

**Case 455. 36-year-old pipefitter died when purging with natural gas, the 1-inch gas line feeding a 2nd floor unit exploded.**

A 36-year-old male pipefitter died when purging with natural gas, the 1-inch gas line feeding a 2<sup>nd</sup> floor dehumidification unit exploded. The decedent and a coworker were purging gas lines using natural gas odorized with mercaptan. The gas lines reduced from a 6-inch main located at ground level and reduced to a 1-inch line at the dehumidification unit. The decedent and his coworker were charging the gas lines with natural gas and purging any atmospheric air from the line to bring the dehumidification units into service. The gas lines had been purged three times without incident prior to the explosion. Each dehumidification unit was located in its own mechanical room in a penthouse's doghouse. To purge the line, the 1-inch natural gas line feeding each dehumidification unit was opened at each pipe union between the hand valve (Isolation) and the 90-degree elbow, just before the gas train attached to the dehumidification unit, to detect the rotten egg odor of gas. When the rotten egg odor was detected, the workers shut the valve and retightened the union. The incident occurred after approximately one hour of purging. Two dehumidification units were being purged simultaneously. The gas was vented to the mechanical room (not to the outside air) nor was a calibrated-combustible gas detector in use prior to the explosion. The penthouse had outside dampers. Additionally, there was an open atrium below the penthouse. An explosion occurred during the decedent's purging activity. Natural gas with the added mercaptan cause the gas to be heavier than air causing the released gas to sink to lower levels and reach possible ignition sources. The decedent was found on a landing halfway down a stairway. The decedent was able to walk out of the building and notified another worker that the gas was still on. This worker shut off the gas at the 6-inch valve. The decedent passed away from injuries sustained.

MIOSHA Construction Safety and Health Division issued the following Serious violations to the employer at the conclusion of its investigation.

SERIOUS: GENERAL RULES, CS PART 1, RULE 408.40114(2)(c): An accident prevention program shall, at a minimum, provide for all of the following:

(c) Instruction to each employee in the recognition and avoidance of hazards and the regulations applicable to his or her work environment to control or eliminate any hazards or other exposure to illness or injury.

Employees exposed to unknown requirements contained in the following applicable standards/codes while purging air-filled natural gas lines with natural gas.

Instance A: No documentable training for the National Fuel Gas Code 2012 Edition/NFPA 54/ANSI Z223.1. Purging operation located between 6-inch main source valve through two separate isolation valves and out of 1-inch pipe union located just prior to valve train of dehumidification units.

Instance B: No documentable training for the National Fuel Gas Code 2012 Edition/NFPA 54/ANSI Z223.1. Purging operation is located between the 1-inch isolation valve and the 1-inch pipe union just prior to the valve train of two separate dehumidification units.

Instance C: No documentable training for NFPA 56 Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems 2017. Purging operation is located between the 6-inch main source valve and the 1-inch isolation valve just prior to the opened 1-inch pipe union of two separate dehumidification units.

SERIOUS: MICHIGAN OCCUPATIONAL SAFETY AND HEALTH ACT, ACT 154, RULE 408.1011(a): An employer shall furnish to each employee, employment and a place of employment that is free from recognized hazards that are causing, or are likely to cause, death or serious physical harm to the employee.

No proper ventilation to an indoor/outdoor atmosphere and/or a calibrated listed combustible gas detectors in use at time of explosion. Employees exposed to accumulating gases while located in the southeast and southwest elevated mechanical rooms. Employees engaged in a natural gas line purging operation and were in the process of purging air from natural gas lines with natural gas.

One feasible method of abatement to correct the violation is: complying with the National Fuel Gas Code 2012 Edition/NFPA 54/ANSI Z223.1.

NOTE: Purging operation was taking place between the 6-inch main source valve through two separate dehumidification units being put into service.