

City of Portsmouth, Ohio

Client

Portsmouth Water Works

Project

DOC Removal on Ohio River

Location

City of Portsmouth, OH

Expected Commissioning

July 2008

Engineer

HDR/Quest, Lexington, KY

Eckler Engineering, Coral Springs, FL



Figure 1: Settling vessel at Portsmouth, Ohio MIEX® Installation

“Portsmouth City water customers are experiencing cleaner and tastier water from the tap, at a cheaper price to area taxpayers.”

Sam Sutherland, Director,
Portsmouth Water Works

Project Summary

The City of Portsmouth operates a 15 MGD conventional WTP with average flows between 4-6 MGD. The City continues to expand its distribution service area serving neighboring townships thus expanding the water residence time.

Unable to meet the DBPR Stage 1 TOC treatment technique, the WTP operated under Step 2 TOC removal guidelines as directed by the Ohio EPA. With little margin meeting the Stage 1 DBP rule and the Stage 2 DBP Rule imminent, the City was sure to violate the maximum locational running annual averages for DBPs.

Challenge

The City of Portsmouth, OH draws its source water from the Ohio River, the 13th longest

river in the United States. The OH River is one of the most populated and industrialized U.S. rivers.

The major cause of water pollution in the Ohio River is attributed to non-point source pollution from urban runoff, agricultural activities, and abandoned mines; each of these contributing to the load and characteristics of the dissolved organic carbon (DOC).

Much of the Ohio River disinfection byproduct (DPB) precursors can be characterized as dissolved, low SUVA, low molecular weight organics. Traditional or enhanced coagulation is generally unsuccessful at removing large portions of this type of DOC.

The City faced the challenge of complying with EPA regulations while minimizing the economic impact on their disadvantaged community.

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Figure 2: Portsmouth settled raw water (left), MIEX® Treated water (center) and TOC/DOC removed from water (right)



Solution

The City of Portsmouth determined that conventional low cost compliance options such as enhanced coagulation, designer coagulants, alternative disinfectants, or relocating the point of disinfection would not bring their conventional system into long-term EPA compliance. The MIEX® Technology was considered as an alternative treatment method for compliance with the Stage 2 DBPR along with GAC contactors and nanofiltration. A trial of the MIEX® System was conducted September 29 through October 16, 2003.

Treatment results were favorable showing impressive reductions in DOC and resultant DBP formation potential as well as additional downstream benefits. The trial results showed that MIEX® Pretreatment reduced average treated water TTHM and HAA5 Formation Potential by 51% and 69% respectively, allowing Portsmouth WTP a comfortable safety margin below the EPA DBPR standard.

Following the successful pilot, the City of Portsmouth decided to move forward with the installation of a 7.5 MGD MIEX® Dual Stage

Treatment System which was the least cost option compared to GAC and nanofiltration.

Project Outcomes

The 7.5 MGD system was commissioned July 16, 2008. With MIEX® Treatment, the plant has seen the following benefits

- Cleaner, clearer settled water basins
- A reduction in chlorine dose
- An average 40% reduction in TOC
- Alum dose reduced by half
- Reduced solids loading in the basin, directly affected by the alum dose.

Within just weeks of MIEX® commission, TTHM quarterly results were significantly reduced as compared to the quarterly average of the year prior (See Table 1).

Table 1: Reduction of DBPs at Portsmouth, OH after MIEX® System Installation in July 2008

Parameter	Q3 2007	Q3 2008
TTHM (µg/L)	83.8	65.4
HAA5 (µg/L)	22.3	17.1

The City expects to see further reductions in DBP averages as the distribution system is completely turned over with MIEX® treated water.