Practical Exercise

Dangers of Purging Gas Piping into Buildings: CSB accident description.

On June 9, 2009, a major natural gas explosion heavily damaged the ConAgra Slim Jim meat processing factory in Garner, North Carolina, just south of Raleigh. Three workers were crushed to death when a large section of the building collapsed. The explosion critically burned four others and sent a total of 71 people to the hospital including three firefighters who were exposed to toxic anhydrous ammonia from the plant’s refrigeration system. Approximately 18,000 pounds of ammonia were released to the environment and 100,000 square feet of the plant were damaged. Due to the severity of the structural collapse, there was the potential for numerous additional deaths or serious injuries. The accident occurred during the installation of a new fuel gas-fired industrial water heater in an interior utility room of the plant. Five days prior to the accident, a new section of three-inch steel piping – which would provide natural gas to the heater – was tied into a six-inch natural gas supply line located on the roof. The new natural gas piping ran horizontally over 120 feet along the roof and then descended into the utility room. On the day of the accident, a worker from Energy Systems Analysts (ESA), the water heater manufacturer, was attempting to purge the new gas line by using natural gas to directly displace the air. This was done by removing threaded fittings, creating one or more pipe openings near the heater. The worker then opened a quarter-turn valve to control the release of purged gases. 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. The purged fuel gas was vented indoors into the utility room, which was ventilated by an exhaust fan. However, no assessment was made of the adequacy of the ventilation in comparison to the rate of the gas release; whether a dangerous accumulation of...
flammable gas had occurred could have been most accurately verified by taking direct measurements inside the utility room using a combustible gas detector. Because of the difficulties in lighting the water heater, personnel perceived that the gas line was not effectively purged of air. Therefore, purging was conducted intermittently over a period of up to two-and-a-half hours. ESA and ConAgra employees were aware of the natural gas purging activities inside the utility room. However, no appropriate combustible gas detectors were used to warn of a potential accumulation of gas in the building. Instead personnel relied primarily 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.

Read the whole report at:

http://www.csb.gov/assets/1/19/CSB_Safety_Bulletin_Final_Embargoed_10_2_09.pdf


Student task: Fill out “Example Worksheet Excerpt from What If/Checklist PHA Methodology” – Chapter 6 Supplemental Excel file. Use the first row to evaluate the current natural gas purging
practices. Provide at least two examples of safer practices to prevent future gas purging accidents. Use the drop down menu to assign C = Consequence Class and L = Likelihood Class for current practices and the two suggested safer practices.