

Case Study

Bundamba Advanced Water Treatment Plant



Project Details

Location: Queensland, Australia

Application: Water Reuse

Capacity: Stage 1A: 7.9 MGD (30 MLD)
Stage 1B: 9.5 MGD (36 MLD)

Engineering: Thies/Black & Veatch
Joint Venture

Commissioned: Stage 1A: August 2007
Stage 1B: April 2008

Overview

In 2007, the Southeast Queensland region of Australia experienced the worst drought conditions in more than a century. Despite Level 5 water restrictions, the most stringent in the country, the dams in Queensland were predicted to run dry by the end of the decade.

To avoid such a crisis, the Australian government established the Western Corridor Water Recycling Project (WCWRP), the largest recycled water project in the Southern Hemisphere and the third largest in the world, to provide a secure water supply for this rapidly growing, drought prone region.

The WCWRP features three advanced water treatment plants (AWTP) and a network of 190 kilometers of underground pipelines to transport treated recycled water to two power stations for cooling water, and to Lake Wivenhoe to supplement drinking water supplies. The WCWRP has a total capacity of 230 megaliters (mld) per day.

The Challenge

Build advanced water treatment plants to support growth and significantly limit the impact of future droughts in Southeast Queensland.

The Solution

The first of the three new AWTPs is Bundamba, which will contribute 66 mld of fresh recycled water, about 1/6th of the WCWRP's total water volume. Thies/Black & Veatch joint venture selected MegaMagnum® reverse osmosis (RO) equipment from Koch Membrane Systems (KMS), making Bundamba the world's first large scale, large diameter reverse osmosis system to be applied to reclamation of municipal wastewater effluent. KMS was chosen for its vast experience with water-recycling projects, ability to supply the large diameter MegaMagnum RO elements as part of a custom-designed complete system, and ability to meet an extremely accelerated delivery schedule.

Stage 1A of the installation employed MegaMagnum MM13 RO trains to reclaim municipal effluent for the water supply for cooling towers at the Swanbank and Torong power stations. This phase produced a nearly half (30 mld) of the plant's total anticipated output.

KMS subsequently supplied MegaMagnum systems with an additional 36 mld capacity for Stage 1B of the Bundamba AWTP. Bundamba is

now providing enough water so that both power stations no longer rely on Wivenhoe Dam for water supplies, freeing an equivalent amount of water for potable distribution.

In recognition of this incredible engineering and construction accomplishment, Bundamba won "Water Project of the Year" from Global Water Intelligence in 2008.

The Membrane System

Bundamba AWTP Stage 1A has four pre-engineered, packaged MegaMagnum MM13 trains holding 65 membrane elements each, operating in parallel for a total of 260 membrane elements in the system. Stage 1B has five trains for a total of 325 membrane elements.

The RO skids for Stage 1A were supplied under a 30-week schedule for design, fabrication, and delivery and have been operating since August 2007. The RO skids for Stage 1B were

supplied under a 17-week schedule for fabrication and delivery and have been in operation since April 2008.

Performance data shows there is virtually no evidence of long-term fouling, and the plant is energy efficient compared to other recent Australian large scale MF/RO projects on municipal wastewater, where specific flux has dropped quickly. In fact, when comparing the performance of Bundamba's RO to other large scale Australian MF and RO projects, the energy efficiency improved by 27 percent. Based on an energy cost of ten cents per kilowatt-hour, this translates to an estimated savings of more than \$250,000 annually.

After more than two years, the Bundamba's MegaMagnum RO system is performing extremely well, with 85% water recovery and virtually no evidence of the long-term fouling that is often experienced at water reclamation plants.



Installation of the MegaMagnum RO System

Product Overview

The MegaMagnum elements are the world's largest commercially available spiral wound RO elements. Each 18-by-61-inch MegaMagnum spiral element used for the project contains 2,800 square feet of membrane surface area, compared to 400 square feet in commonly deployed 8-by-40-inch products.

The higher capacity MegaMagnum elements can save as much as 40% on overall footprint, as well as reduce costs associated with maintenance and ancillary equipment such as piping, valves and instruments.

Bundamba Water Quality		
Constituent	Avg. Feed	Avg. Permeate
Calcium (mg/L Ca ⁺⁺)	35	<0.2
Magnesium (mg/L Mg ⁺⁺)	21	<0.2
Sodium (mg/L Na ⁺)	182	6.0
Potassium (mg/L K ⁺)	24	0.9
Iron (mg/L Fe ⁺⁺) (soluble)	0.035	0.003
Bicarbonate (CO ₃ ⁻) (mg/L as CaCO ₃)	141	11
Sulfate (mg/L SO ₄ ⁻)	188	<1
Chloride (mg/L Cl ⁻)	177	4.3
Nitrate (NO ₃ ⁻) max (mg/L as N)	2.0	0.19
Phosphorous (mg/L as P)	3.2	<0.01
Total Dissolved Solids (TSD) (180 °C) (mg/L)	697	23
pH	6.8	5.8
Turbidity (NTU)	<0.1	NA
Conductivity (µS/cm)	1,162	35



Koch Membrane Systems, Inc.

850 Main Street, Wilmington, MA 01887-3388

Main: 1-978-694-7000 • Fax: 1-978-657-5208

Toll Free: 1-888-677-5624

Visit Our Web Site for International Contacts

www.kochmembrane.com

©2012 Koch Membrane Systems, Inc. All rights reserved worldwide. MegaMagnum is a trademark of Koch Membrane Systems, Inc. and is registered in the U.S. and other countries. 5/12
Koch Membrane Systems, Inc. is a Koch Chemical Technology Group, LLC company.