

## Hudson River PCBs Site Proposed Second Five Year Review Report – Technical Review

Prepared by: S.S. PAPANOPULOS & ASSOCIATES, INC.

Dr. Remy Hennes, Ph.D.

### Summary of Technical Review Findings

Fish tissue concentration decay rates are extremely variable, highly uncertain, biased high, and at present, it cannot be concluded from any of the analyses performed that rates of recovery are on track with the ROD model output. The data does not support EPA's conclusion that the goals of the ROD will be achieved.

- **EPA's conclusion that the recovery rate for fish is on track to meet the goals of the ROD is not supported by the data with any reasonable degree of confidence or scientific certainty.** EPA's procedure to calculate a recovery rate for fish in the Hudson river is too uncertain and is unreliable to support EPA's conclusion that the goals of the ROD will be achieved as previously predicted in the ROD.
- **There is a strong likelihood that any recovery rate calculated based on the available data for fish tissue is so uncertain as to be meaningless for predicting fish recovery in the Hudson river.** Data interpretation to derive fish recovery rates must consider the very large uncertainty introduced by the data transformation procedure as well as the uncertainty inherent to fish tissue results to establish a degree of confidence in the calculated recovery rates. Data interpretation for fish tissue in EPA's proposed 2017 FYR also ignores the very large degree of uncertainty introduced by the data transformation procedure applied to calculate fish recovery rates
- **EPA's procedure to calculate recovery rates is at the upper end of the range of rates that available data can potentially support.** The transformed data is impaired by a demonstrable lack of accountability for uncertainty. By applying slight changes (within the reasonable range) to the EPA procedures, variations consistently produced average rates of recovery lower than the rate calculated using EPA's approach and therefore EPA's approach indicates results in recovery rates that are systematically biased high.
- **Using slightly different approaches to data interpretation results in consistently lower average recovery rates than the EPA reported 8% per year decline in fish tissue.** These different average rates correspond to recovery times of about 20 years to reach 0.4 mg/kg in wet weight Tri+ PCB concentration and 30-40 years to reach 0.2 mg/kg.
- **Transforming PCB concentration data from different laboratories, different analytical methods and different field studies into a PCB homologue equivalent database introduces a very large degree of uncertainty on the transformed data.** EPA did not test the effect of that uncertainty on the confidence that can be attached to its fish tissue recovery rates.

- EPA's approach for calculating fish tissue trends included rib-out sample sets taken by GE in 2007 and 2008. **Compared to the rib-in data (NYSDEC standard fillet samples), the rib-out measurements are consistently lower.** Lower concentrations for these samples in 2007-2008 influence the trends calculated for the period 1995-2008 toward faster recovery rate predictions.
- Overall, fish tissue recovery rates are highly variable. **The use of an arithmetic or weighted average rate is unrepresentative of this variation and deceptive when making conclusions about the protectiveness of the remedy.**
- Using Aroclor-based data without transforming the data to homologue equivalents avoid the uncertainty inherent to the data transformation procedure. **Calculating trends using the Aroclor data yields an average recovery rate that is different and substantially lower compared to the rate calculated using the homologue equivalent data.** This demonstrates that the uncertainty introduced by the data transformation procedure is significant.
- **The slowest fish tissue recovery rates hold more weight when considering the remedy effectiveness,** since these species will continue to be a pathway to human exposure past the timeframe asserted by EPA. The use of an average recovery rate applied to all fish species conceals the variability in individual recovery rates by species.

#### Summary of Qualifications

**S.S. Papadopulos and Associates, Inc.** (SSP&A) was established in 1979 to provide professional groundwater and hydrogeology consulting services. With that cornerstone of expertise, they have developed a recognized practice in contaminant studies, environmental engineering, remediation, geochemistry, and surface-water hydrology. <http://www.sspa.com/>

**Dr. Remy J-C Hennet** has over 20 years of research and field experience in investigating the origin, fate, and transport of organic and inorganic chemicals in natural and man-made environments. He has conducted numerous studies that cover the fields of environmental characterization, remediation, monitoring, cost allocation, and litigation. Dr. Hennet's expertise includes the forensic interpretation of chemical fingerprints, in particular for PCB congeners, petroleum hydrocarbons, organic solvents, toxic metals, and inorganic ions such as arsenic and selenium chemical species, nitrate, and perchlorate. His expertise also includes the interpretation of stable isotope data as to quantify or qualify environmental processes. Dr. Hennet has authored and co-authored numerous publications on both inorganic and organic geochemistry. Dr. Hennet received his MA and PhD in geochemistry from Princeton University.