Product Emphasis

Mission Possible

Using glass-lined plug valves to tame Struvite

By Val-Matic

Your system is running like clockwork. The pressure and flow are normal and everything is moving smoothly. You are about to leave for the night, when you start to notice the flow rate dropping. The backpressure starts increasing while your flow is steadily decreasing. Getting concerned, you check on things and find the flow rate has all but slowed to a trickle.

It is a quick search and when you locate the problem it's not what you want to hear—Struvite. Also known as magnesium ammonium phosphate, Struvite can develop quickly and its crystals can grow like weeds until it all but shrinks your flow area to nothing.

A common occurrence in wastewater treatment plants, Struvite can quickly get out of control. When the conditions are right, the Struvite will rapidly form crystals that spread throughout a pipeline forming a concrete-like crust. It is most commonly a problem in dewatering filtrate or lagoon decant and in spots with local turbulence, such as pipe elbows, mixer blades and pumps, according to a white paper entitled "Struvite Deposits, A Common and Costly Nuisance."

The Madison Metropolitan Sewerage District in Madison, Wis., was well acquainted with Struvite. A large plant, the Nine Springs Wastewater Treatment Plant treats over 40 million gallons of wastewater per day, and serves over a quarter of a million residents in Madison and the surrounding townships. Its sprawling compound is fed by 120 miles of interceptor sewers and force mains, and it boasts over 100 pumping stations.

"We have a problem with Struvite forming in digested sludge lines," said Jeff Brochtrup, director of administration and formerly the project manager for digestion improvements project at the Nine Springs Wastewater Treatment Plant. "We've also seen it in plug valves."

To combat the Struvite problem, the Madison Metropolitan Sewerage District partnered with engineering firm Black & Veatch along with mechanical contractors J.F. Ahern Co.

"Madison has had a significant history of Struvite accumulation within their digesters and associated digested sludge piping and valves," said Scott Fronek, project engineer with Black & Veatch.

Ripple effects

Struvite can become debilitating if left unchecked. Like cholesterol coating the walls of vessels and arteries, Struvite can reduce flow area significantly, severely restricting flow and reducing pressure. Its effects aren't only felt there.

Struvite can damage equipment, especially valves.

"Struvite becomes a problem with valves because when the valves close, the Struvite rips the rubber faces of the plugs," commented Jeff Brochtrup of Madison Metropolitan. "It not only reduces flow, but you lose the ability to close the valve snugly."

It also requires frequent, laborious maintenance, as the employees at the Nine Springs Wastewater Plant learned.

"Madison has experienced some maintenance issues as a result of Struvite accumulation. Struvite would normally build up on the inside of piping and valves, causing a reduction in flow. This necessitated disassembling the piping system to chisel the Struvite from the piping and valves," said Fronek of Black & Veatch.

The proposed solution was to install glass-lined plug valves. The glass lining provides a smooth, non-stick surface that helps to prevent the collection of elements that lead to a Struvite build up in a location that's known to be a likely problem area.

"Most plug valves are provided with a fairly rough epoxy lining to which Struvite can attach," commented Fronek. "Glass-lined plug valves were chosen because they provide a smoother interior surface and will reduce Struvite accumulation on the plug valves."

Added benefits

Though not readily available as a coating option, glass lining plug valves in a Struvite-prone environment has a number of benefits in addition to Struvite reduction.

"Part of the decision to go with glass-lined plug valves is to cut down on friction loss," said Bart Barthaly, assistant project manager with J.F. Ahern Co.

To find the glass-lined plug valves, they turned to Val-Matic Valve and Manufacturing Corp.

"Glass lining is a highly specialized option. Val-Matic is one of the few manufacturers who provide glass lining for all sizes of plug valves," said Carl Smith, director of sales for Val-Matic.

As of presstime, the Nine Springs Wastewater Treatment plant has installed nearly 20 Val-Matic glass-lined plug valves.

However, other methods of Struvite removal exist, the most popular of which is chemical control. Though these methods can be effective, they can also be costly and would be an indefinite expense in order to keep the problem in check. By choosing to glass-line the plug valves, an area particularly prone to Struvite growth, there is only the upfront cost to consider.

Madison Metropolitan Sewerage District is one of a number of utilities making the switch to the installation of glass-lined plug valves to alleviate their Struvite problem. No longer will they have to waste valuable man-hours chiseling out inches of Struvite in order to get their pipeline flowing again, or have their system running below capacity due to a buildup of Struvite. ■

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