



Tulita, NWT 2019

The Tulita Water Treatment Plant (WTP) and truckfill station has been upgraded with a new truckfill water treatment building and other system components. The existing intake lines and water storage building will be retained and reused. The design-build project upgrade will increase treated water production flow from 114 L/min to 227 L/min.

The raw water is from Great Bear River. The river turbidity is normally in the range of 2 NTU to 10 NTU. However, during spring break-up, it can reach levels of up to 100 NTU for short periods and often reaches more than 15 NTU during rainy fall days when runoff water from the catchment area flows into Great Bear River.

Tulita in the Dene language means “where the rivers or waters meet” and is a hamlet of about 500 Sahtu Dene, Metis and Slavey First Nations in the Northwest Territories on the Mackenzie River. The community started as a Hudson’s Bay Company trading post known as Fort Norman in 1869.

The package treatment plant was trucked by multi axle trailer, just meeting the 55,000 pound limit from Surrey to Fort Simpson. On the edge of the Mackenzie River it was lifted off onto a barge in time for July’s community deliveries.



Figure 1 – The new truckfill water treatment plant sits beside the existing water storage building.

The treated water quality will be in compliance with the Guidelines for Canadian Drinking Water Quality and all Northwest Territories regulatory requirements, including approval of the Chief Public

Health Officer, including 1) ≥ 4 log reduction of viruses; 2) ≥ 3 log reduction of Giardia and Cryptosporidium; and 3) reduction of turbidity to < 0.1 NTU.

The new water treatment equipment system includes:

1. Memcor Ultrafiltration system
2. Backup Generator
3. Hydronic heating system, including 2 boilers
4. Domestic water supply and tempering system
5. Truckfill station
6. Control and alarm panel

The new backup generator is 50 kW to support the larger raw water feed pump and membrane system. The hydronic system is similar to the system in the previous WTP building and consists of 2 boilers and a domestic water tempering system.

A single truckfill station comes with 2 operator stations and an insulated & heat traced truckfill line. There is one centralized control panel with PLC and HMI control. The membrane system is a packaged unit, with a separate PLC and HMI.

Waste water that does not contain chemicals (e.g. membrane unit standard backwash, turbidity analyzer drains, air relief drains) is discharged back to the river.

Waste water that contains chemicals drains to a small sump. A sump pump transfers this waste to a neutralization tank. When required, the neutralization tank should be emptied by a vacuum truck. Level sensors and alarm indicators inform the operator when this is required.



Figure 2 – The Memcor Ultrafiltration system

The MEMCOR XPsr 18 is the core treatment process for together with the adjustment of the cleaning regimen, the UF unit functions with variations in the Great Bear River raw water quality throughout the year while still producing high quality potable water.

The MF system is designed for automatic operation, which will be called on when the set low level of the reservoir is triggered. To maintain the normal operation of the MF unit, a cleaning process including routine backwash (BW), chemically enhanced backwash or maintenance backwash (MW) and Clean-In-Place (CIP) is required.

The MEMCOR UF unit has its own local PLC/HMI control panel and will transmit alarms and flows to the main PLC.

The general concept of a UF treatment system is similar to a MF system which the existing WTP has been utilizing since 2003. The estimated UF membrane replacement frequency is every 20 to 25 years based upon the expected membrane usage intensity to satisfy the required potable water demand.

The UF process can effectively remove bacteria including Giardia and Cryptosporidium, and the MEMCOR UF is verified for 4 Log removal of Giardia and Cryptosporidium. The UF process is not effective for virus removal (1 Log removal credit can be awarded if preceded by coagulation process). In order to further inactivate bacteria and viruses and to provide the required chlorine residual for drinking water, chlorination is a mandatory treatment process. The UF + Chlorination process guarantees at least 3 log reduction of Giardia & Cryptosporidium and 4 log reduction of viruses.

Heat exchanger - A feature that is required in the North is the heat exchanger connected to the boiler to warm cold water in the treated water storage tank. This system consists of a recirculation pumps and the heat exchanger. .



Figure 3 - Heat Exchanger with Insulation Jacket

This project included moving the existing water treatment plant to allow the new plant to sit in its place. In addition, the intake line was modified and a larger raw water pump was installed.

Local workers were hired to prepare a new gravel pad on a raised area for the fuel tank, according to new regulations for diesel, with double wall valves to avoid diesel spills. Community members helped prepare the site by digging trench for the new electrical lines, underground pipes, painting, installing ballards, mixing cement with water hauled in buckets from the river. BIPW worked with locals to learn about the water system, train operators, and make videos about the plant operations.

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.

BI Pure Water specializes in reviewing water quality test results, analyzing customer needs and then 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 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.

BI Pure Water package water treatment plants are cost-effective because:

- The water treatment plants are custom engineered to a specific water analysis and budget.
- The plant can be built in the Port Kells factory where the trained staff works.
- The completed water treatment plant is leak- and flow – tested at the factory.

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