

Location: LaBarge, Wyoming Owner: Town of LaBarge Engineer: Forsgren Associates Contractor: Hydro Construction

New Water Source Challenge

The Town of LaBarge, Wyoming, is home to nearly 500 residents. In the past, drinking water was drawn from a groundwater source and required only chlorination. When the infiltration gallery collapsed, the groundwater supply diminished and another source was needed.

The Green River was used to supplement the groundwater but required further treatment. As an interim solution to meet EPA regulations, LaBarge rented a small ultrafiltration membrane skid from WesTech. This direct filtration system provided interim treatment while the new treatment plant was designed and built.

During spring runoff, turbidity levels in the Green River reached over 1100 NTU. As there was no pretreatment, the membranes would blind off quickly, requiringfrequent backwash. The town needed a more permanent and comprehensive drinking water system.

Equipment Selection

The town council, in conjunction with the engineer, selected a permanent membrane filtration system with clarifier pretreatment. WesTech was chosen to provide all of the major process equipment for the new facility including one solids CONTACT CLARIFER™ and two Ultrafiltration Membrane Filters.

Solids CONTACT CLARIFIER™		
Size	30 ft diameter	
Flow Rate	Design: 425 gpm Hydraulic Peak: 530 gpm	
Hydraulic Loading Rate	0.72 gpm/ft ²	
Recirculation Rate	2,550 gpm	
Detention Time	Total: 175 min Flocculation: 30 min	
Motor HP	Rake Arm Drive: 0.5 HP Impeller Drive: 1 HP	
Coagulant Dose	Range: 40-50 ppm	

For pretreatment, a solids CONTACT CLARIFIER was the best fit to treat raw water from the Green River. The WesTech solids CONTACT CLARIFIER is an enhanced flocculation device with internal solids recirculation, gentle flocculation, and gravity sedimentation in a single unit. Compared to a conventional clarifier, high volume internal solids recirculation and low floc shear are provided by the solids CONTACT CLARIFIER, while using less horsepower.

By effectively reducing iron, manganese, turbidity, and TOC, solids CONTACT CLARIFERS have demonstrated their ability to provide excellent pretreatment to membrane filters. Improved clarification also reduces the cleaning frequency and chemicals needed to maintain a membrane filtration system.

Treatment Plant Turbidity		
Raw Water	Range: 10-1180 NTU Avg: 17 NTU	
Clarifier Effluent	Range: 0.07-3.2 NTU	
Ultrafiltration Membrane Effluent	Range: 0.02-0.06 NTU	

Operating with internal solids recirculation and a sludge blanket, the solids CONTACT CLARIFER allows for enmeshment of uncoagulated material in the event of high turbidity spikes or a coagulation system shutdown. The sludge blanket provides an additional buffer in the event the coagulant dose requires adjustment.



During spring runoff in 2011, the LaBarge Treatment Plant operated for approximately one week without the addition of alum while waiting for a chemical delivery.

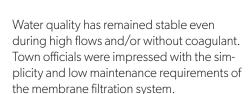
After carefully monitoring the system, they were pleasantly surprised when the clarifier continued to produce water with turbidity levels of < 5 NTU. Because of the effectiveness of the solids CONTACT CLARIFIER, the membranes were not fouled and LaBarge was able to continue providing high quality water to the town.

The WesTech Ultrafiltration Membrane System has a pore size of 0.01µm, providing the highest level of pathogen and particulate matter removal available for low-pressure membrane filters. The system also consistently produces the highest possible quality filtrate, with greater than 4 log removal of cryptosporidium and giardia.

The engineer selected a 32-module system for the Town of LaBarge. With the current demand, 26 modules were purchased and are in operation. To allow for future growth, LaBarge can add the remaining 6 modules and increase the capacity by 140 gpm.

Through the clarification and membrane ultrafiltration process, water has consistently met or exceeded EPA standards since the beginning of operation in the fall of 2010.

Ultrafiltration System		
Quantity	2 trains 16 modules per train	
Ultimate Capacity	32 modules	
Modules Supplied	26 modules	
Permeate Production	600 gpm	
Build-out Capacity	6 modules 140 gpm	
Design Flux	30 GFD	
Recovery	96%	



With the fully automated system, adjustments to plant operations could be made entirely from the control room. Simplicitywas essential since the operators at LaBarge have many other responsibilities at the plant. In addition to the simplicity of the treatment equipment, the operators were also pleased with the high quality of water produced.

With unmatched customer service, WesTech's CONTACT CLARIFIER and Ultrafiltration Membran System supplied a long-term, high-quality treatment solution to meet the drinking water needs for the Town of LaBarge.



Solids CONTACT CLARIFIER[†]



Weir and Rake Arm

Treatment Plant Flow Diagram



