

Don't Follow Your Nose

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Source: CSB

On June 9, 2009, an explosion ripped through ConAgra's Garner, NC Slim Jim plant. The force of the blast blew out walls and caused a large section of the roof to collapse, killing five and sending 70 to the hospital. Approximately 18,000 pounds of anhydrous ammonia subsequently leaked from the plant's damaged refrigeration system, sickening three firefighters.

The explosion was caused by the buildup and ignition of natural gas during the installation of a gas-fired industrial water heater. Gas purging is currently a common technique for clearing air from fuel lines; on this particular occasion, workers had difficulty lighting the heater and repeatedly purged the fuel lines over two hours.

As gas flowed out of the fuel line, it accumulated in the utility room where the heater was located. Although there was an exhaust fan in the utility room, it was insufficient to keep gas levels below the ignition threshold. Workers reportedly relied on their sense of smell to determine if natural gas levels were unsafe.

Proposed Gas-Purging Requirements

The National Fire Protection Association's National Fuel Gas Code Committee,

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responding in part to Chemical Safety Board (CSB) recommendations, recently proposed changes that would require specific conditions to be met during the purging process. In situations in which gas purging cannot be directed outdoors, the revised code would require:

- The point of discharge be controlled with a shutoff valve.
- The discharge point be at least 10 feet from sources of ignition, and located a minimum of 10 feet from building openings and a minimum of 25 feet from mechanical air intake openings.
- That during discharge, the open discharge point be continuously attended and monitored with a combustible gas indicator.
- That purging operations introducing fuel gas be stopped when 90 percent fuel gas by volume is detected within the pipe at the point of discharge.
- That all persons not involved in the purging operations should be evacuated from the area within 25 feet of the point of discharge.



Source: CSB

Odor Fade & Odor Fatigue

The CSB also emphasized that plant personnel be trained on the dangers of odor

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fade and odor fatigue:

- **Odor fade** occurs when the odorant added to natural gas is filtered out by pipes or other media. It occurs predominantly in installations of new pipe, especially steel pipe and pipe of larger diameter and length. Odor fade can be caused by physical or chemical processes, such as the presence of rust and intermittent gas flow.
- **Odor fatigue** (also known as olfactory fatigue) occurs when receptors in the nose are continuously exposed to an odor. Cell membranes stop allowing signals to travel from the receptors to the brain as a way of adapting to constant stimulation.

On top of this, other plant odors can mask the gas odorant, making it impossible to accurately gauge gas concentrations. As such, plant workers should use combustible gas detectors and not rely solely on their sense of smell.

There are a number of portable gas detectors on the market, with some specifically designed for use in confined spaces. The major differences between each are the gases they can detect, detection thresholds and resolution, battery life, calibration methods (automatic or manual) and alarms (light and sound). Ensure that any detector you choose for gas-purging operations can give gas composition as a percentage of total volume, in line with the proposed changes to the National Fuel Gas Code.

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