

PLANTPROFILE

By Caitlin Cunningham

Membrane Defense

An Oregon municipality centers its operations at one WTP to meet modern drinking water requirements

NAME:

Row River Water Treatment Plant

LOCATION:

Cottage Grove, Ore.

PLANT SIZE:

4 mgd; expandable to 8 mgd

INFRASTRUCTURE:

New pressurized MF membrane racks remove bacteria. Various other improvements included supporting vertical turbine pumps, variable frequency drives and pre-strainers; a two-mile water distribution line; an 8-mgd intake structure; SCADA software; and insertion probe magmeters.



After careful consideration, the city of Cottage Grove decommissioned the Layng Creek WTP and expanded its Row River WTP.



Cottage Grove funded the WTP upgrade with the help of two loans from the Oregon Economic and Community Development Department.



Row River WTP converted from a conventional granular media filtration process to pressurized MF membranes.

In 1996, the state of Oregon determined that the Layng Creek Water Treatment Plant (WTP) facilities serving the city of Cottage Grove were approaching the end of their useful life and falling short in terms of satisfying drinking water requirements. The state ordered city officials to replace the facilities, which were located approximately 20 miles east of Cottage Grove in Umpqua National Forest.

The city hired an engineering firm to determine the needed improvements and estimate costs for various upgrade options. Planning was completed in December 2002. In the interest of cost-effectiveness, the engineers recommended that the city eliminate the Layng Creek WTP, discontinue water service to about 110 customers along the pipeline between Layng Creek and the city and develop added water production capacity at Row River WTP—an additional facility located within city limits.

Cottage Grove officials considered the recommendation and gathered input from its water customers, ultimately opting to retain a second engineering firm to design an improvement project at the Layng Creek facilities. When the firm calculated a higher-than-previously-estimated price point, the city sought a second opinion from an independent engineer, who confirmed that upgrading the Layng Creek facilities was not cost-effective in the long or short term. Based on 2006 construction costs, water system improvements to the Layng Creek facilities would have cost customers \$33 million over the next 20 years, whereas upgrades at the Row River facilities would total \$7.2 million over the same time period.

On April 10, 2006, the Cottage Grove City Council approved final plans to abandon the Layng Creek facilities, stop service to the 110 aforementioned outlying customers and upgrade the Row River WTP to meet local water service needs.

“The decision to eliminate the Layng Creek plant was difficult,” said Cottage Grove Mayor Gary Williams. “We tried as hard as we could to keep the Layng Creek plant operating, but the costs to meet new regulations and replace the aging pipes was just too great. It would not be possible for customers of the system to pay the additional \$26 million.”

Operation Upgrade

The city received two loans from the Oregon Economic and Community Development Department to fund the Row River WTP improvement project—a \$6.27-million loan from the Safe Drinking Water Revolving Fund and a \$2.48-million loan from the Water/Wastewater Financing Program. Cottage Grove’s investment totaled \$846,630.

Black & Veatch provided engineering for the project, and Slayden Construction Group led building efforts. The entire upgrade initiative was designed, permitted, constructed and commissioned in less than two years.

New Technology

Since its original construction in 1992, the Row River WTP had utilized a conventional granular media filtration process; the revamped plant now uses advanced technology—pressurized microfiltration (MF) membranes manufactured by Pall. The MF process removes *Giardia* from 8 to 30 microns,

Cryptosporidium cells from 3 to 8 microns and other bacteria from 0.2 to 50 microns.

Extending the plant by 36 ft allowed for the incorporation of two new membrane racks—each with 89 modules and additional fittings for three more modules, if needed in the future. Each rack of 89 modules is capable of producing 2 million gal per day (mgd) of filtrate.

Three new 100-hp Floway vertical turbine pumps controlled by variable frequency drives feed the membranes. Amiad 300-micron screens serve as pre-strainers and feature self-cleaning cycles controlled by operator set points. Row River WTP operators have adjusted the time set point from 300 to 60 minutes, and they will continue to make seasonal adjustments for loading factors.

The upgrade also included the installation of a new 8-mgd intake structure on the Row River. The structure incorporates an air-burst screen-cleaning system and National Marine Fisheries Service-compliant fish screens. Additionally, to increase stream flow and improve fish habitat, one small dam was removed, and another dam is scheduled to be removed this year.


Finishing touches at Row River WTP included a two-mile water distribution line; SCADA software; two insertion probe magmeters; two new backwash ponds with membrane-lined banks, baffling and concrete floors; a high-efficiency centralized HVAC system; and much more.

Long-Term Considerations

To compensate for the decommissioning of the Layng Creek facilities, which were turned over to a newly formed water district, the capacity of the Row River WTP was doubled from 2 mgd to 4 mgd. To keep pace with future population growth, the reconstructed plant is expandable to 8 mgd with minimal expansion of its operating area.

The new Row River WTP includes membrane feed pipe for two foreseen expansion phases. An additional membrane rack, also designed to produce up to 2 mgd of filtrate, would be installed in Phase I, likely to be initiated in about five years. Phase II would add one more membrane rack to produce 2 mgd more of filtrate, again without enlarging the building.

Integrity testing—a five-minute pressure decay test using compressed air—is conducted daily on the new membrane system. Air bubbles are visible through transparent plastic joint fittings if fibers are broken; Row River WTP has not experienced this problem but would pin the fibers in such an instance.

“This design-build project was executed efficiently and delivered within the budget and on schedule by our joint-venture team,” said Dan McCarthy, president and chief executive officer of Black & Veatch’s global water business. “The citizens of Cottage Grove now have an advanced treatment facility that will provide them with sustainable supplies of safe, high-quality drinking water.” 

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