

Refinery Improves Environmental Compliance and Reduces Costs with Wireless Instruments

RESULTS

- Eliminated false Volatile Organic Compound (VOC) emission reports
- Reduced VOC emissions through timely operator intervention
- Minimized fines for VOC emissions through more accurate reporting
- Eliminated manual logs for compliance reporting

APPLICATION

Coking Unit in a Refinery

CUSTOMER

Refinery in North America

CHALLENGE

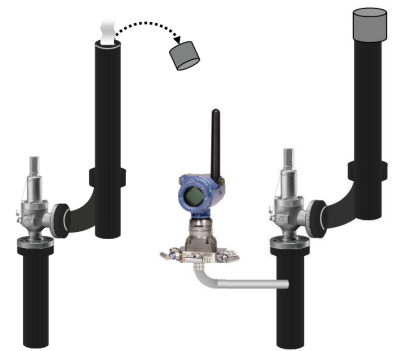
A refining customer in North America needed better monitoring of their pressure relief valves (PRVs) to track any release of VOCs more closely. Pressure relief valves allow a release only when line pressure builds up to a critical level, to prevent a more catastrophic failure due to overpressure. The Environmental Protection Agency (EPA) requires plants to report any VOC release, and assumes a worst-case scenario. That means the plant must assume the release happened immediately after the last logged entry, and that it lasted the full complement of time until the next logged entry. The plant is then fined accordingly. For this refining customer, that time was a 12 hour period. The plant did not have resources to automatically monitor the pressure relief valves on the coking unit, so they put rubber “socks” on the stacks to indicate a VOC release. If a sock was off, a 12 hour emission at the maximum rate was assumed and reported. Unfortunately, VOC release wasn’t the only culprit for a “sock-off” scenario. High winds sometimes blew the socks off, resulting in fines up to \$350,000 for zero emissions. The plant did not have labor resources to manually monitor their PRVs more frequently than once a shift, and did not have \$300,000 to engineer, design and install a traditional instrument network. They needed a more cost-effective solution to eliminate false emission reports, accurately report the length of time and rate for a true VOC release, and maintain a log to prove zero emissions.

SOLUTION

The refinery found a solution that was 90 percent below the cost of a traditional wired network. This reliable and economical solution came from Emerson Process Management’s Smart Wireless self-organizing network. The plant placed twenty-seven Rosemount 3051S wireless pressure transmitters on stacks in the coking unit to automatically monitor the high side of the pressure relief valves. This network provided coverage to an area spanning 1500 feet horizontally and 150 feet vertically.



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A “sock off” situation (left) automatically assumed a 12 hour VOC emission at the maximum release rate. New wireless instruments from Emerson (right) provide trend data that can help operators prevent VOC emissions.

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The customer hired their standard contractor to engineer the instrument locations and install the network of devices. The contractor treated the devices as if they were wired, following their standard installation practices. There was no complicated site survey required to ensure wireless connectivity. They were placed on top of towers, at ground level, beneath the coking infrastructure, and between tanks. When the electrical sub-contractor installed the first 14 devices, they had perfect connectivity across the entire process unit. The self-organizing network allowed any device to talk to any other device on the network, so they had built-in communication redundancy at multiple levels. The network was strengthened when the remaining 13 devices were added according to the same standard installation practices.

The instrument readings were seamlessly integrated into the existing OSIsoft® PI System™ through the 1420 Wireless Gateway for trending, analysis, calculation of VOC release rates, and automatic reporting of events. They provided high resolution data to prove environmental compliance; in fact, the rate of one point every fifteen seconds is four times the resolution required by the EPA for electronic equipment. The plant now has 2,880 data points per shift instead of one. They also have an actual pressure reading instead of a “sock on” reading. That pressure reading provides valuable trend history to generate alerts, and operators can take proactive steps to prevent an emission. Furthermore, instead of the “sock off” reading the customer now has the time of release within 15 seconds, as well as the actual rate of emission, so maximum pressure is no longer assumed. Finally, there are no more false positives from socks being blown off by high winds. The socks are still there, but only provide redundancy.

The result has been a significant drop in fines by eliminating false emission reports, prevention of VOC emissions through timely operator intervention, and true time and rate calculations for brief emissions that previously were assumed to be 12 hours at maximum pressure. A significant cost to the plant was also reduced with automated compliance reporting. Proving compliance is often more costly than compliance itself, and the plant was able to utilize their existing plant host to trend, analyze, report and prove zero emissions. The new technology has been openly embraced by IT, process operators, instrument technicians, contractors and engineers, and the customer plans to eventually install wireless devices on all 600 pressure relief valves in the refinery, both for stacks and drain pipes. Emerson Process Management’s Smart Wireless technology enables any refining facility to cost-effectively meet new, stricter regulations.

RESOURCES

<http://www.emersonprocess.com/rosemount/smartwireless/>

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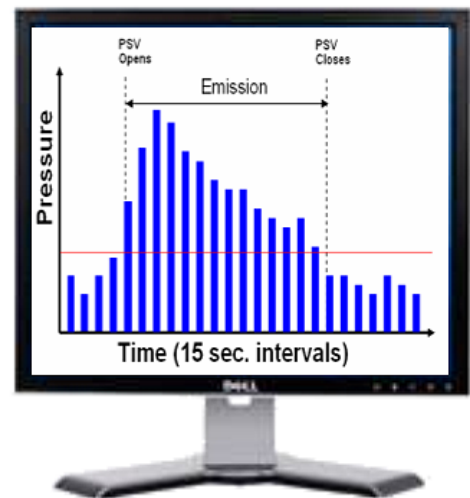
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The new technology has been openly embraced by IT, process operators, instrument technicians, contractors, and engineers.



The existing OSIsoft® PI System™ is used for trending and compliance reporting.