

Remedy Effectiveness Evaluation for the Upper Hudson River PCB Remediation Project: A Water Column Perspective

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Background/Objectives. As a result of the discharge of approximately 1.3 million pounds of PCBs in the Hudson River dating back to the 1950s, the Hudson River was declared a federal Superfund Site in 1984. In 2002, a Record of Decision (ROD) called for active remediation of PCB contamination. Dredging in the Upper Hudson River (UHR, River Mile 154 to 194) commenced in 2009 and was completed in 2015, resulting in the removal of 2.7 Myd³ and about 300,000 pounds of PCBs. Rigorous water column monitoring during dredging documented the loss and downstream transport of PCBs, estimated at less than 1% of the mass dredged. While major efforts were made to minimize the mass lost, there was still a substantive impact on water column PCB levels. Although the 2002 ROD didn't specify remedial targets for reductions in water column PCB concentration, the water column is an important link between PCBs in sediment and aquatic biota. Thus, analyzing water column concentrations before, during and after remedial activities provides a key metric for assessing the effectiveness of dredging activities in reducing PCB exposure to aquatic biota. We analyzed water column PCB concentration datasets taken before, during and after remediation along multiple lines of evidence to assess how effective the dredging project was in meeting its remedial objectives.

Approach/Activities. With approximately 3 years of water column data collected since the end of active remediation, it is possible to begin to assess the effectiveness of the remedy on reducing PCB levels in the water column of the UHR. Long-term datasets of water column PCB concentrations (2004 or earlier through present) exist at four monitoring locations in the UHR and two locations in the LHR (Albany and Poughkeepsie). At each station, pre- through post-remediation Tri+ PCB concentrations (sum of Tri- and higher PCB homolog groups) were compared using various qualitative, quantitative, and statistical methods to permit assessment of the effectiveness of the remedy with regard to reduction in water column PCB concentrations.

Results/Lessons Learned. Because of the short residence time of water in the Upper Hudson, as compared to fish and sediments, it is expected that water column conditions will be the first to respond to the remedy in terms of reduced PCB levels. Comparison of pre- through post-dredging water column PCB concentrations indicate that following an initial increase in concentration during dredging, water column samples now exhibit PCB concentrations substantially below pre-dredging conditions. That is, any impacts due to short term releases of PCBs during dredging have already dissipated sufficiently that water column conditions are again reflecting the levels of PCBs in the surface sediments. These data demonstrate the effectiveness of the resuspension controls required by EPA as part of Resuspension Performance Standard in keeping releases to a minimum and largely eliminating any long term impacts. These results also indicate that fish exposure to PCBs has already been reduced and should be reflected in fish body burdens. This presentation will examine the detailed record of water column PCB levels through the last twenty years and show the recent recovery relative to baseline conditions as well as to ROD model forecasts of the post-dredging period. Increases in

water column concentration during high river flow events and their influence on PCB transport from the Upper to the Lower Hudson River will also be presented.