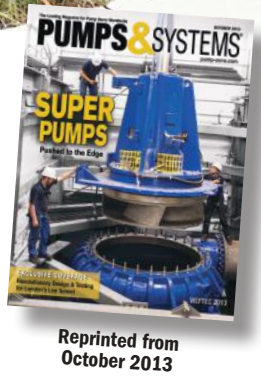
SPECIAL
PUMPS & SYSTEMS
SECTION

Wireless Controls & Monitoring



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Wireless SCADA Technology Supports Utility During Winter Storm

Managed cellular system helps California water utility achieve zero downtime.

By Lauryn Colquitt, Mission Communications

Hillview Water Company in Oakhurst, Calif., credits its cellular SCADA system for averting disaster in winter 2011. Its remote monitoring capabilities kept water flowing to thousands of customers after a major snow storm caused massive power outages and wreaked havoc on the surrounding area.

The public utility lies in a valley, drawing its water from sources several miles away near Fresno, Calif. It maintains 16 different pressure zones and 1.5 million gallons of emergency storage in the Oakhurst area. The utility has 60 miles of pipeline and 1,500 connections throughout its infrastructure. According to James Foster, manager of Hillview, the remote cellular SCADA system helped prevent water outages to thousands of customers who were without power for up to a week.

KEEPING THE WATER FLOWING

The massive storm darkened Hillview wells and treatment systems several miles away in the mountains. During the storm, all locations could be remotely monitored for volume levels. Valves could be opened and closed remotely when levels fell below a certain point. Foster called that ability "quite miraculous," especially in a mountainous area where elevated storage is uncommon. What could have been untenable was manageable because of cellular SCADA and the Web-accessible data. Hillview worked closely with

Above: Even with no power because of a broken power line mast, one of the RTUs continued to operate and send information using its own battery for several days. That RTU and others like it informed the utility of exactly when power was restored at any of its sites.

The cause of the potential water supply interruption, which was avoided because of the wireless SCADA system

its local power company to make sure remote wells and treatment systems near the water supply maintained power during the storm.

"If the power goes out, you can light a candle or use a flashlight, but if the water goes out, the toilet won't flush and you can't take a shower," Foster explained. "We recognize that it's personal, and we wanted to do everything possible to keep that from happening."

Hillview supervisors were able to monitor their systems around the clock. They always knew when water levels were getting low and could make the necessary adjustments. The utility kept thousands of customers supplied by balancing water in different storage tanks. Often, they relied on gravity throughout the mountainous terrain to deliver water to the community.

"Because of the SCADA system, we were able to monitor the levels in all of our tanks and open and close the valves remotely," Foster said. "Everyone in Oakhurst had water throughout the entire storm."

Foster said his operators would have been "running blind" without the SCADA system. Several wells were without power for more than a week. However, Hillview personnel remained well-informed with notifications delivered by the remote monitoring system when power was restored to those stations.

"You don't know the power of this kind of system until you get into an emergency like that," said Foster. "It was a pretty amazing situation for us. We would not have been able to do nearly as good a job or know what was going on if we did not have the SCADA system. Not only did it help us out, but it also made it transparent to the customer."

RELIABILITY WHEN IT MATTERS MOST

Foster said the monthly cost of the cellular SCADA is just a few dollars different compared to leasing telemetry lines, but the decision to switch to the SCADA system was a no-brainer because it did not have the potential for downtime that hard-wired systems do when they require repair. Managed cellular or wireless SCADA systems are a cost-effective way for utilities to monitor remote tanks and wells across a large area or in difficult terrain.

"It literally takes a 4-wheel drive to get to some of the stations, and when there's inclement weather, they're inaccessible," explained Foster. "The idea of not knowing what was going on until we could get there was just unacceptable."

Hillview operators rely on the managed SCADA provider and wireless carrier for cellular service and database infrastructure instead of managing it themselves. This keeps operational costs low and provides greater uptime. Hillview also gets seamless cellular coverage for reliable data transmission. Their remote terminal units (RTUs) can access three cellular towers in their area. If one tower goes down, connections immediately transfer to the next tower, so no service interruptions occur.

BEING PROACTIVE

Hillview personnel access a website, provided by the SCADA provider, from desktop computers in the office and smartphones and tablets in the field. They use the data to monitor, track and control their tanks, wells and treatment systems. The utility monitors pump runtimes with adapters on meters at each well throughout the system. They use pulse meters to monitor volumes, along with

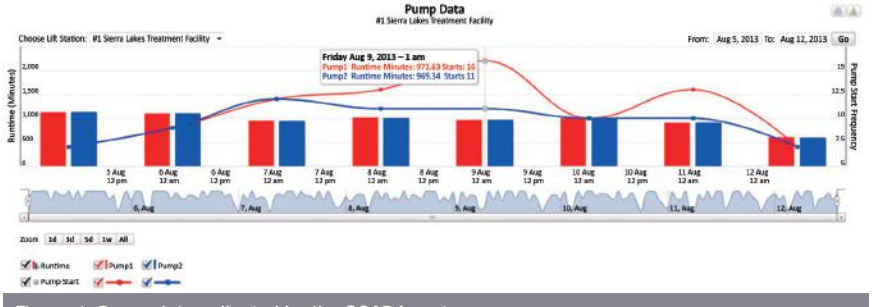

Figure 1. Pump data collected by the SCADA system.

pressure transducers for pump levels at each well. Alarms notify Hillview any time a well gets too low, preventing costly pump repairs and replacements.

"The alarms tell us if there are an abnormal amount of pump starts," explained Foster. "A lot of those alarms let you know about a problem before it gets out of control. You can pinpoint right down to when the problem developed by looking at the numbers on a monthly basis. The reports give you real-time operation of the well, and you can see if it is trending down or up. The ability to see them in real-time is huge."

The utility also takes advantage of the SCADA system's output relays to remotely open and close entry gates and turn flood lights on and off at their stations for maintenance and service visits.

"You can really get creative with what you do with the system," said Foster. "It's given us the ability to simplify the way we operate."

The graphical interface includes a map with each RTU plotted in its relative location along with status information. Foster calls this a nice feature, especially for service personnel who are used to working with maps. "They're able to look at each station and see if it's in an alarm state or if one of the pumps is running. I have experience with computerized routing and scheduling systems, and a lot of companies struggle with knowing what the customer needs and what they're accustomed to. The map interface hit the nail right on the head."

SIMPLIFIED REGULATORY REPORTS

Information provided by the cellular SCADA system also helps the utility generate detailed monthly regulatory compliance reports for the California Department of Public Health. Before the system was installed, these reports were created manually. Hillview can automatically document information on its wells, boosters, well output, pump runtimes and gallons of water pumped per minute. This information is sent to state health officials to fulfill regulatory reporting requirements. Real-time alarms and trending reports delivered by the system have also helped Hillview improve and simplify preventive maintenance and response.

FLEXIBLE ENTRY

The low cost of entry of the vendor-provided cellular- and

cloud-based SCADA has been a game changer for smaller utilities on tight budgets. No additional technicians need to be hired and no other maintenance costs are incurred. That burden shifts to the service provider, which houses, maintains and displays the local utility's data.

Foster said he particularly appreciated the low initial cost and rollout of the system, along with the graphic interface that details real-time equipment information. Different aspects of the SCADA system could be integrated one piece at a time with no interruption to the rest of the utility's system.

"That flexibility was especially important for a public utility that cannot charge pre-emptive rates for improvements," Foster explained. Hillview initially installed 13 RTUs, and they currently have 17 installed.

During the last couple years, large- to medium-size utilities have taken advantage of cellular-to-web SCADA to monitor remote stations. Many utilities prefer this method to avoid installing hard-wire lines that can be unreliable during inclement weather. Several cloud-based SCADA systems offer object linking and embedding (OLE) process control (OPC) links that feed data from the remote stations into an existing SCADA system, a more cost-effective option for large utilities that manage many remote stations.

GROWTH AND OPTIMIZATION

The utility is considering implementing tank and well control in its next expansion phase. The operators recently added five new wells, which doubled the utility's source for its service area. They plan to increase storage capacity by adding 200 gallons per minute of supply. Foster said that they want to implement the SCADA system at another treatment site that also involves multiple wells.

They are currently working to secure four grants for the necessary improvements. Upgrades will significantly improve the water quality by removing uranium and arsenic from the water supply. According to Foster, that will give them "the best quality water in the area." P&S

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