Invisible dangers:  
Meat and poultry: a legacy of risks

In 2013, Tyson Foods was ordered to pay a civil penalty of $3.95 million, create a new risk-management program and provide $300,000 for emergency response equipment in communities where it operates. The penalty was ordered for “various violations of the regulations” related to anhydrous ammonia, a gas that’s commonly used in refrigeration but can cause burning, choking and even death at high exposure at facilities in Kansas, Nebraska, Iowa and Missouri. Tyson disputed many of the government’s charges but agreed to pay the fine.

Ammonia, as well as hydrogen sulfide, methane, and others are among the dangerous gases found in poultry, pork and beef processing plants. Exposure to these harmful substances is a growing concern in a dangerous industry faced with increasing pressures of global competition. Operations are challenged with balancing increased output and operational efficiency with safety risk to workers and the surrounding community.

Wireless gas detection technology is a plausible solution to monitor harmful substances and ultimately protect workers and citizens near such facilities, while avoiding costly fines and liability.

Balancing productivity with safety

The industry, long known for its at-risk working environment, has had a higher workplace injury rate than an average industrial facility. When Upton Sinclair wrote about the horrors of the Chicago stockyards and meat-packing plants at the turn of the 20th Century in his novel “The Jungle,” it raised awareness of worker conditions and social issues of safety as the industrial revolution took rise in America. Today, more than 100 years later, worker safety dangers persist.

According to the Bureau of Labor Statistics, approximately 5.7 injuries occur for every 100 workers1 in the meat and poultry packing and processing industry. The national average for occupational injuries is about three per every 100 workers.
Meat and poultry operations have come into the scope of regulatory bodies such as OSHA and the EPA. Workplace safety and nearby community advocacy have driven this attention.

Contemporary industrial livestock and meat and poultry processing operations are facing growing global competitive pressure. They continually seek innovative and strategic ways to improve their productivity to meet this challenge. Subsequently, an increase in operational tempo means there are more harmful gases.

Such gases are found in enclosed spaces within the plant, in and near manure pits and other containment, along the production line where blood, feathers and bones are being removed and ground into other products, and in the ambient air in and around plant operations and facilities.

Once animals raised on industrial farms are ready for harvest, they enter a butchering or slaughtering operation. From there, the meat is harvested from the animals and goes to a meat-packing operation. However, that which does not become meat — the byproduct of the operation that includes animal parts, feathers, bones, blood and other biomass — is salvaged and used to produce other products, such as animal feed, antibiotics, insulin, fertilizer, alternative fuels and pet food. Nearly 96 percent of an animal is processed into some marketable product. This operation of using the byproducts from slaughter is called the rendering operation.

**Harmful substances**

Operational health risks are presented at different points along the production flow from farming livestock to producing finished inventories of the many products from rendering such as bone meal, blood meal and fertilizers.

Manure and urine is funneled from animal areas to pits or lagoons where it is contained, however, gases such as methane and hydrogen sulfide are produced at such pits.

Slaughtering operations are cooled with air-conditioning and refrigeration plants — sometimes with ammonia as a refrigerant, which leaks and poses a significant safety risk. The following example occurred after fines were imposed on Tyson Foods, as mentioned earlier.

In October 2014, 18 workers at a Tyson poultry plant in Arkansas were sent to the hospital from exposure to high levels of ammonia. Reports of the incident specifically stated that ammonia levels were not detected inside the plant. After subsequent investigation, the facility’s air-conditioning system was thought to be the root cause of the ambient ammonia levels inside the facility.

Earlier, in 2009, an ammonia leak at a Lumber Bridge, North Carolina poultry processing plant killed a worker from exposure. Numerous other workers were hospitalized and the plant was shut down for two days.

The time to process decaying and slaughtered animal parts varies from the type of animal to the specific operation. Hydrogen Sulfide (H2S) is produced naturally by the decay of organic compounds as well as emissions from waste lagoons. In more than 200 poultry operations throughout the United States, H2S is monitored via personnel monitors worn by employees at various locations throughout an operation including areas known to potentially contain higher concentrations.

**Death within minutes**

H2S causes numerous symptoms including eye, nose and throat irritation and produces a foul odor or smell that can radiate for miles beyond a facility’s boundaries. At low concentrations, it can cause dizziness and irritation of eye and respiratory tract. At high concentrations, may result in death within minutes. It may be produced from manure lagoons or other areas of plant processes where animal parts and waste are reclaimed for further production.
In 2009, Tyson Foods Inc. was ordered by a U.S. District Court in Arkansas to pay $500,000 for “willfully violating worker safety regulations that led to a worker’s death” in its River Valley Animal Foods (RVAF) plant in Texarkana, Arkansas. The plant utilized high-pressure steam processors called hydrolyzers to convert the poultry feather into feather meal. Decomposition of poultry feathers produces hydrogen sulfide gas. A maintenance employee who worked near the hydrolyzers — which required frequent adjustment and replacement — was killed and two others were treated from exposure to this gas.

In another incident in February 2012, an employee of a Smithfield hog processing plant in Clinton, North Carolina died while draining wastewater sludge into a tanker truck. The cause of his death was suffocation from hydrogen sulfide fumes.

**Methane gas dangers**

In addition to hydrogen sulfide, methane gas is also known to be present in meatpacking and rendering operations and has been known to cause significant injury. This gas is released from lagoons and then diffuses airborne. It is more likely to be found at the top of unventilated areas such as closed manure pits, rather than open-air lagoons. Victims of this gas may be unaware of exposure because it is colorless, odorless and tasteless. The National Defense Resource Council cites EPA estimates attributing 13 percent of the total U.S. methane emissions were from livestock manure. Emissions from methane, the Agency said, are on the rise in hog and dairy operations — particularly where the lagoon waste is reclaimed as liquid manure.

**Industry solution: Wireless gas detection**

A viable solution to the problem of hazardous substances and their risk of exposure is a wireless gas detection and monitoring configuration.

That’s precisely the viewpoint of the Director of Rendering Operations at a Delaware-based facility. From his perspective, wireless gas detection and monitoring affords a seamless and expedited solution. Elimination of the hardwired connection from sensing points means less labor and disruption to plant operations and flow. Hardwired installations can be disruptive, labor intensive and difficult to change once installed. With wireless gas detection, implementation time is quick with minimal labor, as opposed to a wide-scale hardwired installation.

The sensing points in a wireless system are flexible; they may be moved and changed depending on where high-risk focal points of gas exposure occur. This allows more control and monitoring that’s focused on the source and presence of harmful gases. A hardwired configuration would not offer as much flexibility or the option of moving sensor heads to where problem substances are suspected.

Data also may be monitored using installed software from any remote location with an Internet connection.

Wireless gas detection can be a game-changer that will undoubtedly increase the safety equation for all stakeholders in a competitive and dangerous industry.

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**Wireless gas detection in the poultry and meat industry**

Wireless gas-monitoring technology has a longstanding reputation to mitigate safety risk in many different industries. Its proven use makes it ideal for the poultry, pork and beef industry operations that embrace it.

Here are some important takeaways in using it to monitor and control ammonia, hydrogen sulfide, methane and other dangerous gases present in today’s meat and poultry operations:
• Increased fines, lawsuits, community environmental advocacy and public awareness of meat and poultry worker safety have heightened interest in effective wireless detection and monitoring of harmful gases.

• Wireless monitoring pays huge dividends and prevents huge risks all along the process chain in today’s competitive and advanced global meat and poultry operations.

• Workers and the community are at the bedrock of an industrial facility; wireless gas detection and monitoring preserves the trust and mitigates risk to stakeholders.

• Advanced enterprise-wide wireless gas detection solutions can track, archive monitor and exposure data. Organizations can analyze such data to develop appropriate response and communication plans and mitigates future risk.

Wireless gas detection and monitoring is a key ingredient in the value equation attractive to all stakeholders of today’s meat and poultry operations, from its livestock and poultry farms to waste facilities and rendering operations. Wireless technology combined with the Internet of Things is not only a solution to the problem of balancing safety with productivity, but it is a strategic advantage for those who embrace its merits.


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