



Potable Water Treatment Membrane Treatment

Oil & Gas Client

Potable Water Treatment – Membrane Treatment

Oil & Gas Client

BACKGROUND

ClearBakk specializes in the engineering and construction of water treatment packages, and other fluids management. ClearBakk has a proven track record serving a wide range of clients in Western Canada and North America.

ClearBakk was approached by an Oil & Gas client in Alberta to provide a drinking water treatment plant for a 800 person camp. ClearBakk designed and constructed a potable water treatment plant employing membrane technology to meet and exceed Canadian drinking water quality standards, and the clients needs.



Potable Water Treatment – Membrane Treatment

Oil & Gas Client

PLANT OVERVIEW

- Design Capacity: 800 People
- Design Daily Average Flow (DAF): 200 m³/day
- Building Size: 14.2' W x 74' L x 14.6' H
- The design followed Canadian Guidelines for Drinking Water Quality and Province of Alberta drinking water standards



Potable Water Treatment – Membrane Treatment

Oil & Gas Client

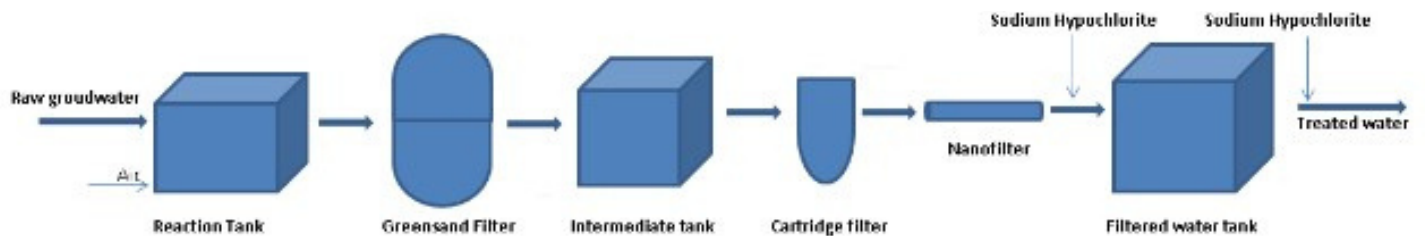
SYSTEM INTRODUCTION

Design Influent & Effluent Water Quality

PARAMETER	Temperature	pH	TDS	Hardness	Sodium	Potassium	Calcium	Magnesium	Iron	Manganese	Aluminum
AS			Aggregate	CaCO ₃	Na ⁺	K ⁺	Ca ⁺⁺	Mg ⁺⁺	Fe ⁺⁺	Mn ⁺⁺	Al ⁺⁺⁺
UNIT	°C	Unitless	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
INFLUENT	5-15	7-7.7	984-1200	420-500	150 - 230	7.5 - 13	110 - 140	32 - 59	0.06 - 7	0.045 - 0.091	0.001 - 0.012
EFFLUENT	-	6.5-8.5	<500	NS	≤200	NS	NS	NS	<0.3	<0.05	<0.1

PARAMETER	Carbonate	Bicarbonate	Chloride	Fluoride	Sulfate	Nitrate	Silicon	Barium	Strontium	Boron	Nitrogen
AS	CaCO ₃ ⁻	CaHCO ₃ ⁻	Cl ⁻	F ⁻	SO ₄ ⁻	NO ₃ ⁻	Si	Ba ⁺⁺	Sr ⁺⁺	B ⁺⁺⁺	N
UNIT	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
INFLUENT	0.5	510 - 560	45	1-6	420 - 560	0.003 to 0.036	6.7 to 8.8	0.01 to 0.06	1.2 to 1.4	0.43 to 0.65	2.7 to 3.7
EFFLUENT	NS	NS	≤250	<1.5	<500	<45	NS	<1.0	<5	<5	NS

Process Schematic



Potable Water Treatment – Membrane Treatment

Oil & Gas Client

MAIN FEATURES

- Greensand filtration removes iron (Fe⁺²), manganese (Mn⁺²), hydrogen sulfide (H₂S), arsenic and radium in the water.
- Nanofiltration (NF) removes multivalent ion contaminants including hardness and partial monovalent ions, producing water with excellent Total Dissolved Solids (TDS) concentration (50-150 mg/L) for drinking water.
- Portion of the water to bypass the Ultra Filtration (UF) unit and blend with the permeate improves process economics by reducing equipment size and power requirements.
- Automatic greensand filter backwash system and NF flushing system were provided to ensure the proper cleaning of the filter facilities. The frequency of cleaning and duration of the each step are operator adjustable which enables the operator to optimize the cleaning procedures based on the actual water quality and operation experiences.
- One aluminum alloy tank structure contains all the treatment retention time for reaction tank, intermediate tank and treated water tank.
- Designed to operate in harsh winter climate conditions: -42°C Minimum Outside Air Temperature

ADVANTAGES

- **Easy Installation:** Easy to install, minimized site work. Ready to use with minimal connections of the electricity and piping.
- **Safety:** Numerous safety and operator friendly features, process tanks are sealed and vented outside, lockable hand-off-auto switches for easy equipment LOTO on Control Panel, mounted fire extinguishers, fire alarm, eye wash station and etc.
- **Small Footprint:** 74' L x 14' W.
- **Modular:** Additional plant module can be installed in parallel for future camp increases.
- **Highest Quality:** All tanks, structural members and flooring are made of aluminum alloy to ensure the asset life is maximized.

Potable Water Treatment – Membrane Treatment

Oil & Gas Client

SUMMARY

One Stop Services

- Design, construction, transportation, installation, commissioning, and operation were provided.

Satisfied Treatment Achieved

- Treated water quality met or exceeded quality guidelines and standards.



	Unit	Sample-1	Sample-2	Sample -3	Treatment Goal	Report Detection Limit (RDL)
Dissolved Iron (Fe)	mg/L	<0.060	<0.060	<0.060	<0.3	0.06
Total Iron (Fe)	mg/L	<0.060	<0.060	<0.060	<0.3	0.06
Dissolved Manganese (Mn)	mg/L	0.028	0.0066	0.0071	<0.05	0.004
Total Manganese (Mn)	mg/L	0.03	0.0081	0.0081	<0.05	0.004
pH		8.34	8.37	8.33	6.5-8.5	
TOC	mg/L	1.3	1.2	1.2	-	0.5
Turbidity	NTU	0.23	0.25	0.23	<0.3	0.1

Sampling location	Total Coliform by MF	E. Coli by MF	Quantity Analyzed	Units	Protocol
PWTP treated water pump discharge	<1	<1	100 ml	CFU/100ml	APHA-9222B
Camp distribution 1	<1	<1	100 ml	CFU/100ml	APHA-9222B
Camp distribution 2	<1	<1	100 ml	CFU/100ml	APHA-9222B

CFU = Colony Forming Unit

<1 = No counts were detected based on the volume / dilution analyzed.