



Where?
What's leaking?
What concentration?
IS ANYONE DOWN?
Is there a plume?

Wireless gas detection technology

Louisiana refinery uses “continual communication” *pg 2*

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Wireless gas detection provides Louisiana refinery with “continual communication”

Chet Canova, an industrial hygienist working for the Valero St. Charles refinery outside of New Orleans, La., discusses in this Q&A case study his facility’s deployment of wireless gas detection technology.

The site is located on approximately 1,000 acres in St. Charles Parish, La., along the Mississippi River, approximately 15 miles upstream of New Orleans, and employs 530 workers. Nearly \$4 billion in upgrades have been implemented at the refinery in the past several years, making it one of Valero’s more complex refineries. Total throughput capacity is approximately 270,000 barrels per day (BPD).

We compare the data to the OSHA PELs to ensure employees are not being over exposed to any contaminates.

The refinery uses ProRAE Guardian to track gas detection data and for GPS tracking. With ProRAE Guardian, you can create your own wireless gas, radiation, biometrics, and plume monitoring command center, and integrate real-time data and alarm status from multiple toxic gas and radiation monitors. A single instance of ProRAE Guardian Host can integrate data from up to 500 RAE Systems monitors and select third-party devices. It combines

data to create a single dynamic map display of the facility or incident site, in addition to displaying the status, alarm, and raw sensor data for each device. ProRAE Guardian can also share the data and the display with other remote instances of ProRAE

Guardian software, so all decision makers have access to the same incident information in real time. Remote users can use web-browser on their laptops, smartphones, tablets or mobile devices to monitor real-time sensor data.

Continuous data-logging, an intuitive user interface, advanced security features, and remote alarming via email and text all help make ProRAE Guardian the industry leader for incident mapping and data integration. With the ProRAE Guardian SDK, developers and third-party manufacturers can build custom solutions to meet specific application needs and integrate real-time gas and radiation detection metadata from networked instruments. This information can allow organizations to extend their system’s safety monitoring and process control capabilities, whether at a single site or in multiple remote locations. ProRAE Guardian - <http://www.raesystems.com/products/prorae-guardian>

Q – What exposure hazards are detected by your gas detection equipment?

A – We use the following sensors: CO, SO₂, H₂S, VOC, O₂, LEL.



Q – The systems you use can continually communicate. What does “continually communicate” mean?

A – The instruments are constantly updating their location and monitoring results to the software every five to ten seconds.

Q – Describe the benefits of “continual communication” and wireless gas detection. How is this an improvement over the way you previously used gas detection systems?

A – It’s similar to watching a DCS screen that operates a plant. The observer can watch the data from a safe location, and anytime the instruments exceed a parameter, an alarm of

We also use this information to set-up cold, warm and hot zones around an incident to protect employees and to verify that no off-site impacts are occurring.

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the software notifies the observer that a parameter is being exceeded. This allows the user to make real time decisions to mitigate an incident. The software also monitors the equipment to ensure it is operating correctly and if it detects an issue (i.e., failing battery, pump blockage, etc.), it alarms on the software.

Q — How do you use the exposure data that is transmitted to you?

A — We compare the data to



St. Charles Valero refinery. Photo courtesy Valero Energy

the OSHA PELs to ensure employees are not being over exposed to any contaminants. We also use this information to set-up cold, warm and hot zones around an incident to protect employees and to verify that no off-site impacts are occurring.

Q — When did the St. Charles refinery begin using RAE Systems wireless gas detection systems?

A — March, 2014.

Q — Why did you choose RAE Systems equipment for gas detection?

A — The selection was based on

Future plans could include permanently installing the equipment on fence-line of interest or using the equipment for continuous confined space monitoring.

the wireless, GPS and data recording capabilities.

Q — The St. Charles refinery uses six AreaRAEs, four MultiRAEs and two RAELink 3 Repeater Modules. Describe the applications these pieces of equipment are used for.

A — The AreaRAEs are used as stationary monitor devices deployed to an area, left there, and they monitor for contaminants in that area. The MultiRAEs are portable monitoring devices that employees walk around with to monitor for contaminants in their area. The RAELink 3 Repeater Modules are repeaters used to boost the signal of the radio frequency so that data can be sent from the AreaRAE or MultiRAE to the software, which tracks the location of each device per GPS and concentration of contaminants real time.

Q — Describe any future plans or enhancements to expand, add to, or change your wireless gas detection systems.



The St. Charles refinery is very active in local community outreach, working with schools to promote science and wellness, local children's charities, and helping local residents after Hurricane Katrina flooding in 2004. Photo courtesy Valero Energy.

A — The current system is deployed when a unit is starting-up/shut-down or when an incident occurs. Future plans could include permanently installing the equipment on fence-line of interest or using the equipment for continuous confined space monitoring.

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Calumet Specialty's Shreveport facility: Wireless detection raises

In 2012, a 21-year old worker was found dead next to an open tank at a Bakken, North Dakota Shale fracking site. Ingestion of a hazardous gas was the suspect cause of this fatality.

The scenario is common -- particularly when workers lack proper gas detection monitors to protect them from exposure to gases, and are working remotely without a man-down alarm.

As the oil and gas industry continues to experience a global uptick in production, risk from exposure of dangerous gas is more prevalent. According to the Bureau of Labor Statistics (BLS), the number of fatalities from exposures to hazardous substances in 2013 represented 12% of the 4,405 worker fatalities. Approximately 112 workers died from exposure to hazardous substances last year.

Gases such as carbon monoxide, hydrogen sulfide, ammonia, methane, fluorine, chlorine dioxide and others are released during the exploration and manufacturing process.

But there's a solution: wireless plant-wide gas monitoring for 24/7 remote detection of hazards.

Refining facility turns to wireless detection to increase worker safety

Calumet Specialty's Shreveport Refining facility produces specialty lubricating oils, waxes and fuel products such as gasoline, diesel and jet fuel. Production processes pose risk to personnel within the facility as well as those beyond the facility's fence line.

Calumet safety managers were

determined to build a safety program that insures personnel within the facility as well as the community outside of it, are safe from exposure to harmful gases and substances.

The operation has high pressure hydrogen compressors within its site, explains Michael Rhoades, Safety and Environmental Manager at Calumet's Shreveport facility. "We also are potentially exposed to hydrogen sulfide (H₂S) and sulfur dioxide inside the plant and around some of our processing equipment that removes the H₂S," explains Rhoades.

Calumet has improved its control and monitoring of these as well as other harmful gases by installing a RAE Systems wireless system and fence line monitoring of the facility. Rhoades says the system is very easy to use and is quite user-friendly. He notes that the configuration and set-up is more technical. "We actually brought some system guys onboard to help with initial troubleshooting. But it's been pretty successful after that."

With this system, industrial hygienists, safety managers, production supervisors and other professionals remotely monitor personnel deployed in hazardous areas. Internet access allows key data to be logged and recorded for historical purposes. Plus, a worker can be monitored, personnel alerted, and action taken immediately, if an incident occurs and they need help. Data is available to facility production and safety managers to share with other stakeholders such as emergency workers and remedi-

ation specialists for better safety planning and prevention.

Rhoades emphasizes the importance of gradual implementation of a wireless detection system to meet all needed challenges and obstacles along the way.

"One of the things that we've found, is that it's more effective to take baby steps," says Rhoades. He says for small and medium sized customers, the idea of a full scale wireless replacement of their existing protocol can be overwhelming. Starting with portable instruments where one can communicate with multiple instruments can be a precursor to a larger fixed system with a software install. "That comes in time," says Rhoades, "but some facilities need to ease into a wireless system, versus a one-time wholesale replacement."

Operationally, he says the wireless system is easy to learn, and users quickly understand how it works, how to use it and what the alarms mean.

"It's really simple, simple stuff," Rhoades emphasizes. "The alarms do not clear until the gas is gone. Indicators tell operators where the alarms are. We've got them on a map on a grid system, so we know exactly where the alarms and monitors are when a notification comes in."

Calumet response teams and community are better protected

"When we get an alarm, we send our people in to first make sure that the area is safe and then shut down any release," explains Rhoades. "We've got protocol developed for an alarm

Greenville Refining

safety levels

and we send people in with understanding of how to test the system to validate. It's been successful numerous times. We've saved equipment loss, and more importantly prevented injury."

Rhoades says that the granularity of the detection has helped to diagnose releases. "The instrumentation is very sensitive," he says. "Some of these small scale releases may have gone unnoticed for longer durations. We're catching them a lot quicker now."

RAE Systems fence line monitoring greatly helps protect the community around them. "We've put about 45 units around the perimeter of the facility," says Rhoades. "And again we're looking at these fence perimeters regularly. Readings of key indications and levels feed into a centrally located panel as well as the facilities central control room. We have alarm set points. So, if we get an alarm on any one of those local units, it feeds into the control room and then the operator can acknowledge it and respond accordingly."

Wireless plant-wide and confined space gas detection trend

Steve Haise is the owner of All Safe Industries in Louisville, Kentucky, a well-established safety distributor in Kentucky and surrounding states. He says that many organizations today are receptive to, and are now installing, wireless detection systems because it improves worker safety.

"Wireless gas detection systems provide a way to communicate data more effectively, specifically data that represents the



condition of atmospheres in work areas including confined spaces. Now safety manager and attendants can monitor readings from multiple instruments with one handheld device. This real-time data may be used to analyze risk and coordinate quicker responses to hazards as soon as they occur," said Haise.

Installing a wireless system requires set up. Organizations can prepare for the deployment challenges by working with their distributor and monitor provider to create a site plan, to reduce any challenges that come with a system installation. "The site plan is critical. Then, once the wireless gas detection system is up and running, customers absolutely love the system," Haise says.

"Real-time wireless gas detection systems are reliable and convenient and reduce operational cost. They are an attractive replacement of legacy fixed and hard-wired systems. And in some plants, wireless systems will include a hardwired system in combination with standalone monitors and rapid deployment kits," said Haise.

Risk of injury from hazardous gas exposure, often a silent killer, can be fatal, as it was for the young man in Bakken, North Dakota. Causes for refinery incidents can include faulty repairs, leaking pipes and pumps, tank overfills and spills, or breakdowns in safety procedures or adequately utilizing safety equipment. Undetected gas leaks and subsequent damage, if uncontrolled

and unmonitored, pose a dangerous safety risk to industrial assets and facility workers, as well as to the communities around them.

Wireless gas detection systems have proven to be reliable in many industries including: oil and gas, steel fabrication, construction, paper production, chemical processing, rendering and others.

Real-time monitoring of threats helps organizations identify tank leaks and dangerous confined-space gas levels. Data including time, location, concentrations, lower explosive limits, and other variables can be archived and analyzed to identify dangerous situations and ultimately predict failure before it occurs.

Wireless plant-wide and confined space gas detection systems help industrial sites operate safely and manage production and safety throughout the facility. This can more effectively protect workers, assets and the community.

1 <http://www.bls.gov/iif/oshcfoi1.htm#2012>

Wireless gas detection: The soul of a new machine

Two dozen workers at a meat processing plant in Minnesota were recently taken to the hospital after they began coughing and vomiting. OSHA investigators were called in to determine the source of their illness.¹

Recently, four workers perished, and a fifth was hospitalized at a DuPont facility in LaPorte, Texas, after reports that the workers were exposed to leak of methyl mercaptan - a substance used to produce insecticides and plastics. The exact cause of the deaths was not determined, however the leakage is suspect.²



Undetected ingestion of hazardous substances is a serious risk that takes the lives of over 100 industrial workers every year. It continues to challenge safety managers, risk assessment executives and workers. Such substances are often difficult to detect and may easily permeate susceptible areas internal to a facility and its immediate surroundings. This is not only dangerous for employees of the facility, but also for vendors, contractors and nearby community.

Getting connected with wireless

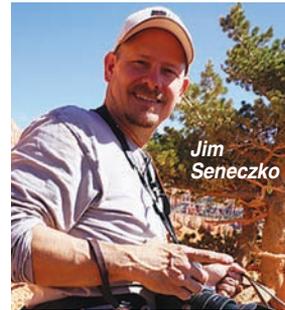
The need for detection control has given rise to wireless detection as the best defense to proactively, 24/7, monitor and detect leaks and worker exposure to hazardous substances.

According to the Gartner Group, network-connected devices will soar to 26 billion by 2020. A report from Gartner states: “. . . This opens up the possibility of connecting just about anything, simple to complex, to offer remote control, monitoring and sensing. Emerging areas will witness rapid growth of connected things. This will lead to improved safety, security and loss prevention.”

Industrial hygienists, safety managers, production supervisors and other professionals are embracing wireless gas detection technology. Workers and other contractors as safety teams may now be centrally monitored and controlled.

Wireless systems can now integrate dedicated wireless monitors, personal protection monitors, GPS data, real-time meteorological data and personal physiologic data.

Detection and data capture expedite and accelerate decision making, and improve planning and forecasting for safety and maintenance purposes. Wireless gas monitors rebroadcast alarms and data in real-time using mobile devices and the Internet. Wireless hazard detection system users can now engage remote experts in the same way that doctors working in remote locations can interface with medical center spe-



cialists in real time. Historical data is useful to determine safe actions related to operational

maintenance and downtime. Logged data from wireless gas detectors, biometric monitors and plume tracking is rich with useful information and can be archived and analyzed to determine predictive worker safety, plant safety during specific processes and maintenance, asset replacement, and higher output due to reduced worker stress.

According to Jim Seneczko, Vice President of AFC International, a gas detection and air-monitoring specialty firm in DeMotte, Indiana, these wireless gas detection benefits are attractive to industrial managers, always seeking safer operations and maintenance efficiency. Seneczko interacts frequently with large industrial and oil & gas facilities in the Midwest that in the past have relied on fixed, portable, and area gas detection systems, but are now focused on implementing wireless gas detection.

“More and more organizations are enthusiastic about wireless gas detection systems and equipment and are anxious to install them in their facilities. In fact, I just got out of a call 10 minutes ago with a company that’s going to budget for a plant-wide wireless system to be installed next spring,” says Seneczko. “The customer felt that a wireless gas detection system is the greatest thing. It’s really going

to solve their monitoring, compliance and worker safety challenges now, and improve plant-wide safety down the road.”

The new customer, a regional operation of one of the largest energy companies in North America, owns and operates some 80,000 miles of pipelines and 180 terminals throughout the continent. Their pipelines transport natural gas, refined petroleum products, crude oil, carbon dioxide and more. In addition, they are a chemical holding company and store or handle a variety of products and materials at a wide array of terminals. These products include gas-oline, jet fuel, ethanol, coal, petro-



leum coke and steel.

Seneczko says that this energy company didn't hesitate when they were presented with a plant-wide wireless gas detection solution that potentially will improve their overall safety record and help the company avoid injuries and lost worker productivity, and plant downtime.

“They're already using portable monitors, but the company now wants to go with the wireless portable gas detection system because they have flash points from a variety of compounds and some of their larger facilities have a cloud of flammable material that can create a plume outside their premises,” says

Seneczko. “The safety manager wants to be able to circle the facility with the wireless monitors and track the information remotely. It's just the perfect application.”

Dividends of wireless

According to Seneczko, there's a high ROI with wireless gas detection. Once a turnkey wireless system is installed, an organization can begin to reap its benefits – both from worker productivity, improved safety and production. Software computes the data from wireless gas detectors and correlates it with other variables such as downtime, worker output, maintenance costs, and production schedules, helping drive management decisions to best allocate resources.

He believes that the return on investment from wireless gas detection monitors and a software safety system can deliver as up to millions of dollars in benefits -- based on the reduction in worker and contractor exposure, improved compliance, automated data logging, reduced worker stress, and higher productivity.

“For example, another organization that's adopted wireless gas detection is an underground tunnel development company based in the Midwest. The company is involved in well digging and geological studies, with 60 locations domestically and 80 locations throughout the world. The company wanted to reduce cost and keep workers safe.

“Their wireless system allows them to monitor dispersed locations in real time. They were very enthusiastic about the fast deployment of the RAE Systems wireless gas detection system, and expect to subsequently reduce their liability coverage premiums while increasing the safety of their workers and stakeholders,” Seneczko said.



In addition, Seneczko says, a plant with a wireless gas detection infrastructure is quite attractive to local regulators, community advocates and safety regulators. The worker and fence-line monitoring, real-time safety tracking and data logging provides discipline and rigor to the overall safety program. This wireless plant-wide monitoring instills confidence in community leaders, establishes data integrity, and helps build rapport with local stakeholders.

Taking a proactive approach to wireless gas detection with data logging is the new model for industrial plant-wide safety. Wireless gas detection data can be combined with and analyzed to identify dangerous situations and predict safety risks early on.

These options give plant safety and risk reduction managers a new set of tools to deploy in a range of safety management situations such as: energy exploration and drilling, refinery turnarounds, sewage/water treatment plants, petrochemical transportation, confined space entry, rendering plant-wide detection, leak detection, worker protection, fence-line monitoring, scrubber efficiency, and hydrogen sulfide (H₂S) safety.

1 Source: <http://minnesota.cbslocal.com/2014/10/21/osh-inspects-willmar-turkey-plant/>

2 Source: <http://news.yahoo.com/4-workers-killed-houston-area-chemical-leak-235204727.html>

3 Source: <http://www.gartner.com/newsroom/id/2636073>

This canary really sings.



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