CASE STUDY

Transalta Energy

Sundance & Keephills sites, AB

May, 2014

BI Pure Water (Canada) Inc. has designed, manufactured and commissioned two process water treatment plants for TransAlta Energy. One package plant is situated at the Keephills site and the other at the Sundance site, on the south shore of Wabamun Lake.

A view of Wabamun Lake at sunset -- site of the largest coal-fired electrical generating facility in western Canada, with six generating units -- 70 km west of Edmonton.

Keephills 3 began commercial operations in September 2011 as one of Canada's largest and cleanest coal-fired facilities.

The objective of the Sundance PWTP is to treat pre-treated process water used in energy production that is released back to the lake.

The system has been designed to treat an average 164 m3/day (one RO train running, treating 6.2 L/sec based on 7.4 hours/day of operation), of pre-treated water from the Wabamun Lake Water Treatment Plant in order to produce water meeting Canadian drinking water quality standards.

The BI Pure Water package system removes residual organic carbon material and disinfection byproducts while at the same time enhancing rejection of trace contaminants and total dissolved solids (TDS) through:

- Two-stage activated carbon (GAC) adsorption, also removing residual ozone from the pre-treated water.
- TDS and contaminants removal by reverse osmosis (RO)
- Cartridge carbon adsorption to ensure that small-scale organic compounds are captured.
- Post-RO treatment consisting of pH adjustment and/or re-mineralization.
- Final disinfection by injection of a sodium hypochlorite solution at a level typically around 0.5 mg/L in order to establish and maintain a minimum chlorine residual greater than 0.1 ppm in the distribution system.

Eight reverse osmosis membranes reduce the level of undesirable contaminants in the water.

Dual insulated media vessels with a control valve nest

Process water treatment at Sundance in more detail:

The water to be treated is pumped into two granulated activated carbon filters in series for removal of ozone and organics. They are followed by an ORP (redox) sensor. The filters are designed to work alternatively as lead/lag filters. Filter backwash water is supplied by the distribution pump after the last contact tank. The filtered water is subsequently injected with an anti-scalant solution to prevent any formation of scale on the surface of the RO membranes.

After 5 micron parallel cartridge filtration the water is pumped by the RO booster pumps into one of the two trains containing four RO vessels followed by five post-membrane 5 micron parallel carbon filters and three 1 micron absolute parallel filters. Each RO vessel contains four (4) Dow Filmtec L-400 membranes. Each RO train will yield 4.65 L/sec of product water. Permeate water quality is verified by conductivity and pH sensors after each train.

Operation of the Clean-In-Place (CIP) system, consisting of the chemical flushing tank, the CIP pump and the 5 micron cartridge filter, is completely manual and CIP cleaning will only be done during a plant shutdown.

The product water is finally injected with bicarbonate and sodium hypochlorite solutions for pH adjustment and disinfection prior to the contact tanks. A recirculation system with a heat exchanger and a chiller provides means for lowering the water temperature to an acceptable level for distribution.

The residual chlorine level in the treated water is monitored manually. However, the automated operation of the chlorination system is controlled by the main control panel. A sample is manually drawn from downstream of the chlorine injection system and is tested to ensure compliance with the initial chlorine residual specification (approximately 0.5 to 0.8 ppm). The residual chlorine level in the treated water is recorded and then a manual adjustment is made if the quantity of chlorine in the water is off specification.

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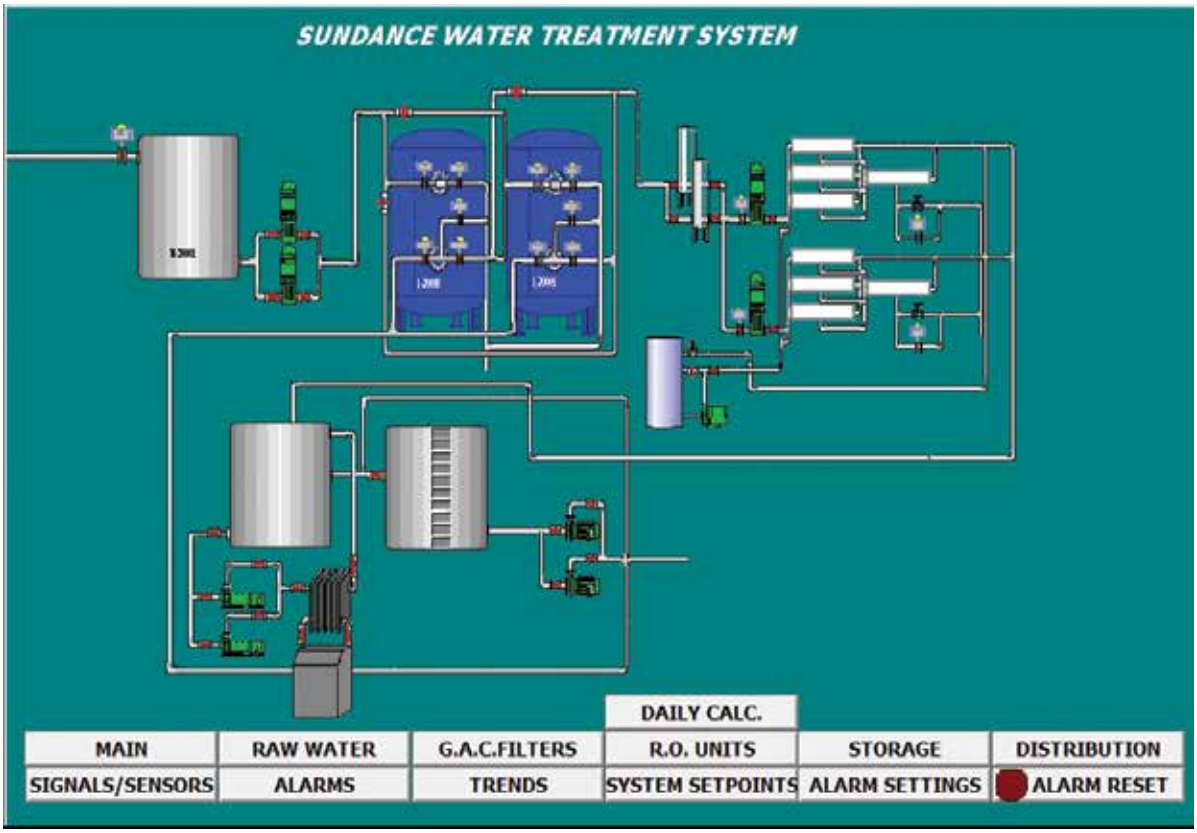

A touchscreen shows the processes and allows the operator to quickly see the data and make changes. The PLC processes the information provided by the monitoring devices and operates the control valves installed on the filters, the UV unit, and the chlorination unit.

BI Pure Water (BIPW) specializes in reviewing water quality test results and prescribing the most cost-effective solution. BIPW engineers pilot, design, manufacture, install, start-up and commission package water treatment plants. The operators are then trained and the plants can be serviced on a regular basis. BIPW provides small and medium-sized water treatment plants for federal, provincial and municipal government, industry, remote camps, private water systems, resorts and First Nations communities.

Our engineered systems are cost effective:

- Years of water engineering expertise: electrical, mechanical and civil engineers specializing in water treatment on staff
- Custom designed to a specific water analysis and budget
- Systems are leak and flow tested at the factory, the PLC is operated and debugged before shipping for faster installation and start-up on site, lower total cost
- We don't sub-contract
- Complete design, build, install, parts

BC & North American award winning design & manufacture

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