

High-Tech Solutions for a Low Tech Problem

A multitude of operational challenges...

The San Sevaine turnout is just one of many places in the Inland Empire Utility Agency's waterworks system where a standard automatic control valve is just not the best product choice for its flow control requirements.

There were several issues that needed to be addressed when Tetra-Tech, the Agency's engineering consultant, set out to design a more effective way to return reclaimed water from nearby wastewater treatment plants to the San Sevaine channel.

Requirements for the automatic control valve at the turnout included the ability to do following:

- Handle a flow rate with high pressure differentials and provide the means to prevent damaging cavitation
- Measure flow within $\pm 3\%$ accuracy
- Control valve position from a remote location
- Transmit valve position and flow rate data to the Agency's SCADA system
- Utilize a valve or valve combination that would meet all operating requirements but be able to physically fit in a small area



The specified pressure range for the turnout was 110 psi - 120 psi, discharging to atmosphere. Expected flow rate was between 1000 and 3,100 gallons of water per minute flowing through the pipeline, discharging to a concrete-lined channel, 20 feet below. Once in the channel, the water would be allowed to either flow through a system that ultimately discharges to the Pacific Ocean or be diverted on an as needed basis by an enormous inflatable dam to a "perc pond" to recharge the local groundwater.

In an application where there are such extreme pressure differentials across the valve, damaging and choking cavitation is a certainty. When line pressure drops from 100+ psi to 0 atmospheric pressure suddenly, severe erosion of piping and damage to internal valve components can result, leaving the valve inoperable in a matter of weeks or months. Dealing with the cavitation issue was a big enough challenge on its own but the engineers also needed a way to remotely control the valve, measure the flow rate at the turnout and communicate that data to the system operators. No ordinary valve combination could meet the Agency's needs. What was really needed was a valve that could "multi-task."

...One "simple" solution!

The consulting engineers found the perfect partner to help them solve their low-tech problem when they contacted Cla-Val's Riverside office for some application advice. After reviewing the system operating parameters and discussing various options for the turnout, a Cla-Val Model 133-11 10-inch metering valve was selected. To handle the Agency's electronic control requirements, the valve was supplied with a 131VC-1 Series Controller that will be used to sense pressure differential across a 6.5-inch calibrated orifice plate. The differential will then be converted to a flow rate which will be used by the controller as a feedback signal and compared with a remote set point. The valve's capacity will then be adjusted by the controller until the two signals match. The flow signal will also be transmitted to the Agency's SCADA system.

Finally, to deal with the most pressing issue -- providing the means to prevent cavitation and extend the life of the valve and associated piping -- the valve was supplied with Cla-Val's new patent pending KO anti-cavitation trim.

Had the consulting engineer not selected the combination of features and components discussed above, they most likely would have had to utilize a valve with a restrictive orifice plate downstream of the valve to maintain artificial back pressure to help minimize the incidence of cavitation. In an alternate scenario, a typical solution would have been to use two valves that would be installed in series to minimize cavitation plus a restrictive orifice plate to achieve acceptable back pressure. Either way, the possibility of cavitation could not be completely eliminated nor would the metering and remote control requirements be met. Cla-Val's unique combination of advanced electronic controls and anti-cavitation trim met all of the Agency's operational requirements in one tidy package.