PALL

Water Processing

Case Study

Pall Aria™ AP Microfiltration Membrane System Removes Turbidity, Iron and Manganese for Crested Butte

Overview

As populations boom in the West, small towns and cities with municipal water service are feeling the strain. The situation is particularly challenging for communities subject to the Environmental Protection Agency's Surface Water Treatment Rule, and for those experiencing high levels of iron and manganese. These 'nuisance contaminants' must be removed from the water to ensure acceptable taste, odor and color, and to reduce buildup in pipelines, water heaters and water softeners. Local officials usually select from three options to meet regulatory requirements and demand growth: locate a new water source, purchase water from another utility, or treat the affected water to bring it into compliance.

Communities that decide on treatment are turning to "off-the-shelf" plants like the Pall Aria™ AP microfiltration membrane systems. As packaged plants, the systems include all the elements of the treatment process in compact footprints. They are capable of removing particles, bacteria, protozoa, iron and manganese. With coagulation, the systems can also remove viruses and large organic matter. Fully automated operation ensures consistent, reliable, and predictable performance with minimal maintenance. Systems also are small enough to fit into

Crested Butte, Colorado was experiencing high levels of turbidity, iron and manganese in its water supply.

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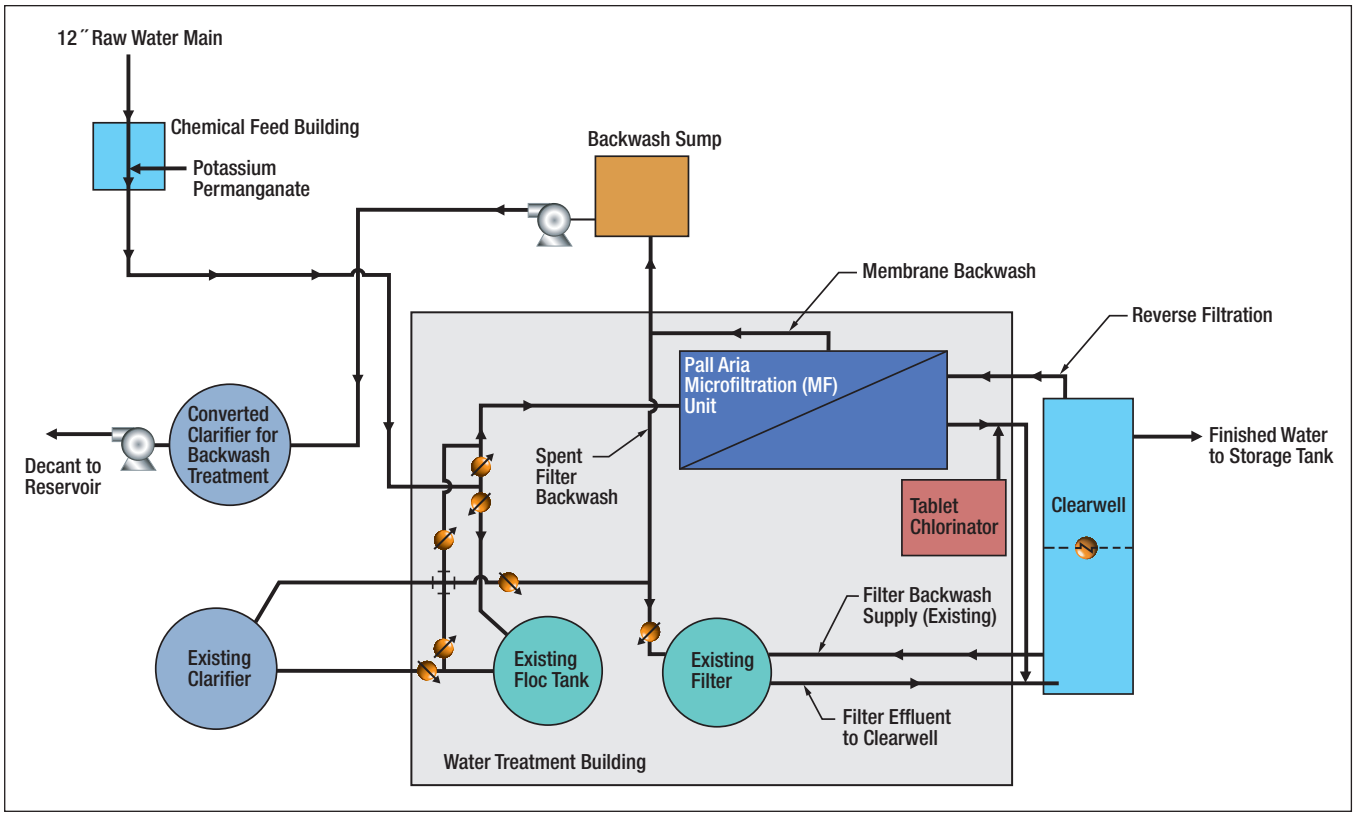

Diagram of Crested Butte's water filtration process.

existing structures and integrate easily into existing filter trains.

A significant benefit of Pall Aria microfiltration hollow fiber membranes is their ability to be chemically cleaned to enable an in-use life typically greater than 10 years. During the life of the membranes the only consumable costs are those linked to providing power to the pumps on the system and to the chemicals used during the monthly cleaning. Both consumables are minimal expenses, much lower than the replacement costs associated with the traditional choice of disposable filter cartridges.

The Challenge

Scenic Crested Butte, Colo., was attracting waves of seasonal visitors and new residents at a time when the community's Western Slope water supply was coming under scrutiny from the Colorado Department of Public Health and Environment. Routine testing had revealed increased levels of turbidity—particularly in the spring when mountain runoff replenished the local reservoir and demand from various sources increased.

"The existing plant was outdated," says environmental engineer Ben Lengacher, P.E., a member of the Stantec Consulting Inc., team hired by Crested Butte officials to recommend options for increasing production capacity and water quality. "Combined Filter Effluent turbidity exceeded 0.5 NTUs at times during spring runoff."

To help community leaders understand the treatment challenges, Stantec performed a comprehensive evaluation of the town's water needs, including water quality, demand trends, hardware reliability, regulatory requirements, and ease of operation. In particular, the firm focused on the difficulties of expanding the existing plant capacity in a constrained site.

"The evaluation results suggested microfiltration would be the best solution," Lengacher says. "But we also wanted a plant that would be

compact, easy to upgrade, and operational in a short timeframe."

As part of a rigorous protocol, Stantec tested two membranes throughout the spring runoff season to establish full-scale design water production rates for each system. The pilot demonstrated how effectively each system was at producing the required quality despite variability in water conditions.

The initial investigation also clarified the critical role adequate pretreatment plays in a region where the water supply includes elevated levels of iron and manganese. Pretreatment with potassium permanganate was determined as essential to assist with removing these contaminants, Lengacher notes. The compound effectively oxidizes soluble iron and manganese into insoluble precipitates that can be removed by microfiltration.

Throughout the testing phase, the Pall Aria system with a highly crystalline, highly permeable PVDF (polyvinylidene fluoride) microfiltration membrane, proved effective in meeting performance requirements and effluent goals. The operating reliability and high recovery rate of the system also helped establish the highest level of customer confidence.

The Solution

Crested Butte acquired three Pall Aria AP-4 systems with 24 Microza* microfiltration modules each. Each system's small footprint meant an existing water treatment building could be reused.

Installation was quick and simple, notes Lengacher. "The town had two identical filter trains, so we were able to take one out and put in the Pall Aria systems and add more capacity while maintaining service."

He and other participants were impressed by Pall's commitment to client satisfaction throughout the project. Support included

Crested Butte's Pall Aria system produces regulatory compliant water in a small footprint.

24/7 remote monitoring of the pilot unit with real-time exchanges between Pall personnel and on-site operators.

Crested Butte utilities director Larry Adams is very pleased with his new system. As configured it can treat an average demand of 400,000 gallons per day with a peak demand capacity of 1.25 million gallons per day.

"The Pall membrane system provided three times the output of the conventional system from the same footprint," Adams says.

The Pall Aria system performed well on a cost basis as well. Compared to competing systems, its recovery rate stabilized at 97%, a full 7% greater than the competition, while delivering the highest peak daily flow rate. At the same time, it delivered less waste (75% lower) and power consumption (close to 60% lower) than the other tested systems. Overall, these advantages suggested that Pall system would be 50% less expensive to operate over its service life.

"The owner is very happy with Pall and the new system," Lengacher says. "It was a good solution for adding capacity in a small footprint."

** Microza is a registered trademark of Asahi Kasei Corporation.*

The Benefits

More communities are selecting the Pall Aria systems for their ability to deliver affordable water treatment solutions with:

- High tolerance for suspended solids loading, including precipitated iron and manganese.
- Uniform membrane structure, which prevents penetration of bacteria and colloidal suspended material.
- Quick installation.
- Minimal chemical cleaning, which reduces chemical and disposal costs and downtime.
- Fully automated operation, which ensures consistent and reliable flux, predictable performance, and minimal maintenance.
- Low circulation pressures for minimal power consumption.
- Long service life.
- Effluent quality that complies with EPA regulations.

About Pall Corporation

Pall Corporation is the largest and most diverse filtration, separation, and purification company in the world. Pall serves municipalities and industries with advanced membrane filtration technology and systems engineered for reliability and cost effectiveness. Pall's space-saving membrane filtration systems are easy to install, simple to use, and satisfy a wide range of filtration requirements.

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