

# Removal of Disinfection Byproducts and TOC from a Surface Water Supply

*Client: Commonwealth Technology Inc.*

*Location: Danville Water Filtration Plant, Kentucky*

## BACKGROUND:

The Danville Water Filtration Plant sources surface water from the discharge of Lake Herrington, a large, recreational, manmade lake. This 10-MGD water treatment plant treats approximately 4 MGD on average and supplies water to 46,000 persons from four counties. Within the distribution system high HAAs are present which occasionally exceed the EPA Stage 1 Disinfection Byproduct (DBP) standards of 60 ppb for haloacetic acid (HAA).

MIEX<sup>®</sup> resin technology is specifically designed for the removal of dissolved organic carbon (DOC), a precursor to the formation of THMs and HAAs, (contributing 80-95% of TOC) from drinking water supplies. Enhanced coagulation with aluminum sulfate improves precursor removal but distribution disinfection by-product levels can still be above the EPA Stage 1 standards. MIEX<sup>®</sup> resin's affinity for low molecular weight DOC that is not removed by coagulation allows greater removal of precursors and a reduction of downstream coagulant demand.

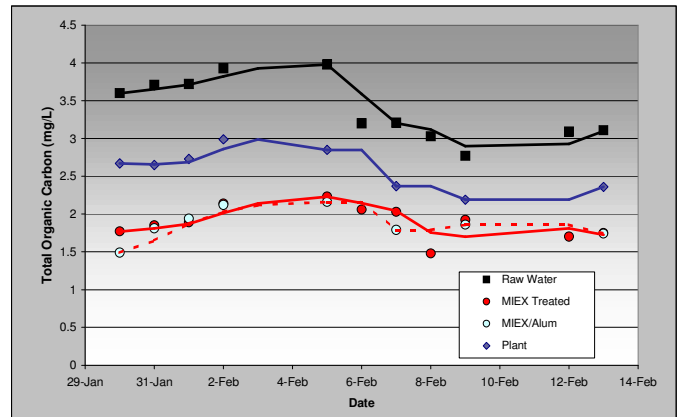
During January 28 to February 14, 2001 Orica Watercare, in conjunction with Commonwealth Technology Inc. conducted a trial to assess the effectiveness of the MIEX<sup>®</sup> technology on the Danville filtration plant's raw water supply. The following objectives were set:

- ◆ Demonstrate the effectiveness of the MIEX<sup>®</sup> process on the raw water source to assess capital and operating costs for a full scale plant
- ◆ Prove that MIEX<sup>®</sup> pretreatment removes a considerable amount of TOC from the raw water thus allowing Danville WTP to meet the EPA DBP standards.

## RESULTS:

Treatment with MIEX<sup>®</sup> improved TOC removal significantly (Fig. 1). As a result, there was little difference in the performance of MIEX when combined with alum. Over 80% reduction in alum dosage was achieved.

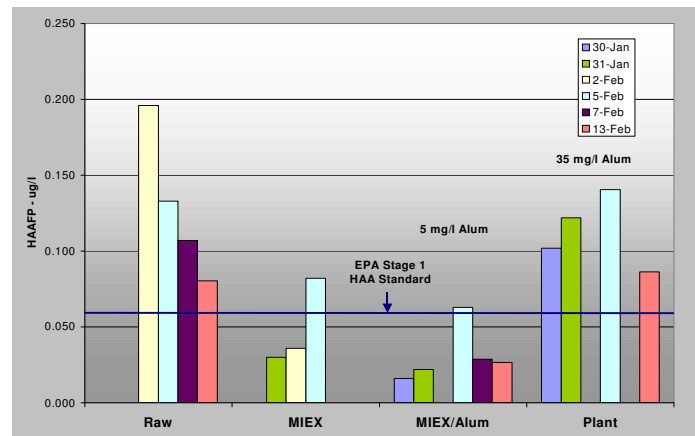
- More organics were removed from the water thus reducing the amount of coagulant, chemical sludge, pH adjustment chemicals, and chlorine required following pretreatment.
- Resin kinetic tests revealed that no irreversible fouling was present throughout the trial.



**Figure 1 TOC Removal Performance**

HAA formation potentials followed a similar trend as that of the TOC results, however the combination of MIEX pretreatment before alum addition removed a higher amount of DBPs compared to the MIEX DOC resin alone. (Fig. 2) On average, MIEX/Alum removed 56% more HAAs than the plant control.

- MIEX<sup>®</sup> resin treatment followed by aluminum sulfate provided consistent compliance with the EPA Stage 1 Standards for TTHMs and THAAS.



**Figure 2 THAA Removal Performance**

## ACKNOWLEDGEMENTS:

Orica wishes to thank Commonwealth Technology Inc and the staff of Danville WFP for their contribution in the preparation and execution of this trial