The Battery Life of the Radius® BZ1 Area Monitor Excels During Plant Shutdown

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Continuous operational processes at an industrial plant are typically shut down 5% or less per year, yet 70% of major accidents occur during non-routine (start-up, shutdown, or online maintenance) operations. Why? The situation at the plant during a shutdown is completely different from a normal day. Processes are stopped, equipment is emptied and opened, and the amount of people and moving vehicles including trucks and forklifts at the site is many times higher than normal.

Decades of knowledge and experience with plant turnarounds prompted one chemical manufacturing and processing plant in Louisiana, well known and widely praised for its focus on safety, to seek out the best solution to continuously monitor lower explosive limit (LEL) levels at one of the plant’s most dynamic areas during shutdown: the entry, exit, and pathways of construction vehicles.

Challenge

During the shutdown, hundreds of vehicles including vans, trucks, forklifts, welding trucks, and contractor vehicles entered and left the site on a daily basis. In an area subject to flammable gas or vapor releases, the air that acts as an oxidizer (causing the desired fuel combustion in the engine) is liable to mix with these flammable gases. The vapors and gases can enter the cylinders of the engine along with the air, providing an external fuel source and increasing the fuel-to-air ratio in the engine. Changes in the fuel-to-air ratio create ignition hazards by elevating engine temperatures or producing sparks that can ultimately lead to an explosion.

Based on the amount of traffic during the shutdown, the hazardous zone around the plant was clearly marked and barricaded with a yellow gate. The area surrounding every vehicle as it entered the gate and traveled to its final destination required continuous LEL monitoring. The turnaround manager at the plant entrusted the company’s safety provider to determine the best monitoring option for this situation. A common solution is the use of a fire watch safety attendant equipped with a portable LEL detector. The attendant accompanies every vehicle as it moves through the possibly hazardous alleyways from entry through the gate and then back again. Due to the size of the project and number of vehicles involved, the fire watch attendant option would be time consuming and costly.

Solution

The company’s safety provider team offered a different and unique solution: deploy area monitors for continuous monitoring. Already having field tested Industrial Scientific’s Radius® BZ1 Area Monitor with LENS™ Wireless with a previous client, the safety provider was confident that this monitor was the right option. “Honestly, what immediately drove us to choose the Radius was the battery life. We knew that we would be able to let every monitor run for 7 or 8 days instead of having to send out 10 people per shift per day to change out batteries, as was the case with another manufacturer’s instruments that
Case Study

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we used in the past,” said the safety provider. “With 146 monitors running at once for the approximately 60-day duration of the project, we also eliminated the need to bump test the instrument every day.” As long as each monitor was continuously running for the duration of 7-8 days, it was only required to be bump tested after that time period.

Radius BZ1 Area Monitors with LENS Wireless, when turned on, automatically connect to every other monitor within the same designated network and start communicating. If one monitor detects a gas or LEL reading and goes into alarm, every other monitor within the network will also alarm and clearly indicate the particular instrument that picked up the reading. This allows vehicle drivers to know immediately where the hazard is, and prompts them to turn off the engines and evacuate the area.

For this turnaround project, the safety company had a total of 171 Radius BZ1 monitors on site. Out of these, 146 monitors were strategically placed in network groups of 18-20 instruments along the alleyways frequented by the moving vehicles. The instruments sat on top of aluminum frames that kept them approximately 2 feet off the ground. This allowed the monitors to withstand rough conditions as they were exposed to flooding rains and ongoing clouds of dust.

The remaining 25 instruments were kept on reserve, fully charged, and rotated in as needed. When one group of 20 monitors was ready to be re-charged, the SafeCore® Modules (central processing unit of the Radius monitor) were removed from the monitors’ bases, and replaced with the reserve modules. With the use of 20 DSXi Docking Stations and their out-of-the-box functionality, the 20 fatigued SafeCore Modules were then all re-charged and bump tested, stored in the reserve Radius bases, and ready to relieve the next group of monitors when needed. This continuous rotation allowed for uninterrupted monitoring for the 60-day duration of the project.

Results

“If we would have worked with fire watch attendants versus the Radius monitors for this project, it would have cost the customer at least double, and required more work permits” said the safety provider. “Out of 171 monitors, we ran into a performance issue with only two Radius monitor screens. That’s close to a 99% positive performance rate, which is almost unheard of. We never missed a beat!” After completion of the project, the customer submitted a positive quality notice to the safety provider and commented on how well the instruments performed. Since then, the chemical manufacturer added another 8-10 smaller scale projects using the Radius BZ1 Area Monitors and has deemed it their area monitor of choice.

1 William Bridges, Process Improvement Institute, Global Congress on Process Safety, 2016; Necessity of Performing Hazard Evaluations (PHAs) of Non-normal Modes of Operation (Startup, Shutdown, & Online Maintenance).

2 OSHA Fact Sheet: Internal Combustion Engines as Ignition Source