

Zerbe Township WWTP Successfully Manages Non-Dispersible Debris Impacting Its Influent Pump Station



The Pump People®

Wastewater treatment plant operators, having to deal with persistent clogs in pumps and check valves due to disposable wipes and other non-dispersible debris, have had limited options for solutions that can be implemented within narrow and deep-channel influent pump station wet wells. Zerbe Township, Pennsylvania, is one of a growing number of WWTP operations that have successfully managed this problem by installing Gorman-Rupp Super T Series® self-priming pumps, upgraded with an innovative Eradicator® Solids Management System.

For decades, wastewater treatment plant operators have dealt with clogging problems at their wastewater treatment plants (WWTPs) and pump stations, but the meteoric rise in the use of disposable wipes and other non-dispersible products has accelerated the problem to epidemic proportions in just about every developed municipality worldwide that relies upon a functioning wastewater treatment system.

Wet-wipe consumption overall has nearly tripled in the past decade, according to Smithers Pira, a worldwide authority on the packaging, paper and print industries. When these reinforced paper towels, cleaning cloths, baby wipes, diaper liners, feminine hygiene and cosmetic wipes are flushed down the toilet, they ultimately reach the influent pump station at wastewater treatment plants relatively intact – clogging and jamming pumps, check valves and screens, and significantly increasing the maintenance, repair and operational costs.

Influent pump stations, being the headworks of wastewater treatment plants, are the first processes impacted by non-dispersible debris. If the pump station has a coarse-bar screen positioned before the pumps, as with many legacy systems, some of the non-dispersible material will be captured before reaching the pumps. But these original-equipment screens, with their 1" to 2" openings which may have performed satisfactorily for decades, are now proving inadequate at stopping the greatly increased flow of non-dispersibles, allowing this material to reach the pumps, which negatively impacts their operation, requiring more frequent shut-downs to perform clean-outs, maintenance and repairs.

Upgrades made to pump stations have primarily focused on the pump replacement aspect with limited regard given to non-dispersible products in the waste stream. Original-equipment coarse-bar screens, when they are even present, are usually left in place, and when screen upgrades are initiated, they are

unfortunately located downstream of the new pumps due to the limited narrow configuration of the existing wet well. Screening is recommended to protect pumps and other equipment from debris-laden influent sewage entering the wastewater treatment plant. Consequently, even when pump upgrades are initiated in pumping stations, the performance of the new pumps is still compromised from the overwhelming influx of non-dispersibles.

Zerbe Township WWTP

This circumstance is precisely what the Zerbe Township (Zerbe) WWTP encountered in 2016, after upgrading its primary influent pump station in the year prior.

Zerbe Township, located in Northumberland County, Pennsylvania, encompassing the town of Trevorton with approximately 1,900 residents, recently upgraded its WWTP to bring it into compliance with both the Pennsylvania Sewage Facilities Act 537, and the Chesapeake Bay Total Maximum Daily Load (TMDL). Act 537 requires municipalities to develop and implement comprehensive plans that provide for the resolution of existing sewage disposal problems, and for future sewage disposal needs of municipalities, under the oversight of the Pennsylvania Department of Environmental Protection (DEP). The TMDL was established in 2010 by the U.S. Environmental Protection Agency (EPA) to restore clean water in the Chesapeake Bay and the region's streams, creeks and rivers. The TMDL set pollution limits equivalent to 2004 EPA standards on nitrogen, phosphorus and sediment, with specific deadlines for implementation.

Originally built in 1963, the Zerbe treatment plant consisted of two primary clarifiers and a drying bed, which decanted into Zerbe Run, flowing into Mahanoy Creek, the Susquehanna River and ultimately the Chesapeake Bay. Prior to the implementation of TMDL, the Zerbe WWTP's nitrogen, phosphorus and sediment discharge loads were considered non-significant. But under the TMDL mandate, Zerbe's treated effluent concentration for nitrogen, phosphorus and sediment discharges were reduced, in conjunction with an increase in hydraulic capacity to 0.5 MGD that was required under Act 537. These changes necessitated a significant plant upgrade to an activated sludge SBR process, and required increased influent pump capacity



Gorman-Rupp Super T Series® pumps can be mounted above the liquid being pumped. Should service or maintenance be required, it can be easily performed using common hand tools and without disconnecting piping.

within the existing pump station. These plant upgrades were initiated in 2014 and completed in 2016.

Upgraded Influent Pump Station

The duplex pump station was upgraded with heavy-duty solids-handling pumps, manufactured by Gorman-Rupp Pumps. The self-priming, centrifugal Super T Series® 6" pumps, are located in a non-hazardous area above and separated from the wet well. The self-priming suction lift design of the pumps allows the design engineer to physically locate the pumps where access is a non-issue and routine maintenance can be completed quickly and easily.

"The pumps' superior solids-handling capability makes them ideally suited for Zerbe WWTP's application of handling solids-laden liquids and slurries," said Steve Solon, Sales Engineer with Envirep, Inc., which specified and installed the new pumps. "Each pump provides a maximum capacity of 1,050 GPM, equal to three times the average influent design flow rate."

The large volute design allows automatic repriming



in a completely open system without the need for suction check valves, even with the pump casing only partially filled with liquid and a completely dry suction line. Their two-vane, semi-open solids handling impellers handle up to 3" diameter solids. Pump out vanes on the impeller shroud reduce foreign material buildup behind the impeller, and reduce pressure on seals and bearings. Additionally, double-floating, self-aligning, oil-lubricated mechanical cartridge seals, with stationary and rotating faces of silicon carbide, are specifically designed for Zerbe's abrasive wastewater.

"Directly downstream of the influent pumps, an EnviroCare screen was put into place, which removed unwanted solids prior to the wastewater treatment process," added Solon.

"Ideally, a screen would be installed before the pumps, but at Zerbe that could not be done. The existing influent wet well was fairly deep, and there was inadequate space to install a screen."

Since the influent pumps are located before the screen, the pumps had to deal with a significant quantity of disposable wipes and other non-dispersible material from the collection system. Although the frequency was considerably less than with the original pumps, the plant was still experiencing jams and clogs.

"With the Super T Series pumps, the incidence of clogging is reduced compared to most other heavy-duty solids-handling pumps," continued Solon. "The unique impeller design and the ability to adjust clearances between the impeller and the wear plate help to reduce clogging. If a clog does occur, the maintenance time is much less – the front cover plate can easily be opened to remove the jammed debris."

Even though the new pumps make for much easier and faster clean-outs, it would still take an hour to open up the pumps, clean out the debris, and close them up.

"We still needed to clean out the pumps and the check valves, at least once or twice per week," said Ed Reed, Chief Operator at Zerbe WWTP. "HandiWipes, baby wipes and that sort of stuff, they do not grind up in centrifugal pumps, they just pack in and wedge the pumps' impeller."

Eradicator® Solids Management System

To minimize the clogging issue, Envirep recommended that Zerbe install an Eradicator® Solids Management System to each pump. Recently released by Gorman-Rupp as an add-on to existing Super T Series pumps, the system provides an aggressive self-cleaning wearplate incorporating a number of notches and grooves, as well as a lacerating tooth that helps break up stringy material, scrape it off the impeller vanes and pass it through the pump. Installation is done without impacting performance or interrupting service.

"Eradicator-equipped pumps do not require expensive chopper blades that need periodic replacement, but rely on passing large solids and stringy materials straight through the pump," said Solon.



The Eradicator® Solids Management System's lightweight inspection cover allows for easy access to the impeller for routine maintenance and clearing blockages.

The self-cleaning wearplate shreds stringy materials to further reduce clogging.

The system provides a special lightweight inspection back cover that can easily be removed if it is necessary to inspect the impeller. The lighter coverplate makes it easier and safer to perform routine inspections.

"The Eradicator has definitely reduced our clogging," continued Reed. "Since we put in the upgrade kits six months ago, we have not yet had to open up the pumps to clean them out to remedy a jam or clog. We have done nothing more than routine maintenance on the pumps."

The Eradicator is available as a retrofit kit on existing Super T Series pumps already in the field, and includes all components needed to make an easy conversion.

“Since this system came out, we have been recommending it to our plant operators as an add-on kit upgrade to their Super T Series pumps,” explained Solon. “Many wastewater treatment plants, like Zerbe, have to deal with pumps clogging from wipes, and the Eradicator is solving that problem for them.”

“Our inflowing pump station is now functioning with an improved operational efficiency,” added Reed. “We have increased pump uptime, and reduced maintenance time and costs.”

About Envirep, Inc.

Envirep, Inc. is a manufacturer’s representative serving the municipal and industrial water and wastewater market in Eastern Pennsylvania, Southern New

Jersey, Maryland, Delaware, District of Columbia, and Northern Virginia. The company represents manufacturers of equipment used to pump, treat and dispose of wastewater and biosolids. It also represents manufacturers of equipment used to pump, treat, distribute and store potable water.

About The Gorman-Rupp Company

The Gorman-Rupp Company is a leading manufacturer of pumps and pumping systems for the municipal, water, wastewater, sewage, industrial, construction, petroleum and OEM markets. The company’s Engineered Systems operation also manufactures a full line of water pressure booster stations including pumps, motors, valves and controls – all housed in weather-proof fiberglass enclosures – meeting about any municipal water supply need.

Ultimately, Gorman-Rupp prides itself on manufacturing and delivering the right pump for the job.



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