



Potable Water Treatment Membrane Treatment

Oil & Gas Client

403.295.8054

clearbakk@alsys-group.com

Oil & Gas Client

Potable Water Treatment - Membrane Treatment

BACKGROUND:

ClearBakk specializes in the construction of water treatment packages and other fluids management with a proven track record serving a wide range of clients in Alberta and across North America.

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



Oil & Gas Client

Potable Water Treatment - Membrane Treatment

PLANT OVERVIEW:

- Design population: **800 people**
- Design daily average flow (DAF): **200 m3/day**
- Design followed Canadian Guidelines for Drinking Water Quality and Alberta drinking water standards
- Building Size: **one of 14.2' W x 74' L x 14.6' H container**



Oil & Gas Client

Potable Water Treatment - Membrane Treatment

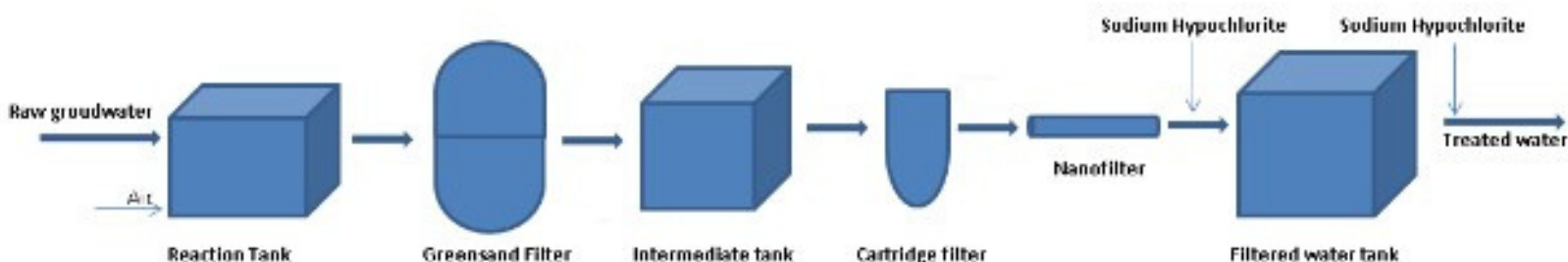
SYSTEM INTRODUCTION:

Design Influent and Effluent Water Quality

PARAMETER	Temperature	pH	TDS	Hardness	Sodium	Potassium	Calcium	Magnesium	Iron	Manganese	Aluminum
AS			Aggregate	CaCO3	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	904-1200	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	CaCO3 ⁻	CaHCO3 ⁻	Cl ⁻	F ⁻	SO4 ⁻	NO3 ⁻	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	0.48 to 0.65	2.7 to 3.7
EFFLUENT	NS	NS	≤250	<1.5	<500	<45	NS	<1.0	<5	<5	NS

Process Schematic:



Oil & Gas Client

Potable Water Treatment - Membrane Treatment

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 TDS concentration (50-150 mg/L) for drinking water.
- Portion of the water to bypass the 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 for the filter facilities. The frequency of cleaning and duration of the each step are operator adjustable which enable 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.
- System was suited to harsh climate in the winter: ambient air temperature (minimum) -42°C.

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 Pane, mounted fire extinguishers, fire alarm, eye wash station and etc.
- **Smallest footprint:** 74 feet long and 14 feet wide.
- **Modular:** easy for expansion; additional plant module can be installed in parallel for future camp increases.
- **Highest Quality:** all tanks, structural members and flooring are aluminum alloy for longevity and avoids rusting of components, ensuring the asset life is maximized.

Oil & Gas Client

Potable Water Treatment - Membrane Treatment

SUMMARY:

One Stop Services:

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

Satisfied Treatment Achieved:

- Treated water quality met or exceeded quality guideline 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.