BI Pure Water Delivers Advanced Water and Wastewater Treatment Plants 2020

The new potable water treatment and waste water treatment plants for a large construction worker's camp apply state of the art technologies to provide safe drinking water and wastewater treatment that meet or exceed the most stringent federal and provincial standards.

Designed and manufactured in Surrey, BC by BI Pure Water Canada Inc., the PWTP and WWTP systems were factory fabricated as modular building sections. This approach allows factory testing of the process and therefore greatly reduced construction time on site. There was great collaboration during the project with the project team members in this complex design-build project.

The new potable water treatment and waste water treatment plants for a construction camp to provide safe drinking water and wastewater treatment that meet or exceed the most stringent federal and provincial standards.

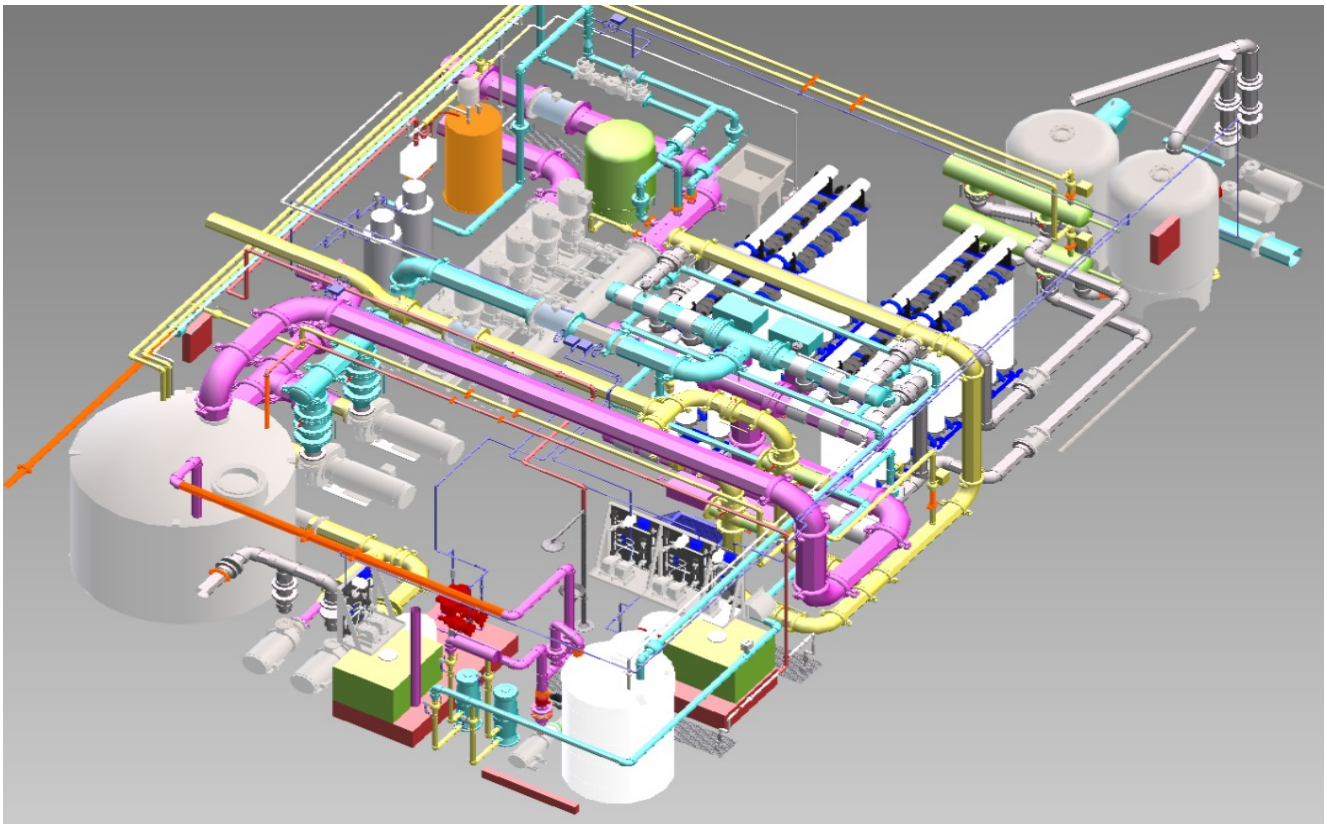

Figure 1 - Water Treatment Plant 3-D schematic showing the white ultrafiltration membranes with blue end caps.

Two treatment trains allow for redundancy, each with the ability to treat 89.2 m3/hr (393.3 US gpm) or 75% of the total plant capacity of 2,846 m3/day.

The raw water for this potable water treatment plant is from the nearby river. As is common when using river water as the source water, the level of turbidity in the water is the primary concern. The raw water analysis provided indicates turbidity average of 9 NTU with seasonal peaks of 44 NTU.

The main water treatment technologies in the plant are:

- Coagulant dosing (PACl), if required
- Pre-filtration with self-cleaning strainers
- Ultrafiltration (UF) membranes
- UV disinfection
- Sodium Hypochlorite disinfection

Figure 2 - Plant inlet with chemical contact time tanks and UF membranes (right)

Automatic self-cleaning filters (200 micron) are the first stage of filtration. An optional coagulation chemical injection system is provided which is controlled by the HMI and which allows maximization of the filter performance through the UF unit.

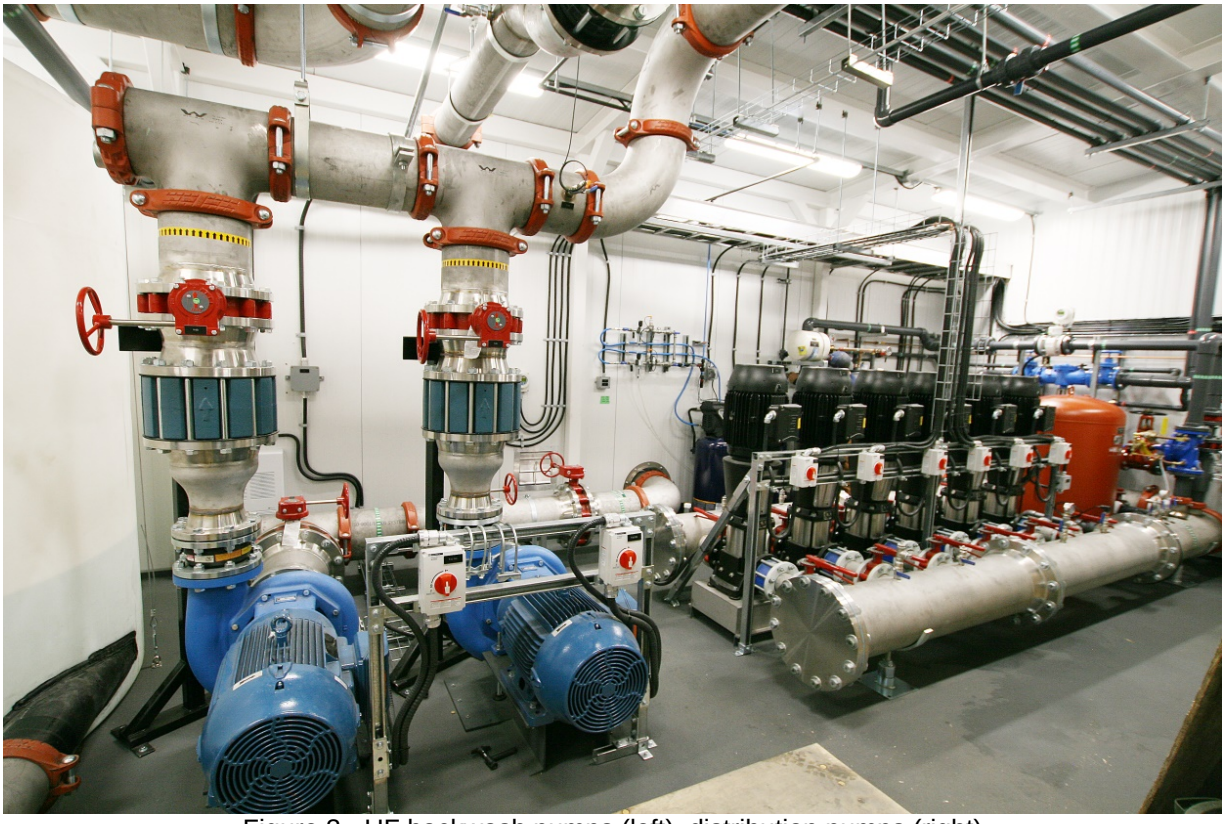
Figure 3 - UF backwash pumps (left), distribution pumps (right)

The UF membranes have a 94.5% overall recovery rate. These membranes do not require air scouring thereby avoiding the added operating and maintenance costs of an air supply system.

To maintain the normal operation of the UF unit, a cleaning process including routine backwash (BW), chemically enhance backwash (CEB) and Clean-In-Place (CIP) may be required. The process parameters of the UF system, including the expected frequency of the cleaning processes, are displayed and modified as needed on the HMI. The UF backwash water is drawn from the potable water storage tank.

The UF system is designed with simplicity and robustness in mind and is easily operated and maintained with minimal supervision

While the UF process can effectively remove bacteria including Giardia and Cryptosporidium, regular air integrity testing, which is a regulation for UF to produce potable water, would increase complexity and operating costs. However, since this UF system offers turbidity reduction only, it can be operated without air integrity testing. The UV and Chlorination process following the UF treatment guarantees the required 3 log reduction of Giardia & Cryptosporidium and 4 log reduction of virus concentration.

Figure 4 - UV units with a control panel for each UV reactor

The two Evoqua ETS-UV SX-225-8 closed vessel, medium-pressure high intensity UV units are validated to USEPA UVDGM and sized for 75% (89.2 m3/hr = 393.3 USgpm) with a UVT of 85%.

The BI Pure Water chemical dosing system is designed for reliability and minimum maintenance. Corrosion resistant materials are used from the solution tank to the injection quills. Leak-free connections and spill containment are standard to ensure safe and reliable long term operation.

The entire WTP is designed for automatic operation, controlled by the PLC/HMI process control system, with manual override capacity for all electrically operated equipment.

The control system provides control, monitoring, alarms (local/remote), data acquisition and conditioning, trending, data logging, and report generation of the WTP. The central control panel is located in the electrical room of the LNG construction camp.

The 720 m3 raw water storage tank is a buffer, allowing for several hours of maintenance on the raw water intake system without interrupting potable water treatment.

The majority of pumps in the system are provided with VFDs for variation of the flow and pressure in response to changing conditions. The VFDs also lessen the mechanical shock on the pumps and piping during start-up and offers energy savings during periods of low demand.

Figure 5 – Water treatment plant (left) and site built raw water storage tank (right)

The Grundfos distribution pump system, consisting of 5 vertical pumps, with a 6th on standby, delivers 1283 litres/min (339 US gpm) and are powered with a Grundfos VFD speed control system for each pump. An Amtrol 500L bladder tank provides the required volume during low demand periods to reduce pump short-cycling. A BI Pure Water subcontractor, Aurora Tanks BC, provided the raw and treated water tanks.

The modular systems included thermally efficient building envelopes, energy efficient LED lighting, variable frequency motor controls and demonstrate a sustainable approach to infrastructure design. BIPW's quality plans, environmental considerations, design and 3D CAD drawings meet the unique requirements and standards of major corporations and utilities. This includes "Design for Resilience", taking into account seismic forces, flooding, extreme storms and other factors.

BIPW specializes in reviewing water quality test results, analyzing customer needs and then prescribing the most cost-effective solution. Our engineers and team pilot, design, manufacture, install, start-up and commission water/wastewater treatment plants. The operators are then trained and the plants can be serviced on a regular basis.

BIPW focuses on small and medium-sized water treatment plants to meet the needs of Federal, Provincial and Municipal Governments, Industrial Process, Mining Camps, Private Water Systems, Resorts and First Nations communities.

These package water treatment plants are cost-effective because:
- The water treatment plants are custom engineered to a specific water analysis and budget.
- The plants can be built in the Port Kells factory where our experienced team of engineers and skilled manufacturing team are available for new custom-designed systems.
- The completed water treatment plant is leak- and flow – tested at the factory.

Contact BI Pure Water at 604 882-6650 or info@bipurewater.com www.bipurewater.com