HALF FILLED MAGMETERS GIVE SEWER AUTHORITY COMPLETE SOLUTION TO WASTEWATER OVERFLOW

Is the magmeter half full or half empty?

That interesting twist on an old cliché is an apt question to ask the people of a certain small Pennsylvania city. The town is located in Schuylkill County, Pennsylvania, smack in the middle of the state's Coal Region, named for the abundance of anthracite coal that was first discovered way back in 1790.

With a little bit of background, the reasons for posing the half full/half empty question becomes abundantly clear. The town was experiencing a serious problem with wastewater overflow – not a complete surprise, given that the sewers themselves had been built back in the 1800's. These were not plastic or even metal pipes; the four-foot-diameter pipes were fashioned out of good, old-fashioned masonry.

For as many years as anyone can recall, raw sewage was being transported via the sewers and dumped straight into an open creek. Eventually, due to environmental concerns, state and federal regulations required that the water be treated before being discharged. Consequently, in the 1970's, an interceptor pipe was installed, which would grab a portion of this flow and send it to a recently built wastewater treatment plant.

Although the interceptor pipe remedied some of the problem, the solution had a serious flaw. The issue arose whenever there was a sizable rainstorm; in such instances, the interceptor system would bring an overabundance of storm overflow to the plant, which wasn't designed to handle the increased water volume. As a result, the plant would flood out, leading to some unpleasant scenarios – legal and otherwise.

"During high water events, the wastewater treatment plant was being flooded out, causing untreated or partially treated water to enter nearby streams," said Richard Lowrie, water and wastewater industry manager for KROHNE, a global technology leader in the development, manufacture and distribution of accurate, reliable and cost effective measurement instrumentation for the process industries. "This would result in fines from the state regulating agencies, not to mention the unfortunate impact on the environment."

Obviously, since nothing could be done to change the weather, a solution had to be devised that would control the flow of water to the wastewater treatment plant, particularly during heavy storms. The key would be regulating the initial flow of water into the interceptor system that fed the wastewater treatment plant.

To begin designing a viable solution, the city turned to Buchart-Horn of York PA, a full-service engineering and architectural firm. The firm answered a Request for Proposal (RFP) to perform an update of the city's 537 Plan. (The Act 537 Program, the Pennsylvania Sewage Facilities Act, was enacted on January 24, 1966. Its purpose is to correct existing sewage disposal problems and prevent future problems.) To meet this objective, the Act requires proper planning in all types of sewage disposal situations.

"The 537 plan is approved by the state Department of Environmental Protection," said Bruce Hulshizer, a senior engineer with Buchart-Horn and a project manager for sewer and water projects. "That's basically saying 'This is what we're going to do for our sewer needs.' Apparently, the DEP wasn't satisfied with the way things were going and they weren't going to meet their consent order, so that pulled us in."

As part of the solution arrived at by Buchart-Horn, KROHNE was brought in to provide a technical component to address the improvements that needed to be made to collection system; that component would ultimately form the centerpiece of the answer to the earlier half full/half empty question.

The component consisted of partially filled electromagnetic flowmeters (magmeters) to measure the lower normal flows and the higher flows during high water events. By using partially filled magmeters, the city is able to measure the normal flows, which would not keep a typical magmeter filled and also handle the higher flow rates in very rainy conditions. This would mean that the storm water flow in high-water events could be diverted away from the plant and into nearby waterways, solving the issue of plant overload (When the flow rates reach a preset flow, it is assumed that flow would consist of storm water run off and thus, can be safely diverted away from the treatment plants.) When normal flow rates resume, the flow is then directed back to the treatment plant.

"The city had a combined system, comprised from storm water and sanitary flow," said Hulshizer. "In order to have such a system, you have to have control structures that basically separate sanitary flow out away from a pre-designated amount of flow. After that, it would be storm flow, so you'd have to have some way of dividing the two. That's where partially-full magmeters came in."

The choice of KROHNE magmeters was a sound one. The company's Electromagnetic flowmeters can be used in almost all branches of industry for the measurement of liquids (with or without solids content) pulps, pastes and other fluids that have a specific minimum of electric conductivity. What's more, the sophisticated electronics provide superior results - reliable and repeatable even under difficult process conditions.

All KROHNE magmeters are wet-calibrated by direct comparison of volumes, the most accurate calibration method available. In fact, the KROHNE calibration rig is the world's largest and most accurate. This translates to a high accuracy - up to ± 0.2 % of actual value.

For this project, Buchart-Horn chose 21 of KROHNE's TIDALFLUX line of electromagnetic magmeters. KROHNE's TIDALFLUX flowmeters are combined with a capacitive flow-level measuring system, built into the wall of the measuring tube, thus providing accurate flow measurements in partially filled pipelines, with levels between 10 and 100% of the pipe cross-

section. TIDALFLUX flowmeters offer precise factory calibration to ensure a level of measurement accuracy never before possible in partially filled pipelines. Featuring excellent abrasion and chemical resistance, the flowmeters' steady display of measured values is achieved regardless of rough product surfaces and distorted flow profiles.

Two different manufacturers bid on this part of the project, but KROHNE was the only manufacturer able to supply magmeters in the larger diameters necessary for the project. KROHNE also has an existing installation base to use as a reference for performance of partially filled magmeters. In other words, this was not the first time KROHNE had engaged in such an endeavor.

In the end, the load on the wastewater treatment plant has been substantially reduced in high water events, allowing the plant to operate within its specified ranges. What's more, the environmental impact of nontreated or undertreated water entering the streams from the plant has been greatly reduced.

"It's been a long process to where the city has come in terms of its wastewater treatment, but it has been a very effective solution," said Hulshizer. "And the KROHNE magmeters proved to be a critical element."

Which of course means that if you ask the city whether the magmeters are half full or half empty, you know what the answer will be.

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