Linn Energy Optimizes Water Disposal Well Operation with Rosemount 705 Wireless Flow and Pressure Monitoring

RESULTS

- $130,000 saved in well bore cleanout
- Optimized productivity of wells and future development, saving $200,000 per well drilled
- Improved productivity of operators
- Improved EPA compliance and reporting

"Wireless gives us a much better picture of what is going on at the well. This has enabled us to improve compliance reporting, improve operator productivity, optimize well bore cleaning, improve well efficiency and optimize future development."

Eric Dhanens, Production Engineer
Linn Energy, Bakersfield, CA

APPLICATION

Wireless flow, totalized flow, and pressure monitoring of wastewater disposal wells

CUSTOMER

Linn Energy, Bakersfield, CA

CHALLENGE

Linn Energy operates oil and gas wells in several areas across the United States. In the Bakersfield area, a separate underground reservoir is used to handle treated wastewater from nearby production wells. Water injection rate and totals are carefully monitored to meet EPA requirements as well as to optimize the wells. Surface or injection pressure is also monitored, both for EPA/safety requirements and to provide further insight to well performance. "This field has over 50 water disposal wells, each about 500 feet apart," said Eric Dhanens, Production Engineer in the Surveillance group at Linn Energy's Bakersfield operation. "My job is to maximize the productivity of existing wells to minimize the number of new wells that need to be drilled."

Wells are not all created equally. They vary in depth and total length of perforations. "Well performance is indicated by the volume we inject per foot of perforations," he said. "The total injected volume of water indicates productivity of that well."

Rounds were made daily to read local chart recorders for water flow into the well and to read local gauges measuring surface pressure. However, these rounds were not sufficient to optimize cleaning or to determine when new wells needed to be drilled. This past year, daily measurements fed into the efficiency model determined that 10 new wells were required. When a more rigorous study was done, it was determined that only 5 new wells were required, saving nearly a million dollars. "The operation changes hour to hour," said Dhanens. A single measurement at 8AM is not the same as 1PM. One measurement does not necessarily

A wireless 705 Totalizer provides flow and totalized injection volume of wastewater. A wireless 3051S provides online injection pressure to indicate stoppage.

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represent what is happening in the field that day, and can lead to erroneous conclusions."

The study was expensive and time consuming. Linn Energy needed on-line monitoring and trending of key parameters to improve well modeling to optimize cleaning, well productivity, and future development.

SOLUTION

Linn Energy installed 15 wireless pressure transmitters on existing manifolds to bring the surface pressure, or injection pressure, online. "These were installed in a couple of hours," said Dhanens. "They were factory configured for the application, including the Network ID and Join Key, so were ready to go out of the box once the battery was fully connected." Fifteen newly available Rosemount 705 Wireless Totalizing Transmitters were installed shortly after on existing turbine meters measuring injection rate and totalized value. Dhanens noted these were done on a Saturday morning in about four hours. "We had a hard deadline, and two maintenance technicians and I were able to meet it with the wireless measurements."

This has helped productivity of the operators. Wireless eliminated daily trips to the wells, saving at least an hour a day. Operators now use this time for more productive tasks. More importantly, wireless provides continuous data to the well performance model. The data is trended and used to calculate an Injectivity Index, a key parameter for productivity. It is a function of surface or injection pressure, injection rate and the fixed number of perforations per foot. The wireless measurements give richer, more reliable data to optimize the model.

"Our biggest take away was optimizing our acidization program," said Dhanens. "We can now trend the surface or injection pressure to indicate stoppage. This is much better than single daily measurements. Well-bore cleanout is expensive and time consuming, and we save $10,000 each time we avoid an unnecessary cleanout." Linn energy has saved at least one cleanout a year for each of the 15 wells, totaling $150,000 in savings.

Equally important, the company can optimize future development and avoid unnecessary drilling without expensive studies. Trended data gives much more insight into the condition of each well, and avoids erroneous conclusions that were too prevalent with single daily measurements. The success has led to four more wells being monitored since the initial installation, with more planned.

"We are always looking to simplify our world," Dhanens concluded. "Wireless gives us a much better picture of what is going on at the well. This has enabled us to improve compliance reporting, improve operator productivity, optimize well bore cleaning, improve well efficiency and optimize future development."

Rosemount 705 Wireless Totalizing Transmitter

RESOURCES

Emerson Process Management Oil and Gas Industry

http://www2.emersonprocess.com/en-us/industries/oil-gas/pages/oilandgas.aspx

Rosemount 3051S Wireless Solutions

http://www2.emersonprocess.com/en-us/brands/rosemount/pressure/pressure-transmitters/3051s-wireless/pages/index.aspx

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