

Case Study

City of Coweta, Water Treatment Plant

The IXOM logo is displayed in a bold, black, sans-serif font. It is positioned in the upper right corner of the page, partially overlapping a decorative graphic of teal geometric shapes.

Client

City of Coweta, Oklahoma

Project

DOC Removal Pretreatment System

Location

Coweta, OK

Engineer

Professional Engineering
Consultants, Tulsa, OK



Figure 1: The MIEX® System at Coweta, Oklahoma

“Based on its demonstrated performance and projected lifecycle costs, the MIEX® Technology provides the city with an outstanding treatment solution to achieve compliance and provide city residents with the highest quality drinking water for the best value.”

Steven Whitlock, Coweta
City Manager

Challenge

With a name based on the French word for “green”, the Verdigris River takes its name from the brilliant green color the water exhibits at various times throughout the year. The Coweta Water Treatment Plant treats water from the Verdigris, which can be a particularly challenging source water to treat due to its high levels of organic carbon, color, turbidity, and bromide. These components can cause challenges with disinfection by-product (DBP) formation for utilities that use the Verdigris River as their source water.

In 2009, the City of Coweta’s packaged conventional water treatment plant was showing its age. Along with its physical degradation, operators had difficulties dosing coagulant chemicals in a manner which removed sufficient organic carbon and color to allow for compliance with Stage 1 DBP regulations. The city, in cooperation with Professional Engineering Consultants (PEC),

began investigating treatment technologies that would reduce the water’s color and levels of DBP formation, with a goal of bringing the city into compliance with current and future DBP regulations, producing aesthetically pleasing water, and allowing the city to continue to use free chlorine as a residual disinfectant.

A further challenge is that the water treatment plant is located in a rural area and does not have access to a direct sewer connection. Since connecting to the sewer system would have been prohibitively expensive, any treatment process applied at the plant would require careful management of process residuals.

Solution

Two of the processes evaluated for color reduction and DBP compliance included advanced oxidation and the MIEX® Process, processes which use different mechanisms to reduce the water’s color and potential for DBP formation. While advanced oxidation serves to



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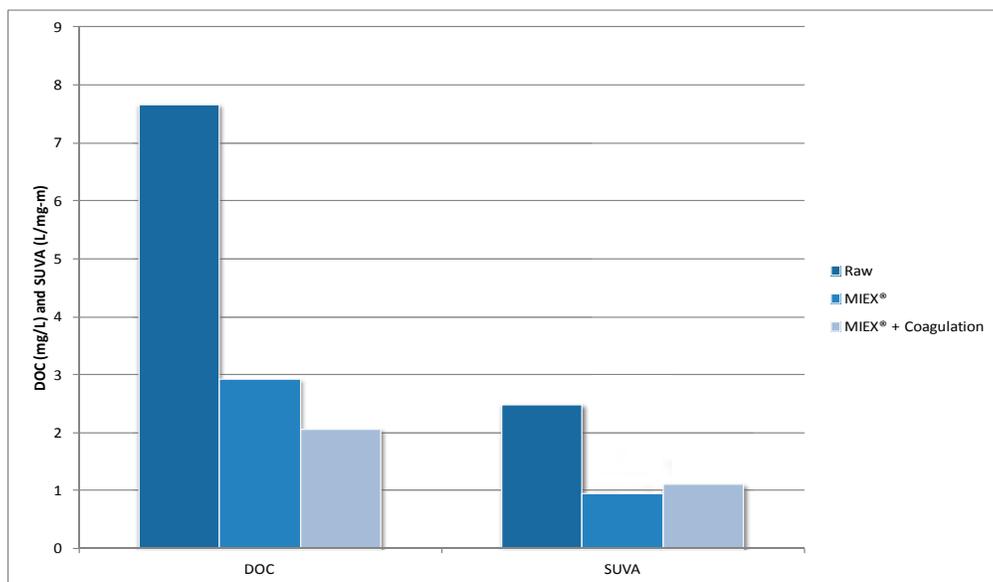


Figure 2: DOC Removal and SUVA Reduction Achieved using MIEX® Treatment and Coagulation

oxidize the dissolved organic carbon (DOC) compounds that contribute to organic color to a form that is less reactive with chlorine upon disinfection, MIEX® Treatment uses the process of ion exchange to remove DOC and color compounds from the water, such that they are no longer present to react with chlorine.

Due to the raw water quality, the selected process would be followed by a conventional coagulation and filtration process for turbidity removal. The MIEX® Process was ultimately selected by the City due to the levels of DOC and color removal and reduction in downstream coagulant demand that were demonstrated during the bench scale evaluation process. A vacuum distillation system was selected to concentrate the MIEX® Process residual and allow for it to be disposed of as solid waste, resulting in a zero liquid discharge treatment process. The reductions in DOC, color, and coagulant demand achieved should significantly reduce chemical costs and provide the citizens of Coweta with aesthetically improved water that also meets

US EPA standards for DBPs and secondary standards for color.

Expected Outcome

The City of Coweta's MIEX® System is expected to be operational in early 2013. The water quality improvements expected upon commissioning of the MIEX® System include:

- DOC removal through the MIEX® System of greater than 55%
- Nearly 70% reduction in UV254 absorbance
- Greater than 75% reduction in coagulant dose required downstream of MIEX® Treatment
- Combined MIEX® and Coagulation processes resulting in a finished water color of <5 CU
- Ability for the utility to achieve DBP Rule compliance

Additionally, the zero liquid discharge system will minimize the impact of treatment on the local environment.



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