

# UF

Partnership between HDR Constructors Inc., BASF/Inge & H<sub>2</sub>O Innovation allow Montevina to upgrade their existing water treatment facility to use membrane filtration with compact footprint and superior results

**APPLICATION:** Municipal Drinking Water

**CAPACITY:** 113 562 m<sup>3</sup>/d (30 MGD)

**LOCATION:** Los Gatos, California, USA

**COMMISSIONED:** Summer 2018

## CHALLENGE

The Montevina WTP, located just outside of Los Gatos in the heart of Silicon Valley, required an upgrade to their existing water treatment facility to use membrane filtration. The retrofit required a compact footprint and superior water treatment results. Treated water quality requirements included a maximum turbidity of less than 0.3 NTU, 100% of the time, an average turbidity of <0.05 NTU, and a minimum LRV score from daily Membrane Integrity Tests of 4.0 log for the membrane system.

## SOLUTION

After an extensive process of partnering with a design-build engineering and construction team and bidding against several teams, the partnership between HDR Constructors Inc., H<sub>2</sub>O Innovation, and BASF/Inge<sup>®</sup> won. A seven (7)-train ultrafiltration (UF) membrane system was selected as the preferred treatment process to maximum water recovery as well as its ability to fit within the tight available footprint. The modular aspect of the UF treatment trains also lend themselves perfectly to a staged and methodical construction process that allowed for minimal disruption of the existing system during installation. The ancillary equipment was also designed to be downstairs of the UF trains, adding another level of complexity to the design of the system.

The system was designed to handle a present-day filtrate flow of 30 MGD using all seven UF trains. Raw water is pumped from various water sources with different water quality results before entering the pre-treatment portion of the system. The pre-treatment steps include the addition of ACH, KMnO<sub>4</sub>, Cl<sub>2</sub>, and NaOH injection, flash mixing, a flocculation basin, and plate settlers.

Once the water has been processed by the pre-treatment system and chemicals, the UF feed pumps send the raw water through 200 micron automated strainers. From there, water is filtered through the UF membrane system. Backwash water that is generated from the membranes is collected and sent to a waste holding tank and then back to the front of the plant. Following the UF membranes, the water is then chlorinated for final disinfection and then pumped to the clearwell before being sent to the city's distribution system



Montevina - RO System



Montevina - Water Treatment Facility



Montevina - UF Trains and Piping

### RO SYSTEM

In addition to the seven (7) UF trains, there are two (2) RO systems provided – one acts as a concentrator of the UF chemical clean solution waste, and the other acts as a softener to treat the filtered water used for the UF cleans. If required, they are configured so that they can operate interchangeably by adjusting valves.

The Montevina WTP is unique in that it is not connected to any wastewater system piping. Because of this, any waste generated by the system that cannot be sent back to the front of the plant must be collected and hauled offsite by a truck. By using the concentrator, the waste produced from the UF cleans is concentrated and reduced, minimizing the water that must be removed from the site and allowing the majority of processed cleaning waste to go back to the front of the plant.

This unique method in combining the use of RO systems with UF cleans increases the effectiveness and reduces the amount of chemicals needed when using the RO as a softener and decreases the amount of waste produced from the site when using the RO as a concentrator.

### BASF/INGE<sup>®</sup> UF MEMBRANES

The UF system supplied for the Montevina WTP is a system designed to fit BASF/inge<sup>®</sup>'s dizzer<sup>®</sup> 0.9 MB 70W module.

The skidded UF membrane racks and control systems were fully factory assembled and tested at H2O Innovation's manufacturing facility to ensure minimal installation labor and time required on-site for system start-up and commissioning. Once the racks were brought into position and connected, the BASF/inge<sup>®</sup> dizzer<sup>®</sup> membrane modules and connection headers were installed, flushed and integrity tested.

The membrane valve racks and the supporting ancillary equipment were designed and selected to meet the operational requirements of the BASF/inge<sup>®</sup> modules. The membrane valve racks are equipped with valving and instrumentation to filter and backwash through the bottom or filter or backwash through the top of the modules. The backwash system is designed without blowers and at a flowrate significantly higher than the design filtrate flowrate of the system. Additionally, the cleaning recipes, frequencies, and methods were implemented to meet BASF/inge<sup>®</sup>'s standard design considerations.

### RESULTS

The UF system supplied for the Montevina WTP is a system designed to fit BASF/inge<sup>®</sup>'s dizzer<sup>®</sup> 0.9 MB 70W module.