

CASE STUDY

Next Generation FPI Mag Flow Meter Helps Provide Clean Water For Seattle

Author: *By Pam Fuller, Regional Sales Manager, McCrometer*

Overview

Seattle Public Utilities has a superior reputation for providing high-quality water to its customers. That tradition continues with the state-of-the-art Cedar Water Treatment Facility (CWTF) located southeast of Seattle at the Lake Youngs Reservation. Designed, built and operated by CH2M Hill, the award winning facility is a model for sustainable environmental design.

The CWTF facility provides 70 percent of the Seattle metropolitan area's drinking water and can treat up to 180 million gallons (mgd) of water per day. The treatment operation relies on both time-tested and innovative technology that includes watershed protection and chlorination, as well as advanced ozonation and ultra-violet (UV) light disinfection.

Accurate flow measurement is essential to the safe, efficient operation of the CWTF facility. Flow meters are installed on the raw water intake system that pumps water from the lake, in the various water treatment areas and at the point of distribution to the municipal water system.

The CWTF was originally built in 2002 and became operational in 2004. During construction, CH2M Hill selected a fiberglass electromagnetic insertion style flow meter to support its UV disinfection system. The meter was chosen for its ease of installation, small profile, low maintenance and cost saving features. This fiberglass mag meter became a part of McCrometer's flow product line when the manufacturer was purchased several years later.

CH2M Hill's subsequent experience with McCrometer demonstrates how operators and suppliers working together with evolving technologies can achieve advances that benefit the entire water industry. In this particular case, coordination and communication between CH2M Hill and McCrometer helped in the new design of the current FPI Mag flow meter.



Figure 1: The Cedar Water Treatment Facility

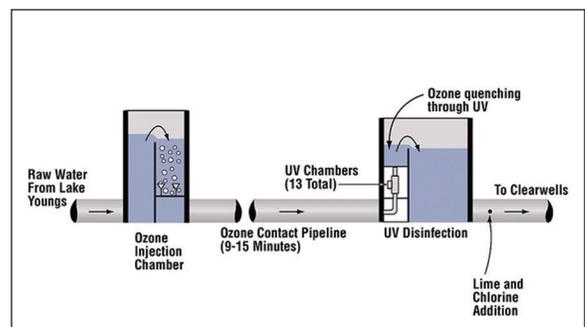


Figure 2: The CWTF Treatment Process

John Wesely, CH2M Hill's CWTF operations manager said, "The original fiberglass meters weren't installed as the primary plant flow meters, but given the more favorable hydraulic conditions in the UV reactor pipelines, they turned out to be the most accurate in the facility. When we decided to install the redesigned FPI Mag® flow meters, we planned to use them as the primary meters to measure treated water for compliance purposes and to determine chemical and power efficiencies."

"We combine the flow of the 13 FPI Mag meters on the UV disinfection lines to calculate total treated plant flow each day. While we have flow meters in other locations that were intended to measure totalized plant flow, our experience has shown the FPI Mag meters provide the most accurate and reliable measurement of plant totalized flow each day."

CWTF Treatment Process

Lake Youngs serves as the treatment facility's supply reservoir for water from the 90,500-acre Cedar River watershed. In the design of the treatment facility, CH2M Hill strived for the least environmental impact on the site.

The facility features a complex ozone/ultraviolet (UV) treatment process which serves to disinfect the water as well as improve taste and odor. Liquid oxygen is transformed into gas and a portion of the oxygen is converted to ozone. The ozone is transferred to the water by diffusing the gas into the flow within concrete injection chambers.

After completing the ozonation process, the water undergoes UV treatment for disinfection using the TrojanUVSwift™ System. The facility's 57 kW UV reactors are set on 13 vertical 24-inch lines. A McCrometer FPI Mag flow meter is installed on each line to measure the liquid flow rate and totalized flow output. Facility managers monitor this important data to ensure operational goals are met each day.

Importance of Flow Meter Accuracy

Flow measurement accuracy in the UV treatment process was essential in meeting the CWTF facility's operational requirements. Several years after the original meters were installed, McCrometer redesigned the product to improve its performance, particularly in harsh municipal applications.

Nick Voss, McCrometer Product Manager, explained, "The UV disinfection application process presented a particular challenge for the prior design. We knew we could partner with CWTF and CH2M Hill to solve both some short-term challenges as well as coordinate on the next generation design. The new design of the FPI Mag is a great example of cross-functional new product development. We took the original product and combined it with both real world feedback and McCrometer's history of developing durable flowmeters."

As a result, the new FPI Mag was designed with a heavy-duty 316 stainless steel sensor body for maximum structural integrity. With no moving parts and a single-piece design, the FPI Mag flow meter contains nothing to wear or break and it is generally immune to clogging by grit or other debris. The sensor's body is hermetically sealed and protected by a rugged NSF certified 3M fusion-bonded epoxy coating.



Figure 3: FPI Mag Flow Meters Installed In UV Processing

The meter's sensor features a unique design with multiple electrodes across the entire pipe diameter. This full flow profile design enables highly accurate measurement by averaging the flow rate calculation over multiple points within the pipe.

The FPI Mag meter's highly stable flow profile provides accuracy of $\pm 0.5\%$ of reading, from 1 to 32 ft/sec velocity range, which rivals the performance of full bore mag meters at a much lower total cost. The flow sensor comes pre-calibrated from McCrometer's NIST traceable Calibration Lab and requires no recalibration in the field.

CWTF operations manager Wesely said, "McCrometer stood behind the product and invested in R&D to make improvements. They also provided all the technical support and customer assistance to replace and reinstall the second generation mag meters at our facility."

Wesely continued, "McCrometer certainly exceeds the standards of most vendors and it was refreshing to see how McCrometer stood behind its product. I would certainly do business again with McCrometer."

Ease of Maintenance

In regard to maintenance, Wesely notes, "The beauty of the FPI's second generation design is that there really isn't much maintenance required. We periodically test the accuracy of the meters by closing the discharge valve on one of our clear wells and compare the increase in water level over time to the measured totalized flow of the mag meters. The fact is that the FPI Mag meters can be easily pulled out in 10 minutes for any reason. You can't do that with a spool meter if there is a problem."

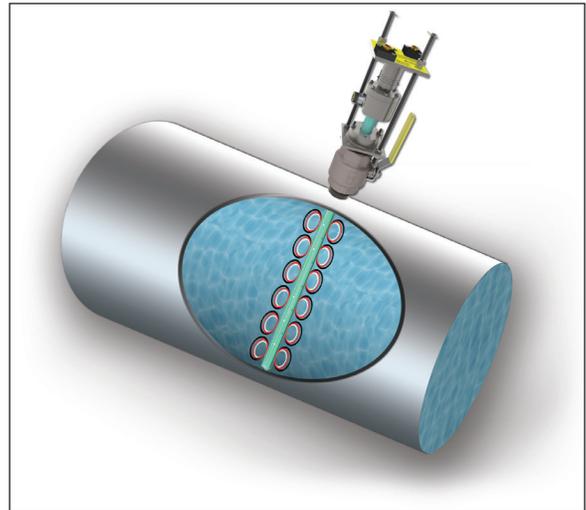


Figure 4: The FPI Mag Flow Meters Multiple Coils