

# Natural Gas Equipment Purging Hazards

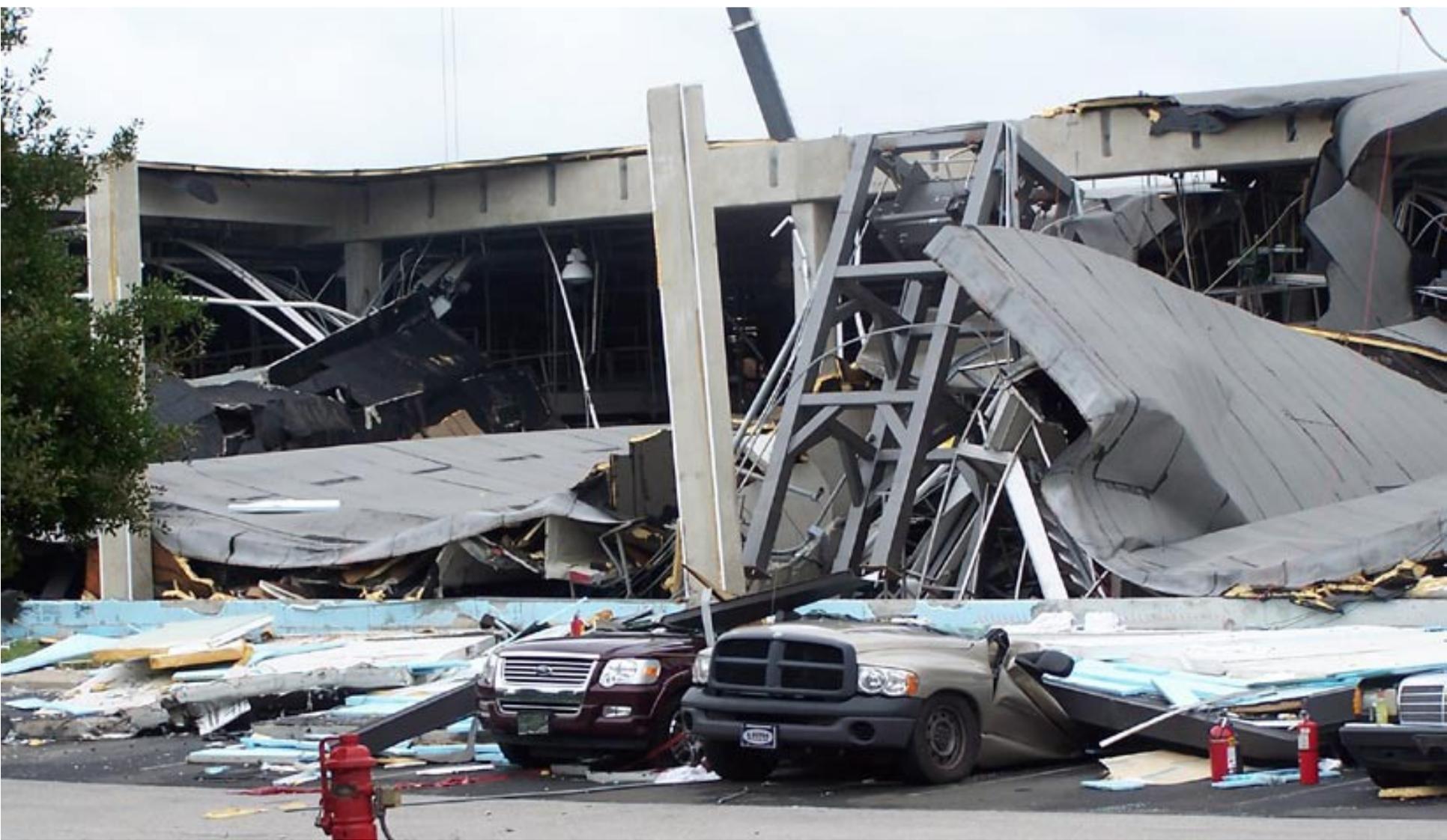
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# Natural Gas

- On the afternoon of June 9, 2009, 4 workers were fatally injured and dozens injured when an explosion occurred at the ConAgra Foods facility in Garner, North Carolina.
- February 7, 2010-Six workers were fatally injured during a planned work activity to clean debris from natural gas pipes at Kleen Energy in Middletown, CT.

# Con Agra Slim Jim plant

- **Natural gas explosion**
- **4 Fatalities-**
- **67 Injuries**
- **Extensive facility damage**
- **Ammonia release complicated search and rescue efforts**
- **Economic harm**





# Events....

- The accident occurred during the installation of a new fuel gas-fired industrial water heater in an interior utility room of the plant.
- The manufacturer, was attempting to purge the new gas line by using natural gas to directly displace the air in the line.
- The purged gas was vented indoors into the utility room, which was ventilated by an exhaust fan.

# Events...continued

- Purging was conducted intermittently over a period of up to two-and-a-half hours....

# Events continued

- Personnel relied on the sense of smell to determine when the piping had been effectively purged of air and whether or not an unsafe release of natural gas occurred.
- Personnel who were in and out of the utility room noticed the gas odor, but most were not seriously concerned and considered the purging activity to be a ***normal part*** of the start-up process
- Over 200 people who had no role in the installation were in the building when the natural gas found an ignition source and exploded at approximately 11:25 a.m.

# “Normal Practice”

ESA reported that it was the company's **normal practice** to purge fuel gas piping directly into the room or area when installing gas-fired equipment. Code officials and other parties told the CSB that they believe this practice to be **common**

# Similar Events

- An explosion at a 30-story hotel under construction in San Diego, California, on May 19, 2008, that injured 14 workers, including three who suffered severe burns;
- An explosion at a hotel in Cheyenne, Wyoming, on August 7, 2007, that severely burned two plumbers;
- An explosion that burned two plumbers at a school in Porterville, California, on November 16, 2005;
- An explosion on August 1, 1997, at a fitness center in Cary, North Carolina, a short distance from the ConAgra facility, which collapsed the roof, severely burned two people, and injured four others.

*Wherever practicable, directly vent purged gases to a safe location outdoors, away from people and ignition sources.*

- Purging new or existing gas piping into buildings can be highly hazardous due to the possible accumulation of gas above the lower explosive limit (LEL) and the associated danger of fire and explosion.*
- This can be done using a temporary hose or piping or permanently installed vent pipes, depending on the facility design.*

*Purging indoors should only be done in **limited circumstances** where purging outdoors is not practicable.*

*In such cases:*

- nonessential personnel should be evacuated;
- all ignition sources should be controlled or eliminated;
- ventilation should be adequate to maintain the gas concentration well below the lower explosive limit at all times.

*Never rely on odor alone to detect releases of fuel gases.*

- The perception of odor is highly subjective and varies from one person to another. People also become desensitized to odor during prolonged exposures. Additionally, new gas pipes and containers can react with or otherwise remove the odorant, an effect known as “odor fade.”

*Always use combustible gas detectors to monitor the gas concentration during purging operations.*

- To provide the most accurate information about combustible gas levels, sampling should be conducted frequently or continuously at appropriate locations.
- Meter detects % of LEL (Lower Explosive limit)

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