From: Public Works March 2015 | Posted on: March 11, 2015

Keeping it cool

A two-valve control system lowers river temperature so fish can spawn.

By Clint Smith and Ryan Spooner

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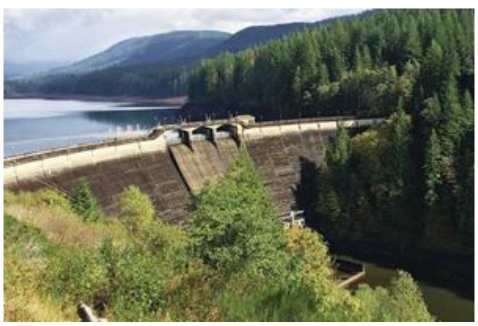

Valve control system regulates water temperature

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The Bull Run watershed has provided drinking water to the Portland, Ore., metropolitan area since 1895. It also plays an important role in supporting the ecosystem of the Sandy and Lower Columbia rivers, where steelhead, chinook, coho, and chum salmon populations are declining significantly.

Released in 2008, the Bull Run Water Supply Habitat Conservation Plan (HCP) outlines how the **Portland Water Bureau** will reverse that trend over 50 years. The HCP's water temperature management plan is critical to reviving fish stocks.

Building up breeding grounds

The bureau diverts and stores water in two reservoirs that together hold almost 17 billion gallons. The Sandy River is supplied by the Bull Run reservoir. During summer, with water being pulled from the top warmer layer of the reservoir, the river would get too warm for fish to spawn.

Bureau managers consulted with engineering firm **Brown and Caldwell** on a plan to regulate the river's temperature: Pull water from the much-cooler reservoir bottom and, based on readings at several points along the river, control the amount of cold water feeding the river.

To make that happen they needed technology that could set a desired flow rate of cold water. The reservoir fill height has an inlet pressure of 45 psi and water goes into the river at atmospheric pressure. Thus, in addition to being able to measure flows exceeding 83,000 gpm, the system had to be robust enough to withstand pressure drops of 45 psi to 0 psi.

CIMCO Sales and Marketing of Puyallup, Wash., brought in **Singer Valve Inc.** of Surrey, British Columbia, to design a solution that integrates with the bureau's existing SCADA system.

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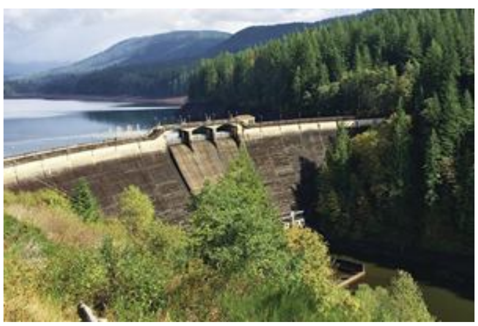

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Extreme pressure, flow changes

Singer suggested 24- and 36-inch S106-2SC-PCO-MV-C-AC valves controlled by an MCP-TP multiple-process panel.

Dual solenoids in the valve's pilot system enable the panel to control and modulate the valve to required set points electronically. The valve is equipped with backflow check to ensure it closes in the event of reverse flow.

Usually cavitation is avoided by installing multiple pressure-reducing valves in a series, which knocks pressure down to controllable levels. But that wasn't necessary here.

"The beauty of Singer's anti-cav technology is that it's contained in the valve itself," says CIMCO Sales Manager Steve Causseaux. "No additional valves are needed, saving money, time, and future maintenance."

The valves' anti-cavitation trim is comprised of two heavy stainless steel sliding cages that maximize the full flow capacity. The first cage directs and contains the cavitation recovery, allowing it to dissipate harmlessly; the second cage allows further control to a level as low as atmospheric pressure downstream.

The cages are individually engineered by entering the data into proprietary software that calculates the size and placement of the orifices on both inlet and outlet cages. The valve bodies are designed to fit a larger cage to provide space between the anti-cavitation trim and the body wall during high flows. This separation allows for consistent uniform entry around the cage area, ensuring that vapor bubbles collapse symmetrically toward the center of the anti-cavitation cage.

The range between a high flow of 83,000 gpm and low flows would typically require a large valve for the high flows and smaller valves to handle the lower flows, as traditional valves become inefficient at low flows and start to hunt and chatter.

To overcome this challenge, the valves were equipped with single rolling diaphragm (SRD) technology. The molded diaphragm provides a constant surface area regardless of valve position and avoids injecting small pressure pulses into the piping. This eliminates seat chatter at low flows, which prevents leakage while providing smooth, precisely controlled flow.

To save on space and costs, the valves were set to run in parallel and the controls were consolidated into one customized panel.

Singer Valve's electronics division designed and built a panel that receives information from both valves and enables operators to control them individually.

Using a differential transmitter and a position indicator from each valve, the panel calculates individual flows through each. This allows operators to control the valves to specific flow rates by entering a setpoint into the panel or remotely via SCADA. The panel then sends signals to the opening or closing solenoid valves to open or close the main valves until they meet their desired flow rates.

Because the panel had to be able to handle a main power loss, a UPS battery backup was added. To withstand the outdoor environment, the panel has an outdoor rated enclosure with a heater and dehumidifier. The customized panel was seamlessly fitted into the existing SCADA system, making it simple for operators to enter desired flow rates from a remote location.

"We achieved what we set out to with a failproof solution that's easy to manage and maintain," says water treatment operations manager Andrew Degner. "The concept's ingenuity was matched with a customized valve to meet some difficult parameters."

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