Leaks and other uncontrolled releases need only an ignition source once the airborne concentration reaches the lower explosive limit (LEL).”

Background

The Occupational Safety and Health Administration (OSHA) in the United States provides a comprehensive publication entitled “Hydraulic Fracturing and Flowback Hazards Other than Respirable Silica.” It includes sections on hazards during transport, during mixing and injection, hazards during pressure pumping and flowback operation, and possible gas encounters. Many of the examples and proposed best practice standards in the report are recognizably the result of past incidents. In the publication, OSHA also reinforces that “flammable atmospheres are a significant hazard during flowback. Leaks and other uncontrolled releases need only an ignition source once the airborne concentration reaches the lower explosive limit (LEL)” – and in turn urges companies to approach safety proactively.

Studies indicate that investments in proactive safety solutions tend to positively affect a company’s bottom line:

• Each prevented lost-time injury or illness saves $37,000, and each avoided occupational fatality saves $1,390,000.

• Over 60% of CFOs reported that each $1 invested in injury prevention returned $2 or more, and 40% said productivity was the greatest benefit of an effective workplace safety program.ii

Yet a reactive approach is still common. This is often due to limited budgets and in part because of the belief that accidents merely happen, and there is no reason to make an investment in safety at this time.

And Then Something Does Happen

A 2017 article published in the Energy Research & Social Science journal indicated that “from 2006 to 2015, 116 unique fires or explosions were identified at O&G sites in Colorado and 67 fires or explosions in Utah.” “Numerous flammable and explosive materials and potential ignition sources are present at O&G operation sites. The hazardous materials can include chemicals and industrial supplies such as the petroleum products (i.e., oil, condensate, natural gas), diesel fuel, shaped charges, primer cord, detonators, and various chemicals. Ignition can be caused by sources such as electrical shocks, mechanical friction causing sparks, lightning, and open flames such as ground fires, pilot lights, welding, cutting torches, lighters, or cigarettes.”iii While gas detection instruments are a consistent part of oil and gas company safety programs, continuous LEL monitoring is not always in place. Any areas that are prone to high pressure leaks, spills and fugitive emissions should be continuously monitored, as atmospheric conditions can quickly change, and portable instruments may not be in the right place at the right time.
Both the Radius BZ1 and Ventis Pro instruments are equipped with LENS™ Wireless technology, allowing them to continuously communicate with each other. Workers have the ability to monitor any instrument from every other instrument, creating a reliable safety network. If one monitor alarms, that particular monitor and its readings are identified on every other monitor within the network, including the constantly moving Ventis Pro.

Every day four Radius monitors are deployed for continuous monitoring, and one spare Radius monitor is kept on site, fully charged, and rotated into the network as needed. The instruments are strategically placed around the site with one Radius monitoring the area around the wellhead (the pressure-containing interface for the production equipment), another is placed by the compressor station, a third unit is placed near the manifold, and the fourth one by the oil offloading system. The spare is kept in the site trailer to serve as the replacement, and the Ventis Pro travels around the site with one of the company employees.

To wirelessly connect the instruments, they are simply turned on without the need for IT, software licenses, or additional infrastructure. With LENS Wireless, users have visibility into hazards up to a mile away.
Each well pad also has one DSXi Docking Station for the Ventis, and one DSXi Docking Station for the Radius SafeCore® Module. The SafeCore Module when installed in the Radius base, serves as the instrument’s central processing unit, and can be removed and docked for maintenance and service. The DSXi is Industrial Scientific’s docking station in cloud-connected mode. In addition to performing bump tests and calibrations, it automatically stores data that can be downloaded from any web-enabled device for reporting and analysis.

iNet Exchange is a subscription-based service for gas detectors covering repair and proactive replacement, eliminating instrument downtime.

Moving Forward

With Industrial Scientific’s iNet® Exchange program, the company intends to use the Radius BZ1 and Ventis Pro instruments throughout all well pad activities including drilling, fracking, coil tubing, flowback and production. iNet Exchange is a subscription-based service for gas detectors covering repair and proactive replacement, eliminating instrument downtime. Parts, equipment, and shipping are covered, and even damaged instruments can be traded in. While iNet Exchange is the perfect solution for this customer, renting the equipment is also an option for short term operations. Industrial Scientific maintains over 25,000 pieces of equipment available for rent. The equipment is serviced by Industrial Scientific employees, and in most cases equipment can be shipped on the same day.

Whether purchasing instruments, implementing iNet, or taking advantage of Industrial Scientific’s short term Gas Detection Rental Program, these wireless instruments will continuously monitor common well pad emissions including carbon monoxide (CO), hydrogen sulfide (H₂S), carbon dioxide (CO₂), oxygen levels and lower explosive limits. While studies and statistics on the cost associated with reactive vs. proactive safety have been published, they widely vary on a case by case basis. But the impact of a lack of safety on people’s lives is, and always will be, immeasurable.

Food for Thought

If proactively implementing continuous LEL monitoring can avoid a single worker’s injury on a well pad, then based on NSC (National Safety Council) average calculations, cost savings can easily outweigh the proactive investment in a thorough gas detection set-up. In addition, consider the possible costs incurred from operating losses, equipment damage, bad press, and most importantly employee trust and morale.

1OSHA, Hydraulic Fracturing and Flowback Hazards Other than Respirable Silica
4Image adapted from Schlumberger article: Artificial Lift for High-Volume Production, Roy Fleshman and Harryson Obren Lekic, p. 7, Spring 1999.