

Thornton, Colorado Improves State-of-the-Art Treatment Plant with Multi-Mag Flowmeters

The City of Thornton, Colorado has recently undertaken two extremely impressive projects at their water treatment plants known as the Thornton Water Treatment Plant and the Columbine Water Treatment Plant.

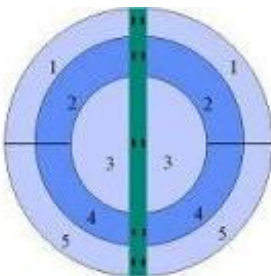
Located 10 miles north of Denver, Thornton is home to 107,900 residents and has consistently been ranked as one of the top ten most desirable areas to live in the United States. Teamed up with the award winning engineering and consulting design/build firm of **Burns & McDonnell**, this project would thrust the city into the limelight for its use of advanced technology for the production of high quality water.



Phase One

Ultraviolet Disinfection Systems for Thornton and Columbine Water Treatment Plants

Phase one of the project encompassed the upgrade of both water treatment facilities with ultraviolet (UV) disinfection systems. According to Mark Lichtwardt, Project Manager for Burns & McDonnell, "Burns & McDonnell provided design and construction phase services for UV light disinfection systems at each of the treatment facilities in the City of Thornton. The UV design is very different at each water treatment plant. The Columbine plant UV design is installed within the existing filter gallery with a design transmittance of 85%. The Thornton plant UV design is installed in a building adjacent to the existing filter building and clear well." The Columbine Water Treatment Plant, a 30 million gallon per day (MGD) facility is currently being expanded to a 50 MGD facility and the 20 MGD Thornton Water Treatment Plant were both provided ultraviolet light disinfection in an effort to provide a double-barrier for additional microbiological protection.



Each Multi-Mag sensor is custom-built to the exact specifications supplied by the customer. Building sensors to exact inside pipe diameter ensures the highest possible accuracy.

As part of the UV design for each plant, flowmeters would be required to accurately monitor water flow for accurate UV dosing. Frank Watt, Thornton WTP supervisor, states, "Accurate flow measurement is key to providing the right UV dose so we definitely needed to have a reliable and accurate meter for everything to work the way it's supposed to." Familiar with Marsh-McBirney's reputation for highly accurate flow instrumentation, Watt adds, "I have been a plant operator for 20 years so I have come in contact with your equipment over the years and it is certainly a product I have had good experiences with." Working closely with Marsh-McBirney's sales representative organization in the area, **Water Technology Group**, as well as Richard Espy, Marsh-McBirney's Regional Sales Manager, an order was placed for five Multi-Mag Magmeters. Three (3) of the meters would be installed on three

36" lines going to the UV chambers at the Columbine plant with the remaining two (2) being installed on two 36" lines going to the UV chambers at the Thornton facility.

The Multi-Mag Insertable Magmeter utilizes proven electromagnetic technology. Its uniqueness lies in the meters ability to monitor flow with the use of multiple electrodes that constantly profile the flow for unsurpassed accuracy. An array of sensors are strategically located on the insertable probe that spans the entire pipe diameter. The insertable probe detects and compensates for shifting flow profiles unlike spool-piece magmeters and flowmeters that provide only a single point flow measurement. Unlike traditional magmeters that require long pipe runs for accurate flow monitoring, the Multi-Mag can accurately monitor flow in some of the most restrictive piping configurations including bends, elbows and short pipe runs. According to Lichtwardt, "We like to use Multi-Mag's in locations where we're tight on space and it's difficult to get the straight lengths that you need for a typical magmeter and that's really why they were selected." Ironically, the City of Thornton's motto is Location...Location...Location due to its ideal geographic location and it's also the slogan for the Multi-Mag flowmeter due to its ability to accurately monitor flow in less than ideal locations. In November 2003, the meters ordered for the UV project were installed and providing accurate flow data. Watt adds, "The technical support aspect of this has been excellent. We have a really good relationship with your rep and Richard Espy." Concerning Multi-Mag's accuracy, he adds, "We are very pleased! In fact, yesterday we ran a pump test on a new system to the Thornton plant using the Multi-Mag. By knowing the actual flow accuracy with the use of the Multi-Mag it was very helpful to us for identifying some issues on a different meter." At the time of installation, the Thornton facility was the largest UV plant in the country. Watt adds, "At the time of installation, the 20 MGD UV reactor was the largest in the country, however he adds, The way technology goes that too could change tomorrow. I think there are larger single UV reactors installed today."

Phase 2

Expansion and upgrade of the Columbine Water Treatment Plant Using Advanced Membrane Treatment

Phase two of the project calls for the expansion and upgrade of the Columbine Water Treatment Plant. Currently rated at 30 MGD, the plant will be upgraded to a 50 MGD plant to accommodate future water demands in the area using advanced membrane treatment processes. Burns & McDonnell will provide design and construction management services for this phase of the project as well including pre-design evaluations, pilot testing design and evaluation, process and ancillary equipment design, preparation of bid documents, oversight of construction, and preparation of zoning and annexation



**Can your flowmeter do this?
The Multi-Mag (circled above) works where
others cannot.**

applications to accommodate future needs at the plant. The 50 mgd expansion includes modifications to the pretreatment and upflow solids contact clarifiers at the plant and replaces the existing gravity-flow tri-media filters with approximately 56-MGD of ultrafiltration (UF) membrane capacity. A portion of the filtrate water is then treated further with 15-MGD of reverse osmosis (RO) membrane capacity to reduce TDS and nitrate concentrations. In addition to these advanced processes, the project includes the design of new chemical feed facilities, a 3-million gallon clearwell, and a new high service pump station. The existing chlorine gas disinfection facility will also be replaced with a new disinfection facility utilizing bulk sodium hypochlorite.

The project addresses water quality concerns as a result of upstream discharges in the source water. Once completed, the Columbine WTP will be the largest membrane plant in Colorado, and one of the largest membrane plants in the country. “Eight Multi-Mag meters have been ordered for Phase 2, states Lichtwardt. Four (4) will be used on 18” clarifier lines and four (4) will be used on 12” clarifier lines. The flow data from the meters will be used to control the valves that will balance the flow to the clarifiers.

Through the successful application of (13) Multi-Mag’s combined at the city’s two water treatment plants, Burns & McDonnell and the City of Thornton WTP personnel can rely on accurate flow data to efficiently operate their advanced technology water plants. Lichtwardt adds, Through the use of two advanced technologies, UV and membrane treatment, Thornton will have some really nice facilities when it is all done.” Marsh-McBirney is proud to supply highly accurate flow instrumentation that will have play a “key” role in the efficient operation of the City of Thornton’s advanced technology water treatment plants.

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