

## Lower Fox River OU1 Remedy Effectiveness Characterized through Water and Fish Tissue Long-Term Monitoring

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**Background/Objectives.** Operable Unit 1 (OU1) of the Lower Fox River (LFR) and Green Bay Site, also known as Little Lake Butte des Morts, is located within the 62.7-kilometer (39-mile) LFR extending downstream of Lake Winnebago to the Upper Appleton Dam. Active remediation (dredging and capping) of LFR sediments in OU1 began in 2004 and was completed in May 2009. Long-term monitoring (LTM) is being performed to assess progress toward achieving the remedial action objectives (RAOs) specified in the *2002 OU1/OU2 Record of Decision (ROD)* and the *2008 OU1 ROD Amendment*. Following baseline monitoring conducted in 2006-2007, the first two LTM events were completed during 2010 and 2012 and provided very positive results. The third LTM monitoring event is being completed in 2018.

**Approach/Activities.** The LTM includes water quality sampling for total suspended solids, total organic carbon, and polychlorinated biphenyl (PCB) congeners. In addition, five fish species are collected in August/September, and a subset of those species analyzed for PCB Aroclors. The fish species include a primary and secondary species for monitoring human health risk, a primary and secondary species for monitoring ecological risk, and a young-of-year (YOY) forage fish to provide an early indication of ecosystem recovery. The data quality objective (DQO) exit criteria of the LFR LTM include a comparison to background concentrations, a comparison to surface-weighted average concentration-reduction targets, and an evaluation of recovery rate. The LTM evaluation incorporates robust multivariate statistical methods, maximizing statistical power in decision assessment of these DQO exit criteria.

**Results/Lessons Learned.** The first two LTM events indicated substantial progress made toward: concentration reduction targets; the ultimate removal or relaxation of fish consumption advisories, and; achievement of the human health RAOs. In 2012, OU1 surface water PCB concentrations had reduced relative to baseline conditions by approximately 79%, with the target 90% reduction projected to be met by 2014. Further in 2012, the target of 90% reduction fish tissue PCB concentration was met for the YOY species (gizzard shad), and the ecological risk-reduction criteria was met for carp. The recovery rate trend line for the human health species (walleye) was projected in 2012 to meet human health target concentrations and background conditions within a 30-year post-remedy timeframe.

A full understanding of the effects of the OU1 remedy will be accomplished through the observation of PCB concentrations over a period of years. This presentation will provide the details of the 2018 LTM implementation along with statistical results of the collected water and fish tissue data. Comparisons of the 2018 results, relative to the LFR OU1 DQO exit criteria and earlier LTM results, will be discussed.