Case Study: Mustang Special Utility District

Mustang SPECIAL UTILITY DISTRICT

Using Lift Station Guardian's (LSG) maintenance suite for remote operation, control, and automated maintenance to reduce/prevent pump clogging.

Overview

Mustang is the largest special utility district (MSUD) in Texas, providing water and wastewater services to more than 120,000 residents, via 42 lift stations, seven pump stations, 24 well sites, and two wastewater treatment plants.

Located north of the Dallas/Fort Worth Metroplex, Mustang covers one of the fastest growing areas in the USA, experiencing a 12.5% year-over-year population growth. This places enormous pressure on MSUD to be resilient.

Key Wins

- Cutting staff time needed in the field, already by 11%, with future forecasts predicting 30%
- Scheduling automated maintenance reduces/prevents pump clogging, cuts down on regular maintenance cost ($26,000/year/lift station), and alerts operators to potential issues before they happen
- Reducing overall maintenance costs by $570k/year across 42 stations
- Preventing Sanitary Sewer Overflows (SSOs) by remotely monitoring sites and proactively scheduling maintenance/deploying resources
- Standardizing on LSG reduces confusion over intended operation, and reduces startup time.

The Challenges

In 2012 when Mustang SUD began working with Specific Energy, they only managed eight lift stations which were controlled by a complex variety of different control panel designs, instrumentation and traditional radio-based SCADA systems. Commands to the lift stations were sent via two-way radio, resulting in multi-minute delays between command and operation; there was minimal remote oversight and control of lift station operations.

"Let's say we had an emergency at a lift station, and I had to turn the pump off, for some reason," explains Aldo Zamora, water reclamations manager at Mustang. "I would have to wait 6 to 10 minutes to find out whether it had damaged anything."

Operators needed to visit each lift station daily, including weekends, to check wet wells for debris, check that the level was below the high float, turn on pumps to check the amperage, and check for clogs caused by grease, oil and debris. Operators would manually log everything in a book, and drive to the next site to start again.

One of the problems that required regular site visits was the pump 'clogging' effect of grease and oil left on the water, which resulted in expensive pump repairs and replacements for Mustang.

> "Once or twice a week, we would have to go out with our vacuum trucks and just pump out all the grease that was floating up on top of the water. The problem is it's (grease and floatables) damaging to our pumps, and we're using a lot of equipment - it's using up a lot of man hours."

The Salt Branch lift station

The Salt Branch lift station features a 22-foot wet well with three 50-horsepower pumps on variable frequency drives (VFDs) and standard instrumentation. A programmable logic controller (PLC) collects data and relays it to the Specific Energy Tagger which executes the LSG software.

Although its 2,500 connections mean Salt Branch is a relatively small lift station, the rapid growth of Mustang's service area and the unique issues Mustang faces with this site make it the perfect candidate to pilot the new LSG maintenance features and its ability to tackle known issues ahead of the future roll out across the district.

The Solution

Specific Energy's Lift Station Guardian (LSG) has been used by Mustang since 2012 to control its lift station operations. Recently, Mustang has been piloting the latest LSG upgraded features at its Salt Branch Lift Station. These new features include remote and automated maintenance options.

"The focus is to save money, equipment, and ultimately save man hours," adds Zamora.

Mustang wanted a solution that could let the utility see what was happening in real-time, to handle the grease, oil and build up, and that could also meet regulations.

Initially, Specific Energy focused on two things: redundant control, and providing insights into what was happening on site. Once these were up and running, a suite of remote maintenance controls were added, which can all be monitored via the LSG's dashboard on a laptop or mobile device.

These maintenance controls included: Pump Snoring, Float Testing, and Force Main Scouring.

Outcomes

The number of lift stations Mustang operates has expanded from 8 to 42 since the partnership began and will continue to increase as growing populations put higher demand on Mustang's system.

The maintenance features have already reduced the time staff spend in the field by 11%, with future projections suggesting a 30% reduction, leaving operators free to focus on continuing to improve the reliability of their system.

"The Lift Station Guardian is a standardized product that is easy to commission, scales with our growth, and makes sure our lift stations operate correctly. We are installing the Lift Station Guardian on every new lift station."

Aldo Zamora,
Wastewater Operations Manager, Mustang Special Utility District

At Salt Branch alone, the reduction of vacuum truck use is leading to cost savings of approximately $26,000 per year. Mustang saves $570,000 per year in man-hours, equipment and fuel by remotely monitoring its fleet of wet wells, lift stations and pump stations with Specific Energy's Tagger SCADA system and smart controllers like Lift Station Guardian. The utility directs resources efficiently and effectively which makes its 12.5% annual growth rate more manageable.

The Float Test

By unfortunate tradition, most lift stations will only reveal that their floats have failed at the exact moment when they are needed to work the most, usually at 3am. With Lift Station Guardian, Mustang's lift stations automatically execute a float test on Tuesday mornings. Operators configure this schedule and can also call for additional tests from the Specific Energy app or a browser on demand.

"Before, when my guys went out there they would have to manually pull the floats and make sure that they move, indicate the settings," explains Zamora.

During the test, the wet well will fill, find the high float, then drain down and find the low float. The Lift Station Guardian saves the new levels of these floats based on the level sensor readings when they were triggered, and Mustang can see a green check in the suite to let them know that their floats are going to work when they are needed.

Alternatively, if for example the test can't find the high float, having reached the maximum allowable height (as configured by the user), it will alert Mustang via a text message alarm that someone might need to investigate. In the meantime, the LSG system will simply return to normal operations so that operators aren't scrambling to get the site working, but rather can take appropriate time to diagnose and solve the underlying issue.

The advantage to the utility is that the automatically scheduled tests pre-warn operators of a likely problem, offering a proactive (rather than reactive) tool.

Force Main Scouring

Another maintenance task that can be scheduled and controlled remotely is force main scouring. Lift stations are meant to convey waste down the collection system towards treatment, but the lift station must routinely achieve a minimum velocity in the force main to properly convey solids. Mustang can configure the force main scour module to achieve this desired flow rate for a desired length of time to make sure there are no blockages, and the water is free flowing.

"That's a really good feature to have as we don't have to wait further on down the line to find the pumps aren't pumping enough or there's blockage," adds Zamora. Mustang can set and adjust these parameters based on the geometry of each individual site while monitoring the performance remotely through the LSG dashboard.

Odor Control

For quickly growing utilities like Mustang, brand new lift stations will often spend several months with very low demand. This can cause a high detention time in the wet well and an increased risk of septic conditions that cause unwanted odors. The LSG maintenance suite has an odor control option that can automatically turn a pump on if the lift station hasn't operated for a certain amount of time. This will decrease the detention time of the lift station and reduce the likelihood of odor issues.

"That makes sure that we take water out of the wet well, and get some fresh sewage in there, stopping things from getting stagnant and smelly. We've got customers around the neighborhood, and we don't want that issue," adds Zamora.

Pump Snoring

One of the main issues Mustang has experienced at the Salt Branch site is grease, oil and debris on the surface of the water, which can cause issues with the operation of the lift station. Ideally, this material would be routinely cleared out when the amount to remove is manageable.

Mustang has traditionally achieved this with a vacuum truck and many man hours of work, on a bi-weekly basis in the case of Salt Branch. With LSG's pump snoring option, Mustang drains Salt Branch to below the inlet level of the pumps for 30 seconds twice a week to pass this material out of the wet well and reduce the amount of manual cleaning that is needed at the lift stations. As with all other LSG maintenance tools, Mustang can adjust the parameters and monitor the performance remotely from operators' phones or computers.

"By [pump snoring], we're eliminating man hours and the need for vacuum trucks - that's very efficient for us. We can set it any given time; twice a week, three times a week. That's the beauty of this program - we can adjust it to our liking."

Aldo Zamora,
Wastewater Operations Manager, Mustang Special Utility District