ORICA WATERCARE

Case Study

Aireys Inlet Water Treatment Plant

Customer

Barwon Water, Victoria

Application

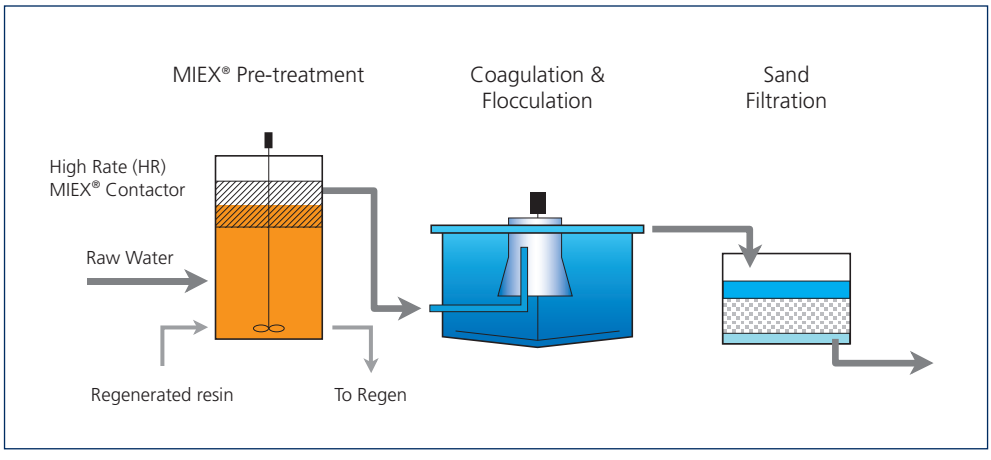
MIEX® pre-treatment to improve existing conventional drinking water treatment

Commissioned

December 2004

Upgraded

June 2006



The Problem

The Aireys Inlet Water Treatment Plant (WTP), located about 150 km from Melbourne, is operated by Barwon Water and sources its raw water from the Painkalac Reservoir. The raw water contains high levels of colour and dissolved organic carbon (DOC). These factors combined with low alkalinity and variable turbidity make this water very difficult to treat using conventional processes.

The existing conventional 2.85 MLD plant consists of alum coagulation, flash mixing, flocculation, sludge blanket clarification, filtration and chlorine disinfection. Historically, DOC removal objectives were difficult to achieve using this treatment, despite the application of very high alum doses (eg. enhanced coagulation). This resulted in high treated water chlorine demand, quick chlorine decay, low chlorine residuals and in turn bacterial regrowth in the distribution system. In addition, the reaction of chlorine with DOC led to the formation of elevated concentrations of disinfection by-products in the treated water.

The Solution

A Dual Stage MIEX® System was installed in December 2004 to greatly enhance the removal of DOC from the water prior to conventional treatment. The MIEX® System was positioned at the head of the conventional treatment process with a maximum capacity of 1 MLD. The inlet works allowed the flexibility of providing the conventional plant with 100% MIEX® Treated water or a blend of raw and MIEX® Treated water, depending on demand for treated water.

The MIEX® System was upgraded to a 2 MLD High Rate configuration in 2006. The High Rate configuration combines the contacting and resin separation in a single vessel. Figure 1 demonstrates the significantly smaller footprint of the High Rate system compared with the existing contactor and settler of lower capacity. Reduced pumping of resin and lower mixing speeds in this system also significantly reduced resin replacement rates and therefore operating and maintenance costs.

MIEX®

Orica Watercare
Head Offices

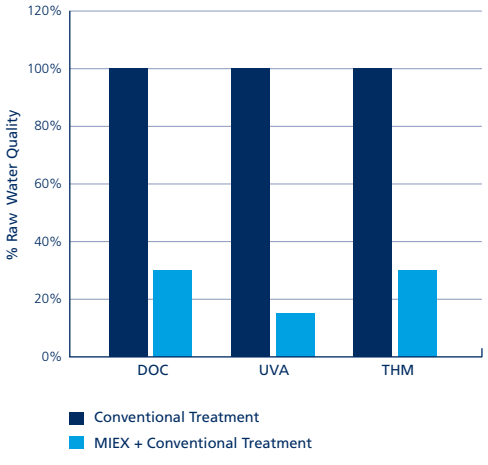
Asia Pacific
T 61-3-9665-7111
F 61-3-9665-7937

USA
Toll Free 1-877-414-miex
T 303-268-5243
F 303-268-5250

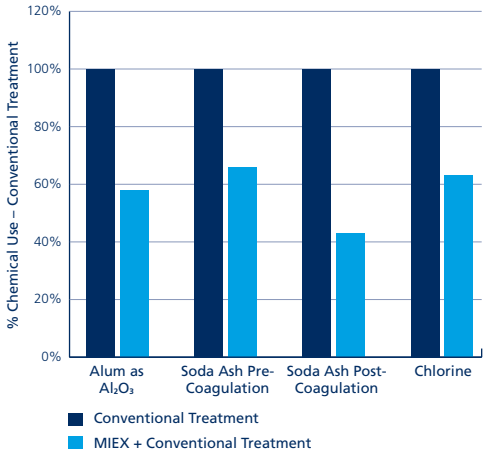
Europe
T 44-1257-256-616
F 44-1257-256-149

E miex@orica.com
www.miexresin.com

Water Quality – Aireys Inlet WTP



Process Efficiency – Aireys Inlet



Project Outcomes

The MIEX® System was originally designed to treat raw water with maximum DOC levels of 15 mg/L (based on historical highs). Upon commissioning of the MIEX® System, heavy rainfall increased the DOC levels in the source water to greater than 20 mg/L. The MIEX® System was able to accommodate this change while still providing a range of water quality and process benefits.

Under these circumstances, coagulation would have been very difficult with constant monitoring being required to ensure aluminium residuals were kept under control. However, the inclusion of MIEX® pre-treatment led to stable plant operation, reduced coagulant doses (30 mg/L as Al_2O_3) and, consequently, the production of excellent quality water with low aluminium residuals.

Overall, the benefits gained with MIEX® pre-treatment include:

- Increased DOC removal rates by 40%, compared to conventional treatment
- Reduced THM levels by approximately 60% from 150 to 60 mg/L

Figure 1 MIEX® High Rate Contactor (foreground) with Dual Stage System (background)

- Improved operational stability of the downstream conventional treatment process
- Treated water chlorine demand reduced by 70%
- Alum demand reduced by 50%
- Improved taste and odour, resulting in fewer customer complaints

This has been achieved despite a significant deterioration in raw water quality and without a significant increase in operational costs.

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