

Case Study

Town of Hudson Bay, Saskatchewan Water Treatment Plant

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Client

Town of Hudson Bay,
Saskatchewan

Project

DOC Removal/DBP Reduction

Location

Hudson Bay, Saskatchewan

Commission Date

2011

Engineer

Bullée Consulting



Figure 1: Hudson Bay, Saskatchewan chose the MIEX® System for DBP Reduction

Project Summary

Similar to many communities in Saskatchewan, the Town of Hudson Bay is faced with treating a challenging raw water source. The town's raw water source is high in dissolved organic carbon (DOC) compounds, which are precursors to the formation of disinfection by-products (DBP), such as trihalomethanes (THM) and haloacetic acids (HAA).

After evaluating several treatment options to improve DOC removal and DBP reduction, the town chose to pilot a fluidized bed ion exchange process utilizing a magnetized resin, referred to as the MIEX® Process, applied as pretreatment to the existing plant. Pilot testing was completed in 2008. The pilot system treated the raw water source directly, and its use resulted in significant reductions in DOC concentrations and DBP formation.

Challenge

The Town of Hudson Bay is a community of approximately 2,000 in population in east central Saskatchewan. The town's surface water treatment plant treats water from a variety of surface water sources, at a maximum flow of 2.7 MLD. The current treatment process includes oxidant addition and coagulation, followed by clarification using a packaged treatment system. The water is then chlorinated and discharged to the town's distribution system. The town's raw water source can contain more than 8 mg/L of DOC and can also exhibit high UV254 absorbance.

The significant concentrations of DOC present in the raw water source were not consistently removed by the town's existing conventional treatment process, which resulted in distribution system TTHM concentrations that were, at times, in excess of the Health Canada MAC of 100 µg/L. The Hudson Bay Water Treatment Plant was challenged to reduce distribution system

“We are excited to have identified an effective solution for the treatment of the high DOC water sources that are prevalent throughout so much of this region.”

Lawrence Lukey, President
of Bullée Consulting

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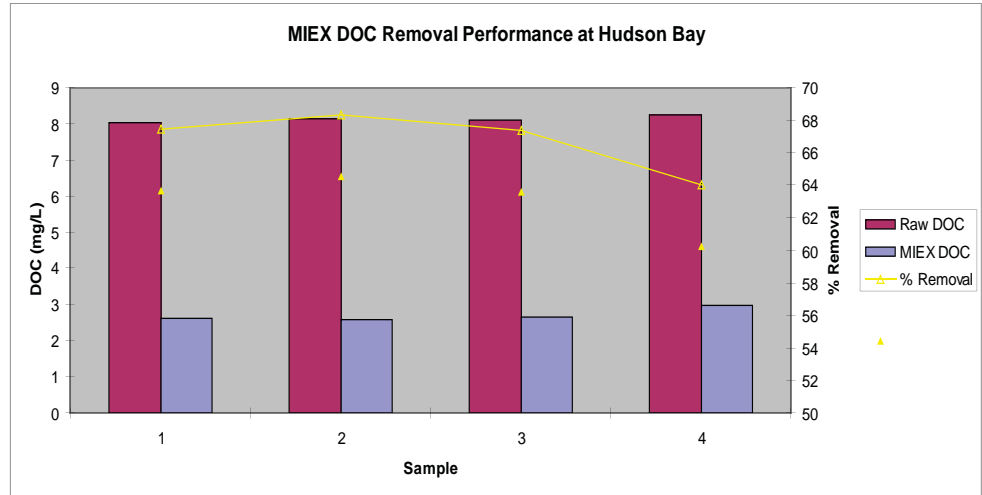


Figure 2: MIEX® Pilot results for DOC removal

TTHM concentrations, while minimizing system operating cost and operational complexity.

Solution

The town chose to address their challenges with TTHM formation through DOC removal and opted to pilot test a MIEX® Pretreatment system, to assess its effect on DBP formation. Pilot testing was completed in September of 2008, and the decision was made to install a 2.7 MLD MIEX® System as pretreatment to the plant's conventional treatment process.

The MIEX® Process was selected due to its pilot scale performance and the anticipated downstream reduction in coagulant demand. During the pilot testing, the MIEX® Process alone reduced TTHM formation to less than 60% of the MAC, with similar reductions in HAA5 observed. Downstream coagulation is expected to remove additional DOC and further reduce DBP formation. Bench scale testing indicated the potential for a significant reduction in coagulant dose; from a plant dose of 65 mg/L of PACl to a dose of 5 mg/L of PACl required after MIEX® Pretreatment.

After construction bidding in August 2010, the 2.7 MLD MIEX® System is currently under construction at the Town of Hudson Bay, with commissioning expected in 2011.

Project Outcome

Based on bench and pilot scale results, the MIEX® System at the Town of Hudson Bay is expected to achieve the following results:

- Average DOC removal of 64%
- Average reduction in UV254 absorbance of 89%
- DBP formation that meets Health Canada Requirements, with TTHM formation of 55-60 µg/L and HAA5 formation of 40-45 µg/L, using MIEX® Treatment only
- Reduced consumption of coagulant and disinfection chemicals

With the construction project underway, Lawrence Lukey, President of Bullée Consulting states, "We are excited to have identified an effective solution for the treatment of the high DOC water sources that are prevalent throughout so much of this region."

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