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**Bureau of Water Protection and Land Reuse  
Remediation Division**

Brian E. Heim , General Counsel  
Intellectual Property/Environmental  
International Paper  
6400 Poplar Avenue  
Memphis, TN 38197

Re: Risk Assessment-Versailles & Papermill Ponds  
Sprague, CT

Dear Mr. Heim:

Attached for your review is a memo comprising the Connecticut Department of Energy and Environmental Protection's (DEEP) and Department of Public Health's (DPH) comments, based on the review of the baseline ecological and human health risk assessments for Versailles and Papermill Ponds, dated February 2015, that were prepared by AECOM on behalf of International Paper (IP).

As the memo concludes, sediments in Versailles Pond and, to a lesser extent, within Papermill Pond need to be remediated. Pursuant to Pollution Abatement Order Nos. WC-5229 and WC-5271, DEEP establishes the schedule for IP's next steps as follows: develop and submit (for DEEP and DPH approval) remedial action plan (RAP) by December 31, 2017 for remediating sediments throughout Versailles Pond as well as for remediating the "hot spot" areas identified in Papermill Pond.

If IP would like to meet first to discuss the memo, please contact me by September 30<sup>th</sup>, 2017 regarding IP's availability. DEEP will coordinate with DPH staff for the meeting. Meg Harvey of the DPH remains the technical lead for human health risk assessment related issues for the site while DEEP oversees the baseline ecological risk assessment and administrative/regulatory issues. If you have any questions regarding this letter, please feel free to contact Bill Warzecha or Jessica Stefanowicz of CT DEEP at 860-424-3776 and 860-424-3849, respectively. Ms. Harvey can be reached directly at 860-509-7748.

Sincerely,



Patrick F. Bove, Director

Remediation Division

Bureau of Water Protection and Land Reuse

cc: Mr. Brent Sasser, P.E., Corporate EHS&S, International Paper, 6400 Poplar Avenue, Memphis, TN 38197 (letter/memo)  
John Bleiler, Project Manager, AECOM, 250 Apollo Drive, Chelmsford, MA 01824 (letter/memo)  
Margaret Harvey, CT DPH (letter/memo)  
Traci Iott, CT DEEP (letter/memo)  
Rosemary Gatter-Evarts (letter/memo)  
Bill Warzecha, Jessica Stefanowicz, DEEP (letter/memo)



# MEMO

**To:** Bill Warzecha, Supervising Environmental Analyst, Remediation Division  
Jessica Stefanowicz, Environmental Analyst 2, Remediation Division

**Cc:** Traci Iott, Supervising Environmental Analyst, Water Quality Group

**From:** Rosemary Gatter-Evarts, Environmental Analyst 3, Water Quality Group

**Date:** August 28, 2017

**Re:** Sprague Mill, Versailles Pond Baseline Ecological Risk Assessment Report

The Department in collaboration with the Connecticut Department of Public Health (CT DPH) has reviewed the risk assessments for Versailles and Papermill Ponds dated February 2015 that were prepared by AECOM on behalf of International Paper (IP)

**The Baseline Ecological Risk report reached the following conclusions:**

1) The report concluded that investigations conducted in Versailles Pond indicated that elevated levels of polychlorinated biphenyls (PCBs), mercury, and several inorganic constituents are present in sediment and/or fish tissue.

The Department agrees that copper, lead, zinc, mercury, methylmercury and PCBs are elevated in Versailles Pond when compared to Papermill Pond and the Little River.

2) The report concluded that the reach of the Little River between Papermill Pond and Versailles Pond has not been impacted relative to these constituents.

The Department notes that two areas of the Little River showed the presence of elevated levels of lead and copper: (1) lead was identified in SD-11 near the base of the dam by Papermill Pond. And (2) Copper was identified in SD-14 near the Sprague Paperboard landfill. With the exception of those two constituents at those two locations all other contaminants were below Threshold Effects Concentrations. Also the Little River between the ponds is mostly erosional and thus, there is minimal sediment deposition expected. Therefore, the Department can generally agree that this portion of the Little River is mostly un-impacted.

3) The report concluded that there is no impact in the Little River below Versailles Pond.

This conclusion is based on one sample below the Dam which showed low levels of sediment contamination. This suggests that most of the contaminants in Versailles

Pond have been retained by the dam. Please provide further clarification/evidence to support this conclusion.

4) The report concluded that there are no impacts to surface water.

The Department concludes that based on limited surface water data there may be some impact to human health and aquatic organisms due to PCBs and aluminum. Surface water results indicate that there are some exceedances of water quality criteria in Versailles Pond. PCB concentrations at three locations exceed chronic criteria for aquatic life. PCB concentrations for all samples exceeded the human health water quality criteria based on fish consumption. Two locations exceeded the chronic water quality criteria for aquatic life for aluminum. Several samples were noted as non-detected for aluminum, however the detection limit for aluminum exceeded the chronic water quality criteria. Therefore it is not known if the non-detected values represented exceedances of water quality.

5) The report concludes that sediment in Papermill Pond is consistent with background with some limited exceptions.

The Department agrees with the report's conclusion that sediment in Papermill Pond is consistent with background with limited exceptions. The limited exceptions are shallow sediment samples with elevated mercury concentrations and sediment toxicity as discussed in DEEPs 9/25/2013 review of IP Papermill Pond Background Assessment, as summarized below. Papermill Pond would require hot spot removal of sediment containing higher mercury values to reduce risk to benthic invertebrates, fish and wildlife.

A Comparison of 95% UCL from a Connecticut Lake background study and the 0-24" sediment sample results for Papermill Pond indicates that mercury concentrations in Papermill Pond are roughly three times the statewide average. By removing all sediment with mercury concentrations greater than 1.1 mg/kg the remaining mercury values are all below the Probable Effects Concentration sediment benchmark. If these samples are removed the resulting 95% UCL of the remaining samples will be approximately equivalent to the geometric mean of the Threshold Effect Concentration and the Probable Effects Concentration sediment benchmarks.

Sediment toxicity tests indicates that one of the three Papermill Pond sampling locations, SD-7, demonstrated unacceptable toxicity to *C. tentans*, and based on survival and reproduction. The low survival and reproduction response for SD-7 makes this unsuitable as a background location as compared with the other reference samples.

6) A comparison of Versailles Pond and Papermill Pond indicates that the concentrations of contaminants of concern are greater in Versailles Pond than in Papermill Pond. The Report

discusses the impacts of these higher contaminant concentrations to benthic invertebrates, amphibians, fish, wildlife and human health in Versailles Pond.

#### 7) Benthic Invertebrates:

The Report concludes that there is an increased risk to benthic invertebrates in Versailles Pond due to increased concentrations of contaminants in the sediment that exceeded sediment screening levels for copper, lead, mercury, and zinc and Total PCBs. Adverse effects were also noted in select surface sediment sampling stations during the toxicity testing.

The Department considers the sediment chemistry and results of toxicity test to indicate that there are unacceptable risks to the benthic community in Versailles Pond (and to a lesser extent in Papermill Pond) Several locations in Versailles Pond indicated increased toxicity to the test organisms when compared with the lab controls or the pooled data from Papermill Pond, even when the toxic sample from Papermill Pond was included. Therefore the toxicity test does indicate increased risk to invertebrates in Versailles Pond. The State of Connecticut Water Quality Standards Regulation (RCSA Section 22a-426-4(a) 5 state that sediments should be free of chemical constituents which can cause or contribute to either acute or chronic toxicity, or impair the biological integrity of aquatic ecosystems.

The Report concludes that even though the body burden concentrations of mercury, methylmercury and PCBs in the freshwater mussels were elevated for Versailles Pond, they were below the no effect based critical body residue (CBRs) concentrations found in literature. The Report also indicates that there is no (emphasis added) unacceptable risk to these receptors from the bioaccumulation of contaminants.

The Department agrees that the concentrations found in the freshwater mussels were below the critical body residue concentrations presented in the report. This indicates that it is unlikely these receptors are being adversely impacted by the bioaccumulation of COPCs. However, the critical body residues selected may underestimate the potential for impact since the proposed values are based on a combination of acute and chronic impacts. In any case, the fact that the body burden concentrations of COPCs in freshwater mussels were higher in Versailles Pond than Papermill Pond indicates that mercury and PCBs in Versailles Pond are biologically available.

#### 8) Fish and Amphibians:

The Report evaluated increased risk to fish and amphibians by comparing sediment concentrations to sediment screening levels (benchmarks). The report concluded that since the sediment benchmarks were developed for benthic invertebrates, they therefore do not represent a strong line of evidence for fish and amphibians.

The Department agrees that sediment benchmarks were developed for benthic invertebrates and may not be directly correlated with fish and amphibian growth, reproduction, or survival. However, there may be some effect on these receptors based on the effects of both the invertebrate food source for the fish and amphibians as well as direct ingestion. The State of Connecticut Water Quality Standards Regulation (RCSA Section 22a-426-4(a) 5 require that sediments be free from chemical constituents that can bioconcentrate and bioaccumulate in the tissues of fish, shellfish and other aquatic organisms at levels which will impair the health of aquatic organisms or wildlife, or result in health risks to human consumers of aquatic organisms.

The Report evaluated increased risk to fish and amphibians by comparing tissue concentrations to CBRs (Critical Body Residues). While the concentrations of COPCs in fish and amphibian tissues are slightly higher in Versailles Pond than in Papermill Pond and Hanover Reservoir, the body burden concentrations of COPCs in fish were within the range of No Observable Adverse Effect Level based critical body residue concentrations found in the literature. Likewise, the concentrations of COPC in amphibians were below the range of Lowest Observable Adverse Effect CBRs from the literature. The Report says that this indicates that there is no unacceptable risk to these receptors due to the bioaccumulation of COPCs.

The Department has evaluated the CBRs and determined that the proposed values may underestimate risk to receptors. The CBRs listed in the report were based on a subset of studies in the referenced journals leading to a smaller data set on which to base CBRs and therefore increasing uncertainty. Additionally, studies based on mortality were given the same weight to those based on growth and reproduction. That approach to CBR determination would underestimate risk to receptors. Therefore, it is probable these receptors are being adversely impacted by the bioaccumulation of COPCs.

It should also be noted that the increased concentration of mercury and PCBS in the biota indicate that both Mercury and PCBs are biologically available. Increased body burden or levels of mercury and PCBs in the fish and amphibians constitute a risk to organisms (people and wildlife) which may consume them.

#### 9) Wildlife:

The report concludes that there is limited risk to wildlife receptors from exposure to Site-related COPCs through food web uptake pathways. The potential for risks to wildlife was evaluated by modeling the potential ingestion of COPCs through direct ingestion of fish, invertebrates, and amphibians, and incidental ingestion of sediments. This is based on hazard quotients above one for both the NOAEL and LOAEL effect concentrations.

The food web analysis based on AECOMs assumptions indicated that current levels of mercury, methyl-mercury and PCBS pose a risk to piscivorous birds and mammals. The

same food web analysis also indicated that the current level of mercury and methyl mercury in Papermill Pond poses a risk to piscivorous birds and mammals.

**The Baseline Human Health Risk Assessment (BHHRA) makes the following conclusion statements.**

1) The report concludes that there are no unacceptable human health risks from contamination in Versailles Pond for any receptors or exposure pathways.

The Department and CT DPH does not agree for the following reasons.

- CT DPH reviewed the BHHRA and prepared comments dated July 26, 2016. As stated in the 2016 comments, CT DPH uses consistent risk assessment approaches across the state for purposes of setting statewide and waterbody-specific fish consumption advisories. The fish consumption risk assessment approach used in the BHHRA differs in many ways from CT DPH's approach. Using CT DPH's methodology, risks from consumption of fish from Versailles Pond are not acceptable. This is the reason why CT DPH and CT DEEP maintain a fish consumption advisory for Versailles Pond for both mercury and PCBs.
- In many locations, concentrations of PCBs in Versailles Pond sediment (including near shore sediment where people are likely to come into contact with the contamination) greatly exceed the Department's residential direct exposure criteria for PCBs of 1 mg/kg.
- CT DPH's 2016 comments note that some of the exposure assumptions used in the BHHRA do not represent the highest and best use of the pond and are less conservative than what CT DPH considers appropriate. Using exposure assumptions that are more representative of full use of the pond would result in higher human health risks than the risks presented in the BHHRA.

2) The Report states that no further action is warranted for Versailles Pond sediment and bank surface soils based on the assessment of direct contact exposures to residents and anglers.

- As stated above, CT DPH has identified exposure assumptions and approaches used in the BHHRA that may result in an underestimation of risks from direct contact exposure to Versailles Pond sediment. Therefore, the Department does not agree with the conclusion that no further action is warranted for Versailles Pond sediment. With regard to bank soils, the Department agrees that data presented in the BHHRA support the conclusion that bank soil contaminant levels are low and no further action is warranted.

3) The Report states that consumption of fish poses a potential non-cancer risk in excess of the regulatory target risk level because of mercury but when background levels of mercury in fish tissue are taken into account, the incremental risk posed by Versailles Pond fish does not exceed the target risk level.

- The Department and CT DPH disagree with this conclusion because, as stated above, use of CT DPH's methodology indicates that risks from consumption of fish from Versailles Pond are not acceptable. Data show that releases from the papermill causes and contributes to risk within Versailles Pond. That risk is the reason why CT DPH maintains a fish consumption advisory for Versailles Pond for both mercury and PCBs.

Dioxin:

More recent data shows potential for dioxin to be present in paper sludge from the facility. We do not have data to determine if sludge of similar quality was also released to Versailles Pond. While we have no data on dioxin in Versailles Pond (or Papermill), remediation of the pond to address mercury and PCB risks should also address any potential risks from dioxin, if present.

Summary:

The Department of Energy and Environmental Protection and the Department of Public Health reviewed the Baseline Ecological Risk Assessment and the Baseline Human Health Risk Assessment for Papermill Pond and Versailles Pond and have reached the following conclusions:

- 1) Versailles Pond has significantly higher levels of mercury, methyl mercury and PCBs, in the biota and sediments than Papermill Pond. The levels in the biota and sediment are high enough to cause unacceptable risk to both humans and wildlife based on direct exposure and the consumption of fish and other prey. In addition significantly higher concentrations of copper, lead and zinc as well and aggregate toxicity in the sediment contribute to an unacceptable risk to benthic invertebrates in Versailles Pond.
- 2) Although less severe, there is limited risk to benthic invertebrates in Papermill Pond based on toxicity testing and sediment mercury concentrations above the Probable Effect Concentration. Papermill Pond also has elevated risk to wildlife based on mercury and methylmercury. Removals of sediments with mercury concentrations equal to or greater than 1.1 mg/kg is necessary.

Sediments in Versailles Pond and, to a lesser extent, within Papermill Pond need to be remediated. We recommend that a plan for remediating sediments throughout Versailles Pond as well as for remediating the "hot spot" areas identified in Papermill Pond be required to be submitted for DEEP review and approval.



References:

Beckvar N, Dillon TM, Read LB. 2005. Approaches for linking whole-body fish tissue residues of mercury or DDT to biological effects thresholds. *Environ Toxicol Chem* 24:2094–2105. SETAC Special Publication. Lewis, Boca Raton, FL, USA, pp 297–339.

DEEP. 2013. Connecticut Water Quality Standards Regulations. Adopted October 10, 2013. Online: <http://www.ct.gov/deep/lib/deep/regulations/22a/22a-426-1through9.pdf>.

Dillon T, Beckvar N, Kern J. 2010. Residue-based mercury dose-response in fish: an analysis using lethality equivalent test endpoints. *Environmental Toxicology and Chemistry*. 29(11):2559-65.

