

## APPLICATION: Water Reuse

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# Oil Company and Municipality Partner Up to Recycle Wastewater

*Plant reduces freshwater consumption and an oil company achieves lower sulfur concentrations*

A pioneering partnership between the city of Edmonton, Alberta, Canada, and Petro-Canada is using GE Water & Process Technologies' advanced ultrafiltration (UF) and reverse osmosis (RO) membrane equipment, treatment chemicals and onsite service engineers to reuse treated municipal wastewater effluent for refinery operations. Since December 2005, a 1.3-million gal per day (mgd) GE ZeeWeed tertiary UF system in Edmonton's 82-mgd Gold Bar Wastewater Treatment Plant (WWTP) has been treating clarified secondary effluent to provide Petro-Canada's largest oil refinery with a new, sustainable supply of high quality recycled water for use in its diesel fuel desulphurization process. The success of the project has received numerous industry awards, including a GE ecomagination Leadership Award for reducing freshwater consumption at the plant by up to 700,000,000 gal annually.



A technician installs a ZeeWeed membrane cassette into the 1.3 mgd tertiary filtration plant at Gold Bar WWTP.

### The challenge

Achieving the lower sulfur concentrations meant that Petro-Canada needed more water of similar quality to high-pressure boiler feedwater, for the hydrogen and steam used in the desulphurization process. The oil producer was reluctant to increase withdrawals from the North Saskatchewan River. Edmonton authorities proposed that wastewater effluent from the Gold Bar WWTP could be used by the refinery;

however, Petro-Canada needed better quality water than what was originally proposed and worked with the city to evaluate additional treatment options.

### The solution

GE's UF membranes were selected after the city and Petro-Canada compared several pressurized and immersed membrane systems. ZeeWeed was the preferred choice for its ability to handle high levels of suspended solids, proven ability to deliver high quality water in demanding large-scale applications, future expandability, low operating cost over a 25-year period and compact footprint. The city also saved millions of dollars in capital costs because Petro-Canada no longer needed to expand its river intake system and raw water treatment plant. Instead, onsite treatment plants dedicated to boiler feedwater production could be designed to handle consistent quality recycled municipal wastewater throughout the entire year.

Treated effluent from the ZeeWeed system is chlorinated and transported through a 3.4-mile pipeline to Petro-Canada's onsite hydrogen and steam supplier. Two 400-gpm GE PRO Series RO systems reduce the conductivity of the treated effluent from approximately 1,000 micro-mhos down to 10 to 15 micro-mhos. The high-purity water then flows through a GE sodium zeolite softener. This removes any last traces of total hardness. Following softening, the water is de-aerated and brought up to boiler feedwater temperature. By 2008, Petro-Canada will also begin using the ZeeWeed-treated tertiary effluent to supply up to 30% of the make-up water for its cooling towers or to feed the RO system at the refinery's new boiler feedwater treatment plant. **www**

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