parts per million PCB. With the dredging completed in 2015, and the targeted concentration being 0.4 parts per million five years after dredging is completed, it will take fifteen years at the anticipated natural recovery rate of 8% per year to reach the first target. It would take natural recovery rates of over 20% to reach the first target in the five year time frame specified in the ROD, which is unrealistic and highly unlikely.

NYSDEC General Comments on EPA's Proposed Hudson River Five Year Review Report

General Comment 2:

EPA must follow its own guidance for issuing five year reviews and making protectiveness determinations. EPA's own guidance prevents EPA from issuing a "not yet protective but will be protective" determination after a remedy has been constructed.

The EPA Guidance on Five Year Reviews and Protectiveness Determinations (See Comprehensive Guidance on Five Year Reviews (EPA July 2001) and Clarifying the Use of the Protectiveness Determination (EPA September 2012)) describe in detail how EPA should conduct Five Year Reviews for all NPL sites across the nation. Nowhere in this guidance is it contemplated that a site which has a constructed remedy could receive a protectiveness determination of "not yet protective but will be protective". EPA is violating its own guidance by making up a new category of protectiveness which has never been employed or contemplated in the sixteen years that the Agency has had guidance on Five Year Reviews.

As noted above, EPA must also answer the question if any other information has come to light which would question the effectiveness of the remedy. EPA appears to be ignoring or downplaying all of the information which has become available after remedy selection that calls into question it's modelling and predictions, contrary to the Five Year Review guidance.

General Comment 3:

EPA appears to be abandoning the ROD targeted reductions in fish PCB concentrations that formed the basis for justifying the dredging remedy, and in doing so is arbitrarily ignoring critical questions A & B in its own Five Year Review guidance.

In the proposed five year review report, EPA is now stating that the remedy will not be protective until the ultimate remedial goal of 0.05 parts per million PCB in fish is reached. DEC urges EPA to enforce the selected remedy in the ROD and take the actions necessary to ensure that the remedy achieves the targeted rapid reductions in fish PCB levels, and thus human health and environmental risk, identified in the ROD. The ROD identified that the remedy would achieve the first target (0.4 parts per million or ppm PCB in average fish concentrations) within five years after dredging, and 0.2 ppm in sixteen years. This was the primary basis upon which EPA justified the dredging remedy, and the primary basis for the State's concurrence with the remedy.

EPA also identified these targets as representing, in EPA's view, points where there would be opportunity for the fish consumption advisories to be modified. However, EPA now appears to be pointing only to the ultimate remedial goal of 0.05 parts per million in fish, and no longer appears to be prepared to manage the remedy to achieve the ROD targets.

These ROD targets, representing rapid significant reductions in fish PCB concentrations and thus human health and environmental risk, were the primary basis used by EPA to justify the dredging remedy and the primary basis upon which the State concurred that the remedy would be protective of human health and the environment. EPA has provided no valid justification in its proposed report for abandoning these targets, other than being content to have a "wait and see" approach, while exposing the people and environment of New York State to unacceptable risks for many decades.

EPA should manage the remedy for this site so that the remedial targets identified in the ROD are achieved, and not focus solely on the ultimate remedial goal, which would only be achieved several generations into the future regardless of whether the remedial work was done or not.

General Comment 4:

EPA needs to follow the ROD and adaptively manage this remedial action, now in the "Monitored Natural Recovery" phase with dredging completed in 2015 and habitat reconstruction (planting) completed in 2016.

EPA should recognize that the remedy in the ROD represented EPA's best estimate as to how much remedial work would be necessary to meet the targets and goals set in the ROD. This estimate, based upon the tools available at the time, is what led EPA to determine the extent of remediation necessary for the rapid reductions in fish PCB concentrations, and thus human health and environmental risk, identified in the ROD.

At the present time, with the data from the project design and construction being available over the fifteen years since the ROD was issued, EPA now needs to update the site conceptual model, and gather the data necessary to determine if the amount of remedial work identified in the ROD will achieve the targeted reductions in human health and environmental risk.

DEC asserts that it is likely that further remedial work would be necessary to achieve the targeted reductions in fish PCB concentrations. More PCB was left behind than anticipated, and the most recent fish PCB concentrations indicate that it will likely take unrealistically high natural recovery rates to reach the targeted fish PCB concentrations, the first of which is to be reached five years after dredging.

In order for the remedy to be protective, the remedy should be managed to meet the targets set in the ROD. If the targets are not going to be met, then EPA should adjust the amount of remedial work done, not abandon the targets.

NYSDEC General Comments on EPA's Proposed Hudson River Five Year Review Report

General Comment 5:

EPA must update the agency's understanding of how the PCBs remaining in Hudson River sediments impact the water column and fish in the river.

There have been several important findings since the ROD was issued as it pertains the understanding of the distribution of PCB in Hudson River sediments, and how they impact water column and fish. EPA needs to update this understanding (called the "conceptual site model") to take these findings into account.

First, during the Sediment Sampling and Analysis Program (SSAP), the major data gathering program during project design (done mostly in 2002-2005), much more PCB mass in the river was found than previously thought, and much of this additional mass was closer to the surface.

Second, during implementation of the dredging program, it was again found that in certain areas of the river where woody debris had accumulated, there was significantly more PCB at depth than initially found in the SSAP, due to the debris preventing adequate sampling depth.

Third, the impact of the dredging work on the fish clearly shows that the increase in water column PCB concentration did not have a commensurate impact on the fish in the Hudson River. Typically, only those fish in the immediate vicinity of the dredging work, or immediately downstream, showed a significant reaction to the dredging. This indicates to DEC that the local sediments are much more important in controlling fish PCB concentrations than impacts from upstream sources, which in the Hudson River primarily means upstream sediments. This is most important for the Lower Hudson River, where the fish showed little to no response to the dredging work upstream, and it can no longer be expected that the remedial program in the Upper Hudson will result in significant improvement in fish PCB concentrations south of Albany.

EPA is again using overly optimistic model projections anticipating rates of natural recovery which are likely higher than what is happening in the river.

DEC raised this issue in a July 31, 2000 letter to EPA Region 2 during remedy selection, stating that this overly optimistic view of natural recovery rates (due to underrepresentation of the relative impacts of the sediments on fish) likely understated the benefits of active remediation. EPA understood that there was uncertainty in the modeling effort and, with that understanding, still set the targets in the ROD for protectiveness. EPA is again using the same model, which likely again underestimates the impacts of the local sediments on the fish, and is again likely underestimating the impact of the remaining contaminated sediments on the fish.

If EPA continues to use modeling for this site, as the ROD directs, then it will be necessary for EPA to restructure and recalibrate the model to reflect an updated conceptual site model which properly takes into account what has been learned since the ROD was issued. EPA has never given DEC or the public a valid scientific reason for not updating its modeling and flawed predictions.

General Comment 6:

EPA needs to develop and implement a monitoring plan which is designed to quantify the performance of the remedy at the temporal and spatial scale necessary to understand the remedy performance in a time frame commensurate with the time to reach the targeted rapid reductions in fish PCB concentrations.

DEC believes that the data gathering should be sufficient to understand, with the appropriate degree of statistical certainty, if the remedy is meeting the anticipated recovery rates in the time to reach the first target in year 2020.

To ensure statistical certainty, and to avoid missing differences in remedy performance in one area of the river as compared to another, the data gathering must be done on a spatial scale commensurate with the exposure driving the fish PCB concentrations. As the fish generally do not move between pools (the reaches of river separated by locks and dams), the fish will be impacted primarily by the sediments in the pool where they live. Sediments in Schuylerville will not drive PCB concentrations in fish at Waterford, some twenty-five miles downstream, and sediments in Waterford certainly will not drive PCB concentrations in Schuylerville. EPA's current approach would average between large reaches of river, restricting any ability to discern the actual performance of the remedy at the scale where the exposure occurs.

DEC has identified the data gathering which is necessary to understand the performance of the remedy, and urges EPA to follow the recommendations provided by DEC over a year ago.

General Comment 7:

Moving forward, DEC urges EPA to recognize that there is much more work to be accomplished to address the human health and ecological risk posed by the disposal of PCBs in the Hudson River. EPA should do the work necessary to ensure that the remedy in the Upper Hudson is protective, and to implement a full investigation and remedial program in the Lower Hudson south of Troy.

EPA should acknowledge that the remedy is currently not protective of human health or the environment, as the current risks are beyond EPA's acceptable range. EPA should collect the monitoring data necessary to quantitatively evaluate remedy performance as compared to the ROD targets, and to gather the data necessary to determine how to

modify the remedial work should the data indicate that the remedy will not or is not meeting the targets. In short, should the remedy not meet the targets, EPA should modify the remedy, not change the targets to make it appear to be protective.

EPA also should immediately exercise the authority to implement a comprehensive Remedial Investigation of the Lower Hudson River. The entire estuarine portion of the river south of the Troy Dam is contaminated with PCBs from the Upper Hudson, and EPA no longer expects the remedial program in the Upper Hudson to have much impact on the Lower Hudson River, particularly in the area south of Albany. In the meantime, EPA has no plans to move forward with an investigation of the distribution and impacts of the PCB contamination already present in the Lower Hudson transported from the Upper Hudson.

There is no reason to wait – this portion of the river is already part of the "National Priorities List" site. EPA already has the authority to issue an order to GE to implement a Remedial Investigation and Feasibility Study to determine the nature and extent of PCBs throughout the Lower Hudson, and to evaluate remedial actions needed to abate the human health and ecological risks that EPA currently recognizes as above the acceptable risk range.

Detailed Technical Comments - Attached

DEC has performed a detailed review of the document text and has evaluated the scientific information and assessments presented in the appendices. Attached to this letter is a list of detailed comments on the report. Please provide DEC with a written response to the issues raised in this letter and the attached comments, as well as to the written comments first provided in December 2016 and to the statements read at the public meeting and provided to EPA. DEC is, as always, prepared to meet with EPA to help advance the remedial program for the Hudson River and work toward our common goal of abating the human health and ecological risk caused by the disposal of PCB in the Hudson River.

NYSDEC's Detailed Comments – Five Year Review Report Text and Appendices

#	Report citation	Issue	Quote from document	Comment / Discussion	References
1	Executive Summary, page 1	Errata	"The purpose of this second five-year review (FYR) is to determine whether the remedial actions at the Hudson River PCBs Superfund Site (Site) are protective of public health and the environment and functioning as designed."	This is actually the third five year review for this site overall; the third for OU1, and second for OU2. The initial review of the remedy selected in the 1984 ROD was started in 1989 and culminated in the 2002 ROD for OU2.	
2	Executive Summary, page 2	Models	"Although these recent data present some encouraging results, further monitoring will be required to verify remedy effectiveness, but the analyses presented in this report demonstrate that the models used to support decision making were well-designed, remedial action objectives (RAOs) were appropriately developed, and remedy implementation is proceeding as planned."	USEPA states here that: (1) the models used in remedy selection were "well designed", (2) that the RAOs were "appropriately developed", and (3) remedy implementation is "proceeding as planned". This contradicts later statements that the model projections for reaching the interim targets can not be relied upon, and that the interim targets identified as RAOs should no longer apply.	
3	Executive Summary, Page 4	Reductions in Surface Sediment and Fish PCBs	"Available surface sediment data in conjunction with fish and water column concentrations indicate that surface sediment PCB concentrations are decreasing with time. The reduction in surface sediment concentration associated with dredging alone by river section was 87%, 36%, and 5% in River Sections 1, 2, and 3, respectively. Although the reduction associated with dredging in River Section 2 (RS2) was less than expected and may cause a lag in recovery, the overall surface sediment reduction is within ROD expectations."	EPA and DEC agree that there should be a close relationship between surface sediment PCB concentrations and fish PCB concentrations, particularly at a local level. In order to achieve the desired reductions in fish PCB concentrations, a commensurate reduction in sediment PCB concentrations must be achieved. The RAO interim targets for reach and species averaged fish PCB concentrations are to reach 0.4 ppm total PCB five years after dredging is completed. However, EPA's report states that only at 22% reduction in surface sediment PCB concentrations on a River Section length weighted average. As a result, it is unlikely that natural processes will be able to result in sufficient improvement to allow for surface sediments, and thus fish, to reach the ROD targets for reductions in PCB concentrations over time. The 2016 river section and species weighted average fish PCB concentration is, according to EPA, 1.25 ppm; it would take 25% reductions annually to reach 0.4 ppm by 2020, five years after dredging. At 8% per year (the model projected post dredging recovery rate), at the current fish PCB levels it would take 15 years to reach 0.4 ppm, and 23 years to reach 0.2 ppm. EPA would have had to achieve reductions due to dredging down to 0.6 ppm for an 8% improvement rate per year to reach 0.4 ppm five years after dredging. This equates to a reduction from 2.15 ppm (the 2004-	River Section 1 – 6 miles / 87% reduction River Section 2 – 6 miles / 36% reduction River Section 3 – 28 miles / 5% reduction [(6x0.87)+(6x0.36)+(28x0.05)]/40= 21.95% River Section Length Weighted Average reduction in surface sediment PCB concentrations

				2008 BMP mean) to 0.6 ppm, or a 72% reduction. It is not realistic to anticipate a 72% reduction in fish PCB concentrations with only at 22% reduction in surface sediment PCB concentrations.	
4	Executive Summary, Page 4	PCB mass reduction	Total PCB and Tri+ PCB mass removed were greater than planned, due to underestimates of the depth of contamination during the original remedial design. PCB mass in non-dredged areas is also greater than estimated in the 2002 ROD, although to a lesser extent than within the dredged areas. As calculated by EPA, the volume of sediment, mass of total PCBs, and mass of Tri+ PCBs removed during both Phases 1 and 2 were approximately 2,642,000 cubic yards of sediment, 155,800 kg of TPCBs, and 48,600 kg of Tri+ PCBs, respectively.	EPA here focuses on the amount of PCB removed; conditions in the river after dredging are not controlled by what was removed, but rather by what was left behind. EPA should not focus on the comparison of what was removed as compared to what was anticipated to be removed, as it is not relevant to the evaluation of whether or not the remedy is protective. Protectiveness is determined by evaluating the current site risks, and comparing them to the acceptable risk range. The current site risks are well above the acceptable risk range, and as a result the remedy is currently not protective. The amount of PCB left behind is much greater than anticipated, resulting (as EPA stated in 2012) a delay in reaching the remedial action objectives.	
5	Executive Summary, Page 4	Habitat reconstruction	Habitat replacement and reconstruction was conducted as anticipated. OM&M of restored habitat will continue until project objectives are met.	As discussed between DEC and EPA over the past several years, DEC believes that EPA has not required GE to perform sufficient habitat reconstruction to allow for the work to reach the habitat reconstruction goals. While not specifically relevant to the protectiveness determination, DEC will provide to EPA specific areas where further habitat reconstruction work is necessary to meet the habitat reconstruction goals.	
6	Executive Summary, Page 5	Model Forecast accuracy	Monitored natural attenuation is occurring and rates of decline are generally in agreement with the modeling done for the ROD:	EPA is overstating the actual observed rates of natural recovery which were ongoing at the time of remedy selection and design. "General agreement" is not a quantitative comparison; a more detailed quantitative analysis, taking into account the uncertainty associated with using different data sets over time, needs to be performed.	
7	Executive Summary, Page 5	Model Forecast accuracy - water	For the pre-dredging MNA period (1995-2008), water column Tri+ PCB concentrations declined at rates ranging from approximately 5 to 13 percent per year at the four Upper Hudson	Unfortunately, there are changes in stations, sampling methodology, and changes in flow regimes which complicate this analysis. EPA should properly account for these sources of	

			monitoring stations, and HUDTOX model simulations for this period were generally faithful to both seasonal and long-term trends.	variability and not rely upon the water data to support excessive rates of recovery in this document.	
8	Executive Summary, Page 5	Model Forecast accuracy - fish	Fish tissue concentrations declined during the pre-dredging MNA period (1995-2008). Rates of decline in the Upper Hudson for wet weight and lipid-normalized fish tissue PCB concentrations were approximately 12 to 20 percent per year and approximately 8 percent per year, respectively, consistent with rates estimated from the FISHRAND model output. Lower rates of decline were observed at locations farther downstream in the Lower Hudson River.	EPA should not be using the wet weight PCB data from the time period after 2005, as GE has admitted that their lab did not follow the acceptable and approved sample preparation protocol, introducing a significant negative bias and high variability to the wet weight PCB fish data. EPA knows this and should not have used this data in their understanding of site conditions. The lipid based PCB concentrations, while biased low for these years, is not biased to the degree as being unusable; however, data users should understand that the later BMP, and subsequent RAMP fish data (until 2015) are biased low. As a result, the estimates of natural recovery are biased high (overstating the rate of recovery) since the earlier data are without this bias, and the later data are biased low.	
9	Executive Summary, Page 5	Model Forecast accuracy - sediment	Available surface sediment data in conjunction with fish and water column concentrations indicate that surface sediment PCB concentrations are decreasing with time. Although the exact rate of decline is difficult to determine, as there is no single consistent sediment data set, the results using the available data indicate a decay rate similar to that predicted at the time of the ROD.	DEC has requested that EPA gather the sediment data necessary to quantify the change in surface sediment PCB concentrations over time at a scale (pool by pool) and in a time frame (commensurate with the remedial targets in the ROD) needed to evaluate remedy performance. EPA has thus far refused to do so, and as a result DEC has begun gathering the needed sediment data starting in Summer 2017.	
10	Executive Summary, Page 6	Monitoring recovery in fish PCB concentrations	2016 fish data suggest that fish have begun to recover from dredging impacts and are generally declining. It is important to recognize that up to 8 or more years of fish tissue data may be necessary to draw statistically based conclusions about trends, with a high degree of confidence, depending on the actual rate of decline that is experienced (it is anticipated that it will require approximately 8 years for fish tissue to decline to 50% of its current PCB concentration based on	It is not necessary to wait eight years to have the data necessary to determine if the fish PCB concentrations are reducing at a rate sufficient to achieve the remedial targets set in the ROD. All EPA needs to do is to perform the statistical power analysis, determine the number of fish samples to collect given the sample variance, and collect/analyze the appropriate number of fish. EPA has thus far refused to do so. Also, it is important that EPA points out here that the agency at the present time expects that it will take eight years for fish PCB concentrations to decline by half; with fish PCB concentrations (in reach and species weighted average fish) currently more than three times	

			an 8% decrease in lipid-normalized fish tissue concentration per year).	the ROD target of 0.4 ppm PCB, EPA could conclude today that the remedial target will likely not be met.	
11	Executive Summary, Page 6	Impact of remedy on the Lower Hudson	The rate of decline of fish tissue PCB concentrations generally decreases with distance downstream. As a result, there is a decrease in the correlation between fish PCB concentrations in the Upper Hudson River and Lower Hudson River with distance downstream. This indicates that PCB sources in the Upper Hudson River have less of an impact on Lower Hudson River fish than on fish in the Upper Hudson.	DEC agrees that the remedy in the upper Hudson is not likely to have a significant impact on fish in the lower Hudson. EPA needs to clarify this statement, however, to point out that the GE sources in the upper Hudson are the primary source of PCBs in the Lower Hudson, and that presently GEs PCBs currently still coming out of the upper Hudson are much less of a source to lower river fish that GE's PCBs already in the Lower Hudson as a result of past discharges. EPA should not state that PCB sources other than GEs discharges in the upper Hudson are controlling lower Hudson fish PCB concentrations unless the agency has data to support such a conclusion.	
12	Executive Summary, Page 6	Impact of construction schedule on recovery rates	Overall, the project has been implemented as anticipated in the ROD. Dredging activities did include several operational differences from assumptions in the ROD with potential impacts on recovery rates in fish. Some of these differences included a delayed start to dredging, significantly increased mass removal, the use of a single processing facility, and dredging in multiple river sections simultaneously.	DEC agrees that there may be a delay in the start of recovery based upon construction schedule. However, this delay would only be one to two years at worst, in the landlocked reach in River Section 2 between the Fort Miller Dam and the Thompson Island Dam. There should be little or no delay in the Thompson Island Pool, as there was little remedial work in this River Section over the last two years of the remedy. Similarly, there should be no delay in River Section 3, as these reaches of river were dredged in a sequence nearly identical to that planned. ALSO, there should be no impact whatsoever on the post dredging recovery rates caused by the schedule of the work; in all cases, the post dredging recovery rates are and were assumed to be driven by the post dredging natural recovery processes which are not impacted by construction schedule. It is also important to point out that EPA, in the ROD, already built in a two year delay; while the model predicted reaching 0.4 in three years, the ROD says "within five".	Also - in RS1, the water quality data during the last few years of dredging showed little or no impact from dredging operations; the data were often non-detect for PCBs. The dredging work in the last year of the project were well downstream of the fish sampling locations (just above the TI Dam), or of short duration (two weeks) at the very northern end of the pool.
13	Executive Summary, Page 7	Health Risk Assessments	For OU2 (in-river sediments), the risks that were calculated for the ROD were re-assessed using current exposure assumptions, toxicity values, and standards to determine if the conclusions of the risk assessment or the protectiveness of the remedy has changed. Although there have been	EPA here makes one of the State's main points; the human health risk associated with this site is still well above the acceptable risk range, the conclusions reached in both the upper Hudson and lower Hudson human Health Risk Assessments done during the Reassessment RI/FS.	

			some updates to the exposure assumptions used in the human health risk, the updates do not change the conclusions of the risk assessment. Toxicity values for human health were taken from the Integrated Risk Information System for both cancer and non-cancer health effects, consistent with EPA guidance. EPA determined that the human health RAOs developed in the 2002 ROD are still valid and appropriate for the Site.		
14	Executive Summary, Page 7	Ecological Risk Assessment	For ecological risk, there were some changes to exposure parameters (some increasing and some decreasing) and toxicity values (i.e., the Lowest Observed Adverse Effect Level (LOAEL) and No Observed Adverse Effect Level (NOAEL)). Overall, use of these updated values would result in calculated risk ranges that are narrower than presented in the ROD, with a slight reduction in the upper bounds of the risk-based concentration ranges for PCBs in fish consumed by river otter and mink. This refinement results in risk-based ranges that reduce uncertainty and focus the range of PCBs in fish expected to be protective of the ecological exposure pathway. The lower bounds of the updated ranges are not lower than the lower bounds for both ranges identified in the ROD, and the refinements of toxicity values and exposure parameters do not affect the protectiveness determination of the selected remedy.	As with the human health risk assessments, EPA here makes one of the State's main points; the ecological risk associated with this site is still well above the acceptable risk range, the conclusions reached in the Ecological Risk Assessments done during the Reassessment RI/FS.	
15	Executive Summary, Page 8	Protectiveness Statement for OU2	OU2: Based on data collected and reviewed to date, EPA expects that the remedy at OU2 will be protective of human health and the environment upon completion. Remedial activities completed to date have substantially reduced PCB source materials in the Upper	The State disagrees with the protectiveness determination. The remedy is not protective if it will be several decades until PCB concentrations in fish will no longer require that the State recommend that human consumption of fish be limited, and until significant ecological risk has abated. The State also believes that EPA should recognize and articulate in the Five	

			Hudson River. As expected in the Record of Decision, average PCB concentrations in fish in the Upper Hudson are declining but have not yet reached protective levels. Therefore, as of the date of this five-year review, EPA recognizes the remedy at OU2 to be not yet protective of human health and the environment. Because the remedy includes not only the dredging component but also the subsequent period of monitored natural attenuation, EPA will not consider the OU2 remedy to be complete until the natural attenuation component also has been completed. Based on all the available data to date, EPA expects that continued natural attenuation following the completion of dredging will achieve the long-term remediation goal for the protection of human health with regard to fish consumption (0.05 mg/kg PCBs in species-weighted fish fillet). As EPA indicated in the Record of Decision, EPA believes it likely that improvement will occur gradually over several decades at least. In the interim, the State of New York has in place fishing restrictions and advisories against consumption of fish to control human exposure pathways that could result in unacceptable risks. EPA acknowledged in the 2002 ROD that the consumption advisories are not fully effective in that they rely on voluntary compliance in order to prevent or limit fish consumption. EPA will continue to work with New York State to ensure the ongoing maximum effectiveness of the advisories.	Year Review Report that there are currently, and will be for decades into the future, uncontrolled human health and ecological risk. EPA should also recognize and articulate in the Five Year Review Report that the fishing restrictions and consumption advisories are only partly effective in limiting human fish consumption, and are of no effect to address ecological risk.	
16	History of Contamination,	Reference to PCB mass discharges	From approximately 1947 to 1977, GE discharged an estimated 1.3 million pounds of PCBs into the Hudson River from its capacitor	Although this estimate of mass discharged to the river by GE from the capacitor plants in Hudson Falls and Fort Edward has been repeated many times, by many parties (including DEC) in	

	section 1.1.5, page 12		manufacturing plants at Hudson Falls and Fort Edward.	the past, DEC has concluded recently that there is no basis in the record for this estimate. DEC now believes that it is inaccurate and inappropriate to continue to cite this estimate. The actual mass discharged to the river is unknown, and may be much more than 1.3 million pounds (650 tons).	
17	Five Year Review Summary Form, page 14	Construction completion status	The form here states "No" in response to "Has the site achieved construction completion?"	Dredging was completed in late 2015. Habitat reconstruction as per the scope of work was reportedly completed in 2016. Facility decommissioning work was completed in late 2016. Construction is complete.	
18	Five Year Review Summary Form, page 14	Review Number	The form here states "2" in response to "Review Number".	This is actually the third five year review for this site overall; the third for OU1, and second for OU2. The initial review of the remedy selected in the 1984 ROD was started in 1989 and culminated in the 2002 ROD for OU2.	
19	Remedial Action Objectives (RAOs), pages 17-18	Identification of remedial action objectives	"Reduce the cancer risks and non-cancer health hazards for people eating fish from the Hudson River by reducing the concentration of PCBs in fish. The risk-based preliminary remediation goal (PRG) for the protection of human health is 0.05 mg/kg PCBs in fish fillet based on non-cancer hazard indices for the RME adult fish consumption rate of one half-pound meal per week (this level is protective of cancer risks as well). Other target concentrations are 0.2 mg/kg PCBs in fish fillet, which is protective at a fish consumption rate of one half-pound meal per month and 0.4 mg/kg PCBs in fish fillet, which is protective of the CT or average angler, who consumes one half-pound meal every two months. Attaining such levels might facilitate the relaxation of the fish consumption advisories and fishing restrictions (e.g., the "eat none" advisory for the Upper Hudson could be relaxed as conditions improve)." (AND) "In the	This is the portion of the ROD text where EPA specifically identifies the target concentrations in the ROD as remedial action objectives. In the ROD, EPA also states that "*The time to reach target PCB concentrations in fish was a primary factor in comparing remedial alternatives. As more fully described in Section 11.1 - Overall Protection of Human Health and the Environment, the time to reach target levels (e.g., 0.2 and 0.4 mg/kg) favors the active remediation alternatives.*" (ROD, pages 66-67)	See also ROD pages 71-72, Section 11.1; EPA relies upon the time to reach the 0.4 and 0.2 targets to differentiate between the alternatives and justify the selected remedy.

			ROD, EPA adopted the preliminary remediation goals identified above as the remediation goals for the Site."		
20	Institutional Controls, page 22	Effectiveness of Controls	"It is noted that the fish advisories rely on voluntary compliance and therefore are not completely effective in preventing fish consumption."	This understanding is a primary basis for the need, identified in the ROD, for rapid reductions in human health risk in the years immediately following remediation.	See also ROD page 104: "*Institutional controls do not protect ecological receptors, and human health risk reduction relies on knowledge of and voluntary compliance with the consumption advisories and fishing restrictions. Consequently, the active remedial alternatives are substantially more protective of people who do not follow the fish consumption advisories, because of the residual risk in consuming fish and the shorter time required to reach fish PCB target levels under those alternatives.*"
21	Operation and Maintenance, page 22	Scope of OMM	"EPA is currently considering whether any modifications are necessary to the OM&M programs identified in the Phase 2 OM&M Scope, which is an attachment to the consent decree under which GE is implementing the OU2 remedy."	DEC has already provided to EPA, by emails on February 10 and May 18, 2016, and by letter on March 10, specific recommendations on the needed scope of monitoring to evaluate remedy performance for this site. DEC also provided specific thoughts on the scope of sediment sampling by letter on November 14, 2016, when chose to approve a limited sampling effort for sediments in the upper Hudson.	
22	Operation and Maintenance, page 22	Scope of OMM	"The work plan for sediment sampling under OM&M was completed October 2016 in part to get the sediment samples collected as soon as possible post-dredging since it takes long periods of time (5 years) between sample events to properly measure changes in concentration."	EPA is incorrect in stating that long periods of time are necessary to properly measure changes in concentrations. EPA can make the appropriate evaluations to measure changes in concentration by using standard power analyses to determine the numbers of samples needed for the desired statistical power. In other words, EPA need only collect more samples to decrease the time needed to understand the changes in PCB concentrations over time.	

23	Technical Assessment, Section 5.1, pages 30-31	Analytical Bias in Fish Data due to Failure to Follow Proper Sample Preparation Protocols	"However, from 2007 to 2013 the GE fillet samples were processed while excluding the ribs of the fillet (*i.e.,* "rib-out" fillets), which is not consistent with New York State protocols. For this period, time trend analyses of PCB levels in fish fillets on a wet weight basis do not include these data, although the data are displayed in the various graphs of the report. The "rib-out" issue does not apply to whole body trend analysis (typically performed on fish collected in the fall) and does not affect lipid-normalized fillet trend analyses."	The failure of GE's contractor to follow the proper sample preparation protocols does impact the lipid normalized trend analyses. There is a downward bias in the lipid normalized PCB data on the order of 15%. EPA has determined that this is not significant; however, analyses of the data from the period 2007 to 2013 should include the understanding that the LPCB data from the GE lab is biased low.	
24	Technical Assessment, Section 5.1, page 31	Interpretation of Fish PCB data	"Dredging was completed in 2015 and, thus, the most recent data available (collected in 2016) reflect conditions less than a year after completion of dredging and that were still influenced by dredging-related impacts."	The 2016 spring sport fish in the upper Hudson (black bass, bullhead, perch) should be assessed as being impacted by the dredging work which ended in 2015, as the trend in fish PCB data indicates that the spring fish represent the previous years' conditions. The fall 2016 forage fish, however, should indicate the first year of post dredging conditions, as they went through an entire growth season in 2016 without dredging impacts.	
25	Technical Assessment, Section 5.1, page 31	Rationale for EPA's abandoning the targeted fish PCB concentrations identified in the ROD.	"Further monitoring will be required to verify remedy effectiveness, but the analyses presented in this report demonstrate that the models used to support decision making were well-designed, RAOs were appropriately developed, and remedy implementation is proceeding as planned. The project is currently transitioning from remedial action to the OM&M phase."	If the models used to support decision making were well-designed, the RAOs appropriately developed, and remedy implementation proceeded as planned, then why is EPA no longer seeking to reach the 0.4 ppm and 0.2 ppm fish PCB targets in the ROD?	
26	Technical Assessment, Section 5.1, page 31	PCB remaining in un-dredged areas in the Upper Hudson	"It is recognized that PCB mass in non-dredged areas is also greater than originally estimated, although not to the same extent as within the dredge areas."	EPA has not yet made a quantitative assessment of the PCB mass remaining in non-dredged areas as compared to previous estimates. This assessment is important in understanding long term performance of the remedy.	

27	Technical Assessment, Section 5.1, page 31	Reduction in surface sediment PCB concentrations	"The overall reduction in surface sediment Tri+ PCB concentrations in the three river sections as a result of dredging was 87%, 36%, and 5% in River Sections 1, 2, and 3, respectively. Although the reduction associated with dredging in River Section 2 was less than expected and may cause a lag in recovery, the overall surface sediment reduction in PCB levels is within ROD expectations."	According to EPA's previous five year review report (Appendix A, Table 1 - the EPA prediction from the model, used for the ROD), the reduction anticipated in the ROD was 79% for River Section 1, 64% for River Section 2, and 4.4% for River Section 3. Clearly, the reductions in River Section 2 were not within expectations. This Appendix also states that a delay of ten years in fish PCB recovery should be expected in River Section 2 as a result of this increase in remaining PCBs over what was anticipated.	
28	Technical Assessment, Section 5.1, page 32	Habitat reconstruction	Habitat reconstruction and replacement was conducted as anticipated to mitigate impacts from the dredging operations. OM&M of reconstructed habitats will continue until project metrics are met.	There are significant problems with the habitat reconstruction effort. DEC has provided to EPA, on multiple occasions, detailed comments on the need for further habitat reconstruction work to facilitate recovery of impacted habitats.	
29	Technical Assessment, Section 5.1, page 33	Sediment Recovery Rates	EPA has estimated an annual natural recovery rate of approximately 5 percent for surface sediment	If EPA believes that the sediment recovery rate is 5% on an annual basis, then the agency should also conclude that the fish recovery rate will also be ~ 5%.	
30	Technical Assessment, Section 5.1, page 33	Fish Recovery Rates	2016 fish data suggest that fish have begun to recover from dredging impacts and are generally back to pre-dredging levels. The average PCB concentration in Upper Hudson River fish at the time of the 2002 ROD was approximately 3 mg/kg (species-weighted, wet weight); prior to the start of dredging in 2009 the species-weighted, wet weight average was 1.4 mg/kg; in 2016 the average was 1.3 mg/kg.	The river section and species weighted average fish PCB concentration is here stated to be 1.3 ppm (mg/kg). At 5% annual recover rates (in keeping with the sediment recovery rate above) it will be 24 years until the 0.4 ppm target is reached, and 38 years until the 0.2 ppm target is reached. These were stated in the ROD to be reached in 5 and 16 years after dredging.	
31	Technical Assessment, Section 5.1, page 33	Fish Recovery Rates	It is recognized that up to 8 or more years of fish tissue data may be necessary to draw statistically valid conclusions about trends.	EPA can draw statistically valid conclusions about trends simply by gathering more samples per year.	

32	Technical Assessment, Section 5.1, page 33	Purpose of OMM program	Monitoring of water, fish, and sediment will continue under the OM&M program to confirm that natural attenuation continues to occur and the remedy is functioning as intended.	If the purpose of the OMM monitoring of water, sediment and fish is to confirm that natural attenuation continues to occur, and that the remedy is functioning as intended, then the sampling program must be designed to answer those questions. The remedy was intended to meet 0.4 ppm in reach and species weighted fish within five years; the water, sediment and fish monitoring must therefore be designed to answer the question "Will the reach and species weighted average fish PCB concentrations reach 0.4 ppm within five years after dredging?" The environmental medium in which the attenuation is to occur naturally is surface sediments; therefore the monitoring program must be designed to answer the question "Is the attenuation of PCB concentrations in surface sediments occurring at the rates necessary for the fish to reach 0.4 ppm within five years after dredging?"	
33	Technical Assessment, Section 5.1, page 33	Lower River	Limited data collection from the lower river indicates that recovery rates are slower than in the Upper Hudson River and may not be strongly associated with PCB loading from the Upper Hudson River.	EPA here admits that conditions in the Hudson River are such that a full investigation is needed in the lower River to understand how GE's PCBs already in the sediments of the lower Hudson are controlling water column and fish PCB concentrations, and to determine what remedial actions may be necessary to address the human health and ecological risks in the lower Hudson posed by the sediment PCBs.	
34	Technical Assessment, Section 5.1, page 33-34	Impact of Schedule on Remedy	Overall, the project has been implemented as anticipated in the ROD. The project implementation did include several operational differences from assumptions in the ROD with potential impacts on recovery rates in fish. Some of these differences included a delayed start to dredging, significantly increased mass removal, the use of a single processing facility, and dredging in multiple river sections simultaneously.	EPA, in Appendix 8, describes how there may be an up to two-year impact on recovery rates associated with construction sequencing and the apparent lack of consideration of construction impacts in the model predictions. However, (as EPA now states) EPA anticipated reaching the 0.4 ppm targeted fish PCB concentration two years after dredging, and the ROD text said up to five years to reach the 0.4 ppm target, there is no need to adjust expectations based upon this issue...EPA already took in into account at the time of the ROD, in making the time to target five years instead of two.	

35	Project Operated and Functioned as Designed, Section 5.1.1.2, p. 36	Purpose of OMM program	The OM&M sediment sampling program, specifically designed to monitor long-term changes in sediment PCB concentrations, will produce the most comprehensive sediment dataset to evaluate PCB concentration trends in Upper Hudson River sediments. As there are no RAOs or remediation goals specifically linked to sediment PCB concentrations, the OM&M sampling is intended to create a diagnostic dataset to better understand recovery from dredging-induced disturbances in the Upper Hudson River, but not as a direct means to determine whether (nor where) further remediation of the Upper Hudson River may be warranted.	EPA here misstates the purpose of gathering the sediment data during OMM. According to the OMM Scope document, the objectives are (see section2.3.1) (1) Determine post-remediation PCB levels in sediments in non-dredge areas of the Upper Hudson River; (2) Provide data on Select Areas that exceeded the MPA removal criteria that were not targeted for removal because they were buried by cleaner sediments to assess whether the deposits have experienced erosion; (3) Determine sediment recovery rates in non-dredge areas of the Upper Hudson River; and (4) Examine the changes to surface PCB concentrations in backfill areas. EPA needs to design and implement a sediment sampling program to be used in OMM which meet the overall goal for the OMM program which is to "provide data on PCB levels over time to assess whether the Remedial Action Objectives (RAOs) and Remediation Goals (RGs) set forth in the ROD are being achieved." EPA must focus monitoring effort toward assessing progress toward reaching the near term objectives, and not just on long term changes.	
36	Project Operated and Functioned as Designed, Section 5.1.1.2, p. 37	Basis for Five Year Review analysis of remedy function	For this five-year review, the following criteria represent the primary metrics for evaluation of remedy function: (1) Baseline trends and construction impacts (Water column PCB concentrations prior to and during Phase 1 and Phase 2 dredging (refer to Section 5.1.1.3.3) and fish tissue PCB concentrations prior to and during Phase 1 and Phase 2 dredging (refer to Section 5.1.1.3.4); (2) Sediment and PCB mass removal via Phase 1 and Phase 2 dredging (refer to Section 5.1.1.3.2); (3) Pre-dredging MNA period trends (refer to Section 5.1.1.3.5) and (4) Capping Effectiveness (refer to Section 5.1.1.4).	This passage summarizes the primary problem with the rationale used by EPA to support a protective determination other than the appropriate "not protective". Here EPA states that the evaluation of how the dredging remedy is performing on conditions before the remedy was implemented, and during implementation. The conditions before and during dredging did not, do not, and will not control the rates of decline in fish, water and sediment PCB concentrations. EPA should not use these data from before and during dredging to quantify the rates of improvement after dredging due to natural recovery.	

37	Evaluation of PCB Mass Removal, Section 5.1.1.2.1, p. 39-41	Detailed Evaluation of PCB Mass Removed	(This entire section focuses on the percentage of PCB mass removed within the upper Hudson River)	EPA misses the point. The ability of natural recovery to achieve the recovery in surface sediment PCB concentrations needed to meet EPA's remedial goals is driven by how much PCB was left behind, not on how much was removed.	
38	Habitat Reconstruction, Section 5.1.1.2.3, p. 43-44	Loss of Habitat due to Remedy	(This entire section focuses on the reconstruction of habitat in the project area)	DEC believes that substantial unnecessary habitat loss occurred during the remedial work due to the failure of EPA to follow applicable State guidance and law.	
39	PCB Levels in Fish, Sediment and Water are Declining, Section 5.1.1.3, p. 44	Post Dredging Recovery	The length of time needed to achieve remedial goals and remedial action objectives was an important factor considered by EPA in the 2002 ROD.	EPA should continue to manage this site as though the time to reach remedial goals continues to be important. However, EPA has chosen to ignore the interim targets and instead focus on the long term goal, which would be achieved in about the same time whether or not the dredging occurred. EPA needs to manage this site to meet the ROD interim targets upon which the remedial decision were based - achieving 0.4 ppm in reach and species averaged fish five years after dredging, and achieving 0.2 ppm 16 years after dredging.	
40	PCB Levels in Fish, Sediment and Water are Declining, Section 5.1.1.3, p. 44	Post Dredging Recovery	The HUDTOX model computed an effective rate of decay in sediment concentrations of approximately 8 percent per year for the calibration period. Consistent with the close relationships among sediment, water, and fish tissue PCB concentrations, FISHRAND generated rates of decline of PCBs in fish tissue similar to rates observed in HUDTOX over the 1977-1998 time period, as discussed in Appendix 3. Following dredging, the models predicted continued declines in tissue concentrations, although the upstream project boundary PCB load ultimately results in asymptotic non-zero PCB concentrations in fish (see, e.g., 2002 ROD, p. 54).	EPA here states a fundamental assumption made in selecting remedy - the removal of the sediment targeted in the ROD would result in a post dredging recovery rate of 8% per year, which, because sediment and fish PCB concentration are closely related, would result in post dredging recovery rates of 8% in both media. If this is not being achieved, then EPA should adjust the amount of sediment removed.	

41	PCB Levels in Fish, Sediment and Water are Declining, Section 5.1.1.3, p. 44-45	Post Dredging Recovery	In addition, EPA considered a target concentration of 0.2 ppm PCBs (wet weight) in fillet based on one half-pound meal per month, and a target concentration of 0.4 ppm based on the average (central tendency) consumption rate of one half-pound meal every 2 months. The target concentrations (which can be considered interim milestones) correspond to points at which the fish consumption advisories could be relaxed from the current "eat none" recommendation in the Upper Hudson River to allow a limited number of fish meals (*i.e.,* ranging from 6 to 12) per year, as recovery of the river progresses to the point where unlimited consumption is safe. It should be noted that the fish consumption advisories are under the control of NYSDOH.	EPA here confirms the importance of the 0.4/0.2 ppm targeted (reach and species average) fish PCB concentrations, noting the importance of reaching PCB levels which correspond, in EPA's view, to levels representing reduced human health risk allowing consumption.	
42	PCB Levels in Fish, Sediment and Water are Declining, Section 5.1.1.3, p. 45	Post Dredging Recovery	Modeling presented as species-weighted averages in Table 11-2 of the ROD showed that neither MNA nor the selected remedy would achieve the human health remediation goal of 0.05 ppm PCBs for RS1, RS2, or for the Upper Hudson River as a whole, within the modeling time frame (to 2067) unless the upstream source was virtually eliminated, but would be achieved within 40 years in RS3 (RM168-154).	Here EPA confirms the critical importance of the interim targets, which provided the basis for selecting the dredging remedy. There is no difference between any of the alternatives in reaching the long term target of 0.05 ppm total PCB; the only difference was the time to reach the interim targets (the dredging remedy provided significant rapid risk reductions compared to not dredging).	
43	PCB Levels in Fish, Sediment and Water are Declining, Section 5.1.1.3, p. 45	Post Dredging Recovery	The model results averaged over three species in the entire Upper Hudson River, as presented in Table 11-2 of the ROD, project that a target level of 0.4 mg/kg wet weight could be achieved several years after completing dredging and after 15 years for the 0.2 mg/kg wet weight target level.	The ROD text actually says five and sixteen years, respectively, to reach the 0.4 and 0.2 ppm reach and species weighted average concentration.	
44	PCB Levels in Fish, Sediment and Water	Post Dredging Recovery	The median largemouth bass concentration of PCBs is close to the 0.4 mg/kg target level, and	Here EPA is "comparing apples and oranges." The median is different than the average (also known as mean). Given the	

	are Declining, Section 5.1.1.3, p. 45		the yellow perch median is below this target level. Similarly, Figures A3-3 and A3-4 show that in RS2 (RM184) and RS3 (RM154-168), largemouth bass median tissue concentrations are close to 0.4 mg/kg and median yellow perch levels have achieved the 0.4 mg/kg target concentration.	distribution of the fish PCB data, the median is less than the mean. EPA in discussing the interim targets which were AVERAGES, should not be presenting data in terms of MEDIANS, which are not the same thing. It is also important to point out that the targeted concentrations in the ROD were species weighted as well as river section length weighted, meaning that the comparisons to individual species at individual locations are not particularly meaningful when comparing to the metric EPA chose in the ROD. DEC does agree, however, that comparisons at specific locations are very important in understanding remedy performance over time, and encourages EPA to gather fish, sediment, and water data on a pool by pool basis rather than river section basis.	
45	PCB Levels in Fish, Sediment and Water are Declining, Section 5.1.1.3, p. 46	Post Dredging Recovery	As also discussed earlier, actual dredging activities deviated from the upstream-to-downstream pattern of dredging anticipated at the time of the ROD. For example, dredging occurred in RS1, the most upstream river section, during the final year of the remedy. As a result of this and other operational modifications (described in Appendix 8), specific predictions of dredging-related impacts to water column, sediment, and fish tissue concentrations as presented in the ROD differed in some respects from what was observed. Appendix 8 also discusses short term impacts to fish tissue concentrations as a result of these modifications. As expected, these impacts were spatially and temporally transient.	The work in River Section 1 in the last year of dredging, with the exception of a small area for a few weeks near Rogers Island, was all at the extreme south end of the pool, well downstream of the five fish sampling locations in this pool. This work would not have had a significant effect on the fish PCB concentrations gathered in River Section 1 in either the spring or the fall of 2015 or 2016.	
46	PCB Levels in Fish, Sediment and Water are Declining, Section 5.1.1.3, p. 46	Post Dredging Recovery	Less than one year of post-dredging data is available, and additional years of monitoring data are required for a robust statistical evaluation of post-dredging MNA trends. This five-year review assesses the current status of the river	This statement contradicts much of the report, which relies on the use of pre-dredging data to support the effectiveness of the modeling effort to support the use of the model to predict success of the remedy. A true assessment of the post remedy fish data suggests that it is very unlikely that the ROD targeted	

			using the most current post-dredging data for sediment, water column and fish tissue PCB concentrations, and provides preliminary indications of system response to implementation of the remedy.	rapid reductions in fish PCB concentrations, which formed the primary basis for selecting and implementing the remedy, will not be achieved in the time frames identified in the ROD.	
47	Page 61	Consumption Advisories	"…commercial fisherman…"	Replace with "…fisherman's associations…"	
48	Page 62	Consumption Advisories	"According to NYSDOH, since 2011 certain communities in the Lower Hudson Region (south of Bear Mountain Bridge) may ***have been*** less aware…"	Replace with "According to NYSDOH, previous consumption surveys indicate that certain communities in the Lower Hudson Region (south of Bear Mountain Bridge) may be less aware…"	
49	Page 62	Consumption Advisories	"Therefore, according to NYSDOH, in 2011 NYSDOH ***began focusing more of*** its outreach efforts on the Lower Hudson River Region and since 2012, to more recently observed demographic groups."	Replace with "Therefore, according to NYSDOH, in 2011 NYSDOH continued its outreach efforts in the Lower Hudson River Region and since 2012, to more recently observed demographic groups."	
A4-1	Appendix 4 - General Comment	Surface Sediment Concentrations	(General Comment)	It is important to point out that in Appendix 4, EPA is making a fundamental error - assuming that all of the changes in sediment PCB concentrations are the result of natural recovery. Since 1977, there have been a number of significant events which impact sediment PCB concentrations which are not the result of natural processes. Assuming that changes in sediment PCB concentrations are the result of natural processes (only once in Appendix 4 is source control even mentioned as a potential factor in changes of sediment PCB concentrations) fundamentally confounds the use of Appendix 4 as a source of understanding the rates of natural recovery. For example, looking at rates of recovery between 1977 and 1991, without taking in to account the impact of the cessation of PCB discharges to the Hudson in 1977, remedial measures at the remnant sites, and initial abatement measures at the GE plant sites, significantly overestimates the rates of improvement due to "natural recovery" during this time period. Similarly, the reduction in PCB sources to the river due to numerous remedial	

				measures taken at the GE plant sites over many years starting in the late 1980s at Fort Edward in the early 1990s at Hudson Falls, throughout the period leading up to the start of dredging in 2009 similarly confounds the use of the sediment data to understand rates of "natural recovery". Without taking the impact of source control into account, all of EPA's estimates of rates of natural recovery represent overestimations and upper bounds; recovery rates could be no higher, but the recovery due to natural processes are very likely much less, as the impacts of source control likely dominated changes to the system during the periods in question.	
A4-2	Appendix 4, page 1-1	Sediment - Fish relationship	The reduction in fish tissue PCB concentrations that will be achieved by the overall reduction in the PCB mass that may become bioavailable is closely related to the surface sediment PCB concentration throughout the Upper Hudson. In the selected remedy, reduction of PCBs in surface sediment is achieved through two important processes: 1) sediment removal by dredging and backfilling, and 2) monitored natural attenuation (MNA). Both processes are required to achieve the goals of the ROD. In general, fish body burdens are expected to track with the changes in surface sediment PCB concentrations (*i.e.*, if residues decrease in the surface sediment, then they should also decrease in the overlying water column, and with reductions in sediment and water, the residues in fish should decline as well). Bioaccumulation relationships are site-specific, and in any given setting, if a 10- fold reduction in fish body burden is targeted, then, at a minimum, a 10-fold reduction must be achieved in the media to which fish are exposed (sediments and overlying water).	There is no reason to believe that the sediment - water - fish relationship is different from one reach of the upper Hudson to another. EPA can not have it both ways - either the local surface sediments drive fish PCB concentration, or they do not. EPA has no basis to suggest that the sediments in River Sections 1 and 2 control fish PCB concentrations, while the water column controls fish PCB concentrations in River Section 3. The fish and water PCB data gathered during implementation of the remedy indicate that there could be large increases in water PCB concentrations without corresponding increases in fish PCB concentrations, indicating that the surface sediment PCB concentrations are much more significant contributors to fish PCB than water column PCBs at this site. Local sediments drive local fish. In order to achieve reductions in fish PCB concentrations, reduction in local surface sediment PCB concentrations are likely necessary.	

			This may be achieved directly by reducing contaminant concentrations in sediments composing the feeding/home range of the fish, or as in River Section (RS) 3, indirectly by reducing water column concentrations impacting prey downstream of sediment remediation areas.		
A4-3	Appendix 4, page 2-1	Usability of past sediment sampling programs for temporal analysis	Sediment data are inherently spatially limited, and are typically obtained from samples collected using a coring device or a grab sampler. In trying to characterize large areas of the river bottom, care must be taken to obtain spatially representative samples. Because of the highly variable nature of PCB sediment concentrations, even over short distances (less than 2 meters), a statistically appropriate number of samples and an appropriate sample design are needed to accurately measure the mean concentration in a given area. Thus, any program to monitor temporal changes in surface sediments must be designed accordingly and, in addition, multiple sample rounds need to be collected over time in a consistent way. None of the sediment sampling programs conducted to date was designed specifically with this objective (*i.e.,* to represent changes in sediment PCB concentrations over time), with the exception of the 2016 data collection. As a result, conclusions about concentration trends should be drawn cautiously and their limitations clearly discussed.	DEC agrees; none of the past sediment sampling programs were designed and implemented in a manner which allows for meaningful quantitative temporal analysis of trends in surface sediment PCB concentrations. EPA had an opportunity to implement such a program, designed to achieve the needed data quality objectives - to determine if the post dredging improvement in surface sediment concentrations due to natural recovery is occurring at the rate necessary to achieve the ROD objectives. This is why DEC undertook a sediment sampling program in 2017 to answer this essential question. EPA's sediment sampling program, due to insufficient number of samples, will not answer this question until several years after the first ROD targets are to be reached.	
A4-4	Appendix 4, page 2-1	Usability of past sediment sampling programs for temporal analysis	(See above)	It is also important to point out that EPA here clearly describes the limitations of the analyses presented in Appendix 4. DEC views these analyses as informative, but not quantitative with the degree of certainty needed to evaluate the rate of recovery prior to dredging. It is also an error to try to anticipate or	

				estimate the rate of post-remedial recovery in surface sediment concentrations based upon the rate of improvement before the remedy, as there has been fundamental changes in the system due to source control before dredging and sediment removal/backfilling as part of the dredging.	
A4-5	Appendix 4, page 2-8	2016 Sediment sampling	GE's 2016 surface sediment sampling program was designed under EPA direction as part of the OM&M sediment monitoring program to assess long-term recovery following the completion of the dredging remediation via the collection and analysis of surface sediment samples from both non-dredged and dredged areas in the Upper Hudson River. The 2016 sampling event establishes the initial year of the required sampling design in non-dredged areas. The required sampling of the dredged areas will occur in 2017. Determination of the required number of samples and their locations was based on EPA's sampling design analysis.	EPA should reveal here the fundamental basis for the sample design analysis - understanding the rate of change over ten years, on a river section by river section average basis, which is not sufficient to understand the performance of the remedy in a time frame commensurate with the remedial targets.	
A4-6	Appendix 4, page 2-8	2016 Sediment sampling	The OM&M surface sediment sampling design5 is a probability-based program developed around the objective of supporting rigorous, unbiased estimates of overall post-dredging average PCB concentrations, and associated uncertainty bounds, in RS1, RS2, and RS3. The data collection will be used to quantify changes in overall average surface sediment concentrations over time by river section and to support investigation of relationships among fish, water and sediment during the post-remedial monitoring period.	Unfortunately, EPA's sediment sampling design will confound the ability to use the sediment data to understand the sediment-fish relationship, as EPA will be averaging the sediment PCB concentration between pools in River Section 2 (two pools, six miles) and particularly in River Section 3 (five pools, over 28 miles). Fish in Schuylerville are not controlled by sediments in Waterford. The averaging of sediment between pools, and fish between pools, will dilute out any actual relationships. Fish in one pool are not driven by sediments in another pool. As discussed above, local surface sediments drive local fish PCBs in this system. As a result, the data necessary for the understanding of the fish-sediment relationships needs to be gathered on a pool by pool basis.	

A4-7	Appendix 4, page 3-7 to 3-8	Usability of past sediment sampling programs for temporal analysis	Ultimately, the pairing of sediment surveys to determine the rate of decay in Tri+ PCB concentrations in surface sediments is challenged by the lack of comparability among the data sets. Each survey has unique features that make direct comparison difficult and yield inconsistent rates of change. The 1991 and 1998 surveys utilized composite samples which mask the spatial heterogeneity that is more clearly defined in the dense sampling grid used during the collection of the 2002-2005 discrete samples. In particular, analysis based on sediment compositing is challenged by the difficulties of achieving true homogeneity among discrete portions when concentrations can vary by orders of magnitude, and sediment textures can vary significantly in the proportion of coarse *vs.* fine particles. The use of the available sediment survey data as an independent basis to determine the rate of decay of Tri+ PCB concentrations in surface sediments in the Upper Hudson is highly uncertain.	DEC agrees; none of the past sediment sampling programs were designed and implemented in a manner which allows for meaningful quantitative temporal analysis of trends in surface sediment PCB concentrations. EPA should not rely on such analyses, and instead rely upon the statistically representative and robust data gathering program designed and implemented by the State to understand the relationship between fish and sediment PCB concentrations on a pool by pool basis, with a monitoring program designed to achieve the data quality objectives in a time frame commensurate with the remedial targets in the ROD, ie. five years.	
A13-1	Appendix 13, page 1-3	Editorial	commercial fishermen	fishermen's associations and recreational anglers	
A13-2	1-4 paragraph 2	Editorial	Despite ongoing outreach efforts, as of 2011 communities in the Lower Hudson River region	Despite ongoing outreach efforts, previous consumption surveys indicate that communities in the Lower Hudson River region	
A13-3	1-4 Paragraph 2	Editorial	Therefore, in 2011 NYSDOH began focusing more of its outreach efforts on the Lower Hudson River region.	Therefore in 2011 NYSDOH noted the continued need for outreach efforts in the Lower Hudson River region.	
A13-4	1-5 paragraph below bullets	Editorial	understand the demographics of the project study area fish consumption	understand the project study area fish consumption	
A13-5	1-8 first paragraph	Editorial	feedback from focus groups that reviewed existing signs suggested	Feedback from community partners that reviewed existing outreach materials suggested	
A13-6	1-8 second paragraph	Editorial	Chinese America Planning Council	Chinese-American Planning Council	

NYSDEC's Detailed Comments – Five Year Review Report Text and Appendices

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