

SUBJECT: Three workers died following a propane gas explosion on a quail/pheasant farm.

SUMMARY

Two Hispanic workers, ages 31 and 54, and the 57-year old owner of a quail and pheasant farm died from burn injuries received on August 4, 2003 following a propane gas explosion in a building where birds were kept. The owner of the farm was attempting to light a brooder* in one of the quail buildings when the explosion occurred. The two workers were moving quail from a delivery truck to the building at the time of the incident. They witnessed the explosion and immediately went into the burning building to pull the owner, who was unconscious, out of the building. After moving the injured owner to safety, one of the workers was overcome and lost consciousness as a result of injuries sustained during the rescue. The other rescuer ran to the house, which was about 50 yards away, to have the owner's wife call for emergency services. All three men were severely burned and also suffered from smoke inhalation. The rescuer who ran to get emergency aid died 8 days after the incident, the worker who lost consciousness at the scene died 34 days after the incident, and the owner died 57 days after the incident.

Oklahoma Fatality Assessment and Control Evaluation (OKFACE) investigators concluded that to prevent similar occurrences, employers should:

- Develop written procedures for lighting, servicing, maintaining, and labeling all gas powered heating equipment.
- Ensure that ventilation is adequate in all enclosed areas so that flammable gas does not accumulate.
- Seek guidance from the gas company on proper procedures for installation and use of gas systems.
- Ensure that multilingual workers are able to comprehend instructions and follow safe work practices.

INTRODUCTION

The 57-year old owner of a quail and pheasant farm was severely burned in a propane gas explosion on August 4, 2003 while he was lighting a brooder in one of the quail buildings. Two Hispanic workers, ages 31 and 54, were also severely burned when they entered the burning building to rescue the owner. All three persons died within two months of the incident.



Figure 1. Brooder and feeders

*A hooded device used to control air temperature for poult and chicks during the first several weeks of age.

OKFACE investigators reviewed the death certificates, Medical Examiner reports, State Fire Marshal's report, and the investigating law enforcement officer's Uniform Incident/Offense Report. A site visit was conducted on September 25, 2003; OKFACE investigators interviewed law enforcement officials and a relative of the owner of the farm.

The farm housed quail and pheasant in approximately 20-25 buildings. The buildings were made of plywood and were approximately 1500 square feet. There were window openings at the top of the buildings and plywood panels on the sides of the buildings, which could be opened. Each building had three or four brooders. The owner of the farm and his wife were the only full time employees on the farm. The two workers, who were friends of the owner, had helped on the quail and pheasant farm from time to time for a couple of years. Their primary occupation was construction, and they had moved to the United States from Mexico a couple of years earlier. Spanish was their primary language, but they were able to speak broken English.

The quail and pheasant farm had no written comprehensive health and safety or training program for employees. The two workers had no formal training in the raising and handling of birds, other than the informal on-the-job training provided by the owner, and that training was not documented. The owner did not speak or understand Spanish.

INVESTIGATION

On the day of the incident, the weather was clear and cool, and the working surfaces were dry. Very early in the morning, about 1:45 a.m., the owner and two workers were attempting to move quail from a delivery truck into a building where quail were kept. While the two workers started moving the quail cages from the truck, the owner entered the building and began lighting one of the brooders. The brooder had a metal deflector with a propane burner underneath and was used to keep the quail warm (Figures 1 and 2). The brooder's gas supply line appeared to be a regular pneumatic hose, which ran from the brooder, up to the ceiling, and outside to a 20 pound capacity portable propane tank (Figure 3). The propane tank was on a grassy area just outside the building wall (Figure 4). The hoses were



Figure 2. Inside of brooder



Figure 3. Supply lines

attached and fitted with hose clamps similar to those used in automobile cooling systems.

As the owner began lighting the brooder, an explosion occurred engulfing the entire building in flames. Apparently the brooder had been left on unlighted, or the supply line had a leak. (The Fire Marshal could not conclusively determine the cause of the fire.) In either case,



Figure 4. Propane supply

there was an accumulation of propane gas in the building. The two workers, who were moving the quail cages, saw the explosion and immediately ran to the aid of the owner. Without any fire suppression equipment or protection, they entered the burning building and pulled the owner to safety. One of the workers fell to the ground beside the owner and the other ran to the house, about 50 yards away, to alert the owner's wife to call emergency medical services. They arrived in approximately 10 minutes.

All three men were transported to a nearby hospital and then transferred to a regional burn center. The worker who had run to the house to summon help died eight days after the date of the incident. The worker who was overcome after rescuing the owner died 34 days later, and the owner died 57 days after the incident.

CAUSE OF DEATH

The Medical Examiner listed the cause of death for all three as burns or complications of burns.

RECOMMENDATIONS

Recommendation #1: Employers should develop written procedures for lighting, servicing, maintaining, and labeling all gas powered heating equipment.

Discussion: Occupational Safety and Health Administration (OSHA) standards and manufacturer operating manuals provide guidelines for the safe operation of gas powered heating units. Employers should utilize these resources in the development of a formal procedure for lighting, servicing, and maintaining all natural gas powered heaters. In addition, warning signs should be prominently posted and signs or labels placed on gas controls, circuit breakers, thermostats, and/or controllers to caution workers to turn controls off when brooders are not actually in use. Portable fire extinguishers should also be available.

Recommendation #2: Employers should ensure that ventilation is adequate in all enclosed areas so that flammable gas does not accumulate.

Discussion: Per OSHA guidelines, employers should ensure that there is adequate ventilation for enclosed spaces where liquefied petroleum gas is utilized. This can be attained by using approved exhaust fans or by assuring that areas have openings substantial enough to



release any gases present. In this incident, the building had several air movement openings, but apparently there were not enough open to release the accumulated gas vapors.

Recommendation #3: Seek guidance from the gas company on proper procedures for installation and use of gas systems.

Discussion: Gas company officials should be contacted to inspect gas systems for proper installation and proper pressures. The temporary cylinders in use at the time of the explosion were positioned too close to the outside of the building and were on a grassy area that was not level. According to OSHA and National Fire Protection Association standards, the tank should be placed at least three or more feet away from the structure and should be on a firm foundation or otherwise firmly secured to keep the tank upright.

To prevent the high risk of fire, it is absolutely essential that supply line hoses be gas-rated hoses, not ordinary air or automotive hoses. OSHA and National Fire Protection Association guidelines mandate the use of approved lines and hoses for transporting liquefied petroleum gases. In this incident, it appeared that regular pneumatic hoses were used to move the gas from the tank, through the building rafters, and down to the brooder burner. Only wrought iron or steel, brass, copper, or aluminum alloy pipes may be used for moving this type of gas. The pipes must be labeled appropriately. In addition, pipe joints should meet standards.

Recommendation #4: The employer should ensure that multilingual workers are able to comprehend instructions and follow safe work practices.

Discussion: OSHA standards mandate that employers are to provide all training on health and safety-related programs and procedures in a manner in which the recipient can understand it. This could be accomplished through interpreters or through the use of written material or videos in the language of the recipient. In this incident, following proper procedures for fire emergencies may have reduced the injuries.

REFERENCES

- 29 CFR 1910.110 *Storage and Handling of Liquefied Petroleum Gases*
- 29 CFR 1926.154 *Temporary Heating Devices*
- 29 CFR 1926.153 *Liquefied Petroleum Gas (LP-Gas)*
- National Fire Protection Association's *Life Safety Code*

The Oklahoma Fatality Assessment and Control Evaluation (OKFACE) is an occupational fatality surveillance project to determine the epidemiology of all fatal work-related injuries and identify and recommend prevention strategies. FACE is a research program of the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research.

These fatality investigations serve to prevent fatal work-related injuries in the future by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in injury, and the role of management in controlling how these factors interact.

For more information on fatal work-related injuries, please contact:
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