

Surge of non-dispersible debris impacts wastewater pump stations

»Sun City lift station employs screen-technology solutions to remove effluent debris from narrow- and deep-channel pump stations

By Patrick Roberts



To compensate for higher concentrations of non-dispersible debris, many plant operators have had to increase lift-station pump horsepower to maintain flow rate.

It's a fact — and somewhat uncomfortable making — that wet-wipe consumption has almost tripled the past decade, according to industry analyst Smithers Pira.

For consumers, wipes are effective, clean, convenient and easy to use. But paper towels, diaper liners, cleaning clothes and hygiene-, cosmetic- and baby-wipes reach wastewater-treatment plants and pump-station manual bar racks and pumps

relatively intact.

There they clog screens, jam equipment, and increase maintenance, repairs and costs. According to the Association of the Nonwoven Fabrics Industry (INDA), field tests conducted with utilities show that the wastewater system impact of non-dispersible debris breaks down to 50 percent paper towels, 25 percent baby wipes, and 25 percent hygiene, household cleaning

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and cosmetic wipes.

For decades, plant operators dealt with periodic plugs, but more use of disposable wipes and other non-dispersibles accelerate the problem for wastewater treatment systems.

Impact on pump stations

Found upstream from treatment plants, pump stations are on the front lines when it comes to attack from non-dispersible products. Station upgrades primarily focus on pump replacement, leaving the original-equipment coarse-bar screens intact. These screens, some installed 30 to 40 years ago, with 2" to 2-1/2" openings, may have performed well for decades, but now prove inadequate to stop increased non-dispersible flows, meant to pump right through to treatment plants. The headworks in many plants, however, also utilize coarse screening, allowing non-dispersibles to negatively impact pump and mixer operations – a costly outcome.

Not all of the non-dispersibles make it

through the pump stations. Debris clean-out, maintenance and repair has to be done more often. Draining the pipes and disposing of waste plugging at the lift stations is tedious and unsafe work within tight space constraints. Workers enter lift stations 30 to 40 feet underground, wearing Tyvek suits, rubber gloves and safety glasses, and carry the waste material up flights of stairs for disposal in waste receptacles above ground – a labor-intensive and costly operation.

What's more, to compensate for higher concentrations of non-dispersible debris, many plant operators have had to increase lift-station pump horsepower to maintain flow rate.

Example's success

Reducing the impact on costly-to-maintain-and-replace plant systems can be mitigated by better managing non-dispersible debris upstream, at the lift stations. An excellent example of how this can be achieved is the recent upgrade to the Arizona's Sun City lift station, owned and operated by EPCOR Water.

EPCOR Water is a utility company based in Edmonton, Alberta. It manages numerous municipal water and wastewater treatment facilities throughout Canada and the United States. It's a division of EPCOR Utilities, Inc., which builds, owns and operates electrical transmission and distribution networks throughout Canada and the U.S. The company provides water and wastewater services to more than one million people in over 85 Western Canadian communities and industrial sites. It is also the largest private regulated water provider in Arizona and New Mexico.

"What we had was very antiquated

Pumps pushed non-dispersible debris to the plant several miles away, where it ended up weaving itself into "big masses of material."

screening technology, installed in the late 1970s," says Douglas Griffith, operations manager, EPCOR Water. "The upstream coarse 2" screen was very inefficient, letting just about everything through that was smaller than a bed sheet or a towel. The screen was not designed to deal with a high volume of non-dispersibles that the lift station was experiencing."

Consequently, indicates Griffith, the pumps pushed most of this non-dispersible debris to the plant several miles away, where much of that ended up weaving itself into "big masses of material that would jam the plant pumps and mixers." It was costly.

"Earlier, we had switched-out our existing lift station pumps to larger 250 horsepower slurry pumps, which were much bigger than what we needed for the flow, but necessary to deal with the debris. This solved our flow rate problem, but the lift station was still passing on all of this debris to the plant," says Griffith.



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Trouble downstream

Yet not all the non-dispersible debris passed through the lift station pumps. Some was trapped in the coarse screen and needed to be cleaned out about every two weeks. Two workers descended 30 feet underground through a narrow vertical passage to remove the material and bring it back to the surface.

“Cleaning debris from the lift station screen was very awkward and unsafe,” says Griffith. “We were progressively having to do this more and more frequently. We definitely knew it was time for an upgrade.”

Most solutions that Griffith and his team examined for improved screen performance at the station involved major demolition and excavation, with costs exceeding one million dollars. That’s not what was wanted.

The vertical-bar screen system is meant for narrow- and deep-channel lift stations.

“We were looking for a solution that was cost-effective,” Griffith says. “And something that would fit into our narrow existing channel.”

The system selected, Screentec, from Aqualitec Corp., is an automated vertical-bar screen system designed specifically for narrow- and deep-channel lift stations, headworks, wet wells and manholes. The screen has 1/2" openings, significantly smaller than Sun City’s prior 2" coarse screen. All wastewater flow is diverted through the system, then back out again. The system effectively removes 75 percent

of the debris material before it gets to the lift pumps.

“When I first saw a demonstration of the system, I could see that it would fit into the existing Sun City Lift Station channel,” Griffith says. “That meant there would be no need for demolition or excavation. I also liked the fact that there were no bottom bearings, and that it utilized a strap instead of chains. I would much rather maintain a strap than I would bearings, chains and the lubrication required.”

Fixed it up

Screentec has no moving parts under grade level, for easy and safe maintenance by operational staff, and minimal maintenance costs. An automatic rake system pulls the debris to the top, where a scraper





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puts it into a screw conveyor which then conveys it into a 20-cubic-yard dumpster. The debris from the lift station fills one dumpster weekly.

“The more we can screen out upstream at the lift station, the less we have to deal with at the wastewater treatment facility,” Griffith says. “We stopped a lot of that material from meandering through the plant and ultimately taking out equipment. We also protected the pumps at the lift station, keeping any heavy debris from getting through. Every time a pump gets clog up it causes a wearing issue.”

As a final note, as an added benefit, because of the greatly reduced debris flowing through the lift station pumps, EPCOR believes it can now downsize to much smaller 135 horsepower pumps.

Patrick Roberts writes on water and wastewater solutions.

Aqualitec Corp. is a U.S. distributor of wastewater equipment for municipal and industrial applications. Its product lines include screening equipment, such as vertical bar screens, multiple-rake screens, drum screens, inclined cylindrical screens, static screens, conveyors/ compactors, washer compactors, grit classifiers and motorized rotary brushes. Contact Erwan Ouattara, executive director; 310-703-2174; eouattara@aqualitec.com.

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