



# Energy savings results from use of SITRANS LUC500 controllers for lift stations

Lumberton, Texas, is a small town of 25,000+ in southeast Texas, just north of Beaumont. Robb Starr is the Operations Manager for Lumberton Municipal Utility District. Because of Robb's respect for Siemens products, the Lumberton Municipal Utility District is a showcase for Totally Integrated Automation (TIA). From field instrumentation, to PLCs, to drives, to alarm indicators, Siemens products are used in every area of Lumberton's water and wastewater facilities.

In 1998, Robb conducted a beta test on the Siemens SITRANS LUC500 (formerly the EnviroRanger) level controller to use for pump control and level measurement in the lift stations at Lumberton's wastewater treatment plant. The collection system had previously experienced numerous pump failures due to power issues and faults with the float systems they had been using.

At first, they were just looking to improve the "health" of the lift station control systems. After switching to the Siemens ultrasonic level controller, their lift station system worked much better due to the improved information collected by the LUC500 controller. So, based on that beta test, the district switched to using the LUC500 level controller in all their lift stations.

Robb also discovered another benefit with the new system. It gave him the ability to see how much each pump

in the lift station was actually pumping; and it could give him that information for each of the two pumps. That allowed a comparison to see if one or the other pump was out of the acceptable range in gallons per minute (GPM). This proved that they were cleaning up the health of the system with more precise diagnostics. As a result, the collection system started seeing fewer pump faults, and coincidentally also saw that energy use was going down overall.

It took more time to figure out a way to pinpoint precisely where the pump difficulty was, because it was not easy to tell which pump was at fault. There are two pumps at each station. When there are multiple stations feeding into one main, it's more difficult to tell where the specific issue originates because of the drastically changing head conditions.

Over the next 6 years, the collection system process was refined to improve the dollars that were being billed by the power company for each lift station. Lumberton changed to monitoring the actual kWh (kilowatt hours) used in 2002. This gave them a more precise cost comparison, because the cost per kWh can fluctuate throughout the year. The plant



*Siemens SITRANS LUC500 (formerly the EnviroRanger) level controller*

Process Instrumentation & Analytics

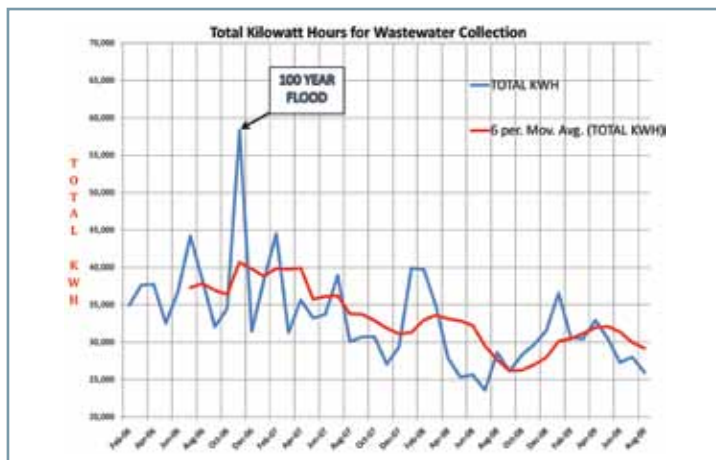
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started getting detailed billing for each lift station from the power company and Robb began tracking those costs in a spreadsheet. During the first 2 years, those costs/bills fluctuated widely. But in the 3rd year, there was a drastic drop. Costs dropped significantly each year until the 7th year, and then leveled out.

Robb had always felt that it was a good idea to monitor the energy costs, but had never seen a level controller do an "hour share" portion vs. alternate portions. This capability gave him a quick and easy way to look at two pumps simultaneously to identify an efficiency problem.

In the past, they would see a lift station have 70 pump starts a day. Each pump would have 35 starts a day, which is excessive. If one pump was pumping longer than the other, there would be a constant for comparison. Robb developed a spreadsheet with conditional formatting. The plant monitors the kw usage for each month, and then reports an average (baseline) energy usage. They would then be able to see when the usage was off course because it was exceeding the baseline. This type of monitoring let them know when there was a problem so they could diagnose.



The plant monitors the kw usage for each month, and then come up with an average (a baseline) energy usage

Using the Siemens LOGO! (programmable relay controller), in conjunction with the LUC500 controller, results in the ultimate (discrete inputs) control. With this system in place, they can take pumps out of service based on efficiency.



Siemens LOGO!  
programmable relay controller

By using the discrete inputs, if a pump is out of service for any reason, the discrete inputs on the LUC500 controller indicates that the pump is out of service. The hourly readings are still valid because the LUC500 controller takes the faulty pump out of the pump rotation. Instead of turning the pump off, the collections system personnel can simply close the contact on the Siemens LOGO! programmable relay controller, and it sends the signal to the LUC500 controller. Before they had this system set up, when they took a pump out of service, the level controller was not aware of the change, so it still called for the pump in its normal rotational duties. This would skew the efficiency data so it was not usable. Now the plant is able to see clearly which pump is using more power.

### Benefits

- Monitoring and control in one device
- Integral telemetry interface (Modbus RTU/ASCII)
- Patented algorithm for calculation of pumped volume within 5% accuracy
- Logging of pump runtime and number of pump starts
- Expandable with I/Os, RAM for data logging, dual point, SmartLinx communications and RS-485 interface
- Simple system configuration and diagnostics with Siemens Milltronics Dolphin Plus Windows®-based software
- AC or DC power supply
- Troubleshooting using an hour meter that starts the counter on the alarm

### About the SITRANS LUC500 Level Controller

SITRANS LUC500 is a complete ultrasonic level controller for monitoring and control of water distribution and wastewater collection systems, with energy-saving algorithms.

It combines non-contacting ultrasonic technology, patented echo-processing techniques, and proven application software to provide accurate level monitoring in liquids up to 50 ft. It also effectively monitors flow in flumes, weirs, and open channels. Five relays control any combination of pumps, gate valves, and alarms. Further advantages include fault signaling and data logging for trend analysis. It can log the time, date, and volume of up to 20 occurrences of combined sewer overflows (CSO).

The basic device has (8) digital inputs, (5) digital outputs, (1) analog input, (1) ultrasonic level point, differential/average capability, and (1) RS-232 interface with Modbus® RTU/ASCII protocol. The LUC500 controller can be expanded by additional I/Os, more RAM, (2) channels, RS-485 or SmartLinx communications models as your needs grow.

It integrates seamlessly with SCADA or DCS systems or a PLC system to provide remote access to all system parameters (pumped volume, pump runtime, pump status). The integral telemetry interface (Modbus RTU/ASCII) allows remote control in realtime.

Siemens Industry, Inc.  
Industry Automation  
3333 Old Milton Parkway  
Alpharetta, GA 30005

1-800-241-4453  
info.us@siemens.com

www.usa.siemens.com/pi

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