



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Three Dead, One Critical in Industrial Septic Tank in Georgia

FACE 8638

Introduction:

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR) is currently conducting the Fatal Accident Circumstances and Epidemiology (FACE) Project, which is focusing primarily upon selected electrical-related and confined space-related fatalities. The purpose of the FACE program is to identify and rank factors that influence the risk of fatal injuries for selected employees.

On July 16, 1986, four employees of a liquid waste hauling company were pumping out an industrial waste tank at a chicken hatchery when the accident occurred. The liquid waste had been pumped out and one of the workers entered the tank to loosen and remove sludge from the bottom and sides of the tank when he was overcome by toxic fumes. In an effort to rescue the downed worker, a second workman entered the tank and was overcome. The third and fourth workers entered the tank and were overcome in a similar manner. Before the fourth worker entered the tank he ran inside the hatchery to get help. When employees of the hatchery arrived at the opening of the tank, the fourth worker was found in the tank semiconscious and the other three were unconscious.

Contacts/Activities:

The Division of Safety Research within NIOSH was notified of these fatalities by the NIOSH Region IV Consultant. Technical assistance was requested by officials of the National Association of Waste Transporters. On July 30 and 31, 1986, the DSR research team (a research industrial hygienist and a mechanical engineer) conducted a site visit, met with officials of the hatchery (site of the accident), the local fire chief, and OSHA personnel. Photographs were taken of the accident site.

Overview of Employer's Safety Program:

The employer is a small-local septic tank service company that pumps, cleans, and repairs residential and commercial waste and septic tanks. The company consisted of the owner and four employees. The company had no written safety policy or program. Safety was the responsibility of the individual worker.

Synopsis of Events:

A hatchery had contracted with the septic tank service company to pump out a 2000 gallon waste water holding tank (5' x 7' x 10' deep) and to clean out any accumulated sludge on the bottom and sides of the tank every two months. The waste tank received waste water from the hatchery which contained chlorinated caustic cleaners (dilute potassium hydroxide and sodium hypochlorite), residue from egg disinfectant (a formulated quaternary ammonium compound), chick down, and some afterbirth and egg shells. No human waste went into this tank. A separate septic tank was used for employees' wash rooms in the hatchery. The waste water tank was cleaned every two months on a Wednesday when the hatchery is operating with a reduced workforce. On Wednesdays no waste water should be going into the tank.

Four workmen for the septic tank service company arrived at the hatchery shortly after 9:00 a.m. on July 16, 1986. The steel cover was removed from the tank, exposing the 25 inch square opening into the Concrete waste water holding tank. The liquid waste was vacuum drawn from the tank into a tank truck. After the liquid was drawn down to the sludge level (approximately 14 inches), a hoe-like tool was used to loosen the sludge. A workman was lowered through the 25 inch square opening via a hose tied to a five gallon bucket. The workman, once inside the tank filled the bucket with sludge which was then pulled out and dumped. This procedure was repeated until all of the sludge was removed from the tank. This same procedure has been used to clean this tank for the last five years. At approximately 10:00 a.m. one of the workmen reported to the office manager of the hatchery that the workmen were in trouble and were down (overcome) in the tank. The fire department was called immediately and arrived on the scene within 10 minutes. It is doubtful if any of the victims recognized this as a confined space with its associated life threatening hazards. The workmen did not test the atmosphere prior to entry, did not use isolation procedures or forced air ventilation. None of the workmen were wearing personal protective equipment or respiratory protection and apparently only one worker used the ladder.

Workmen from the hatchery went outside to assist the downed workmen and found an unattended ladder protruding from the tank opening. Apparently, the worker who requested help, secured a ladder from the hatchery. The office manager stated, upon looking into the tank, all four men were down, of which three were unresponsive. A fan was brought from the hatchery and used to blow fresh air into the tank. The fire department and EMS personnel arrived on the scene and immediately initiated rescue procedures. Two fire department rescuers donned protective gear and self-contained breathing apparatus to remove the men from the tank. All four men were transported to a local medical center. Two were pronounced dead-on-arrival, and two remained critical. One of the two critical died a week later.

Investigation of the incident and tests performed by the OSHA compliance officer at the site revealed no appreciable amounts of chlorine. However, the atmosphere contained 2500 ppm CO₂ and 50 ppm ammonia. Tests were negative for H₂S.

The medical examiner reported a strong chlorine odor on one of the victims while performing an autopsy.

Note: The tank had been cleaned the same way for five years without incident. The following aspects of this incident may have varied from previous occasions and could have contributed to this accident:

- a. The tank was not isolated from the hatchery and if anything was flushed down the drain, it would enter the tank where a man was working.
- b. The chemicals used in the plant are not compatible if mixed. There exists the possibility of chlorine gas being liberated in the tank if the chemical cleaners were mixed in the right concentration.
- c. Toxic gases are also liberated when sludge material is disturbed. Cleaning the sludge in the bottom of the tank could have released toxic gases.
- d. The ambient temperature on July 10, 1986, was 104 degree F.

Cause of Death:

The medical examiner stated the men died of hemorrhagic pneumonitis as a result of chlorine exposure.

Recommendation/Discussion:

Recommendation #1: Companies contracting to have a service performed on their property should implement and enforce a safety program to be followed by the contractor.

Discussion: The company that contracts out work to be performed on their property and assumes the contractor is an expert and adheres to safety procedures can be operating on a dubious assumption. Especially when hazardous tasks such as confined space entry are contracted out, outside contractors should be required to comply with a written safety policy that includes safe work procedures, and these requirements should be enforced by the company. For confined space entry, the recommendations in NIOSH Publication No. 80-106, "Working in Confined Spaces" should be used.

Recommendation #2: The septic tank service company should develop comprehensive policies and procedures for confined space entry, where confined space entry is required.

Discussion.- All employees who are required to work in confined spaces should be aware of potential hazards, possible emergencies, and specific procedures that are to be followed. Prior to entry into a confined space, the following should be addressed:

1. Is entry necessary? Can the tank be cleaned from the outside?
2. Has a permit been issued for entry?
3. Has the air quality in the tank been tested?
 - Oxygen supply at least 19.5%
 - Flammable range less than 10% of the lower flammable limit
 - Absence of toxic air contaminants
4. Have employees and supervisors been trained in selection and use of personal protective equipment and clothing?
 - Protective clothing • Respiratory protection • Hard hats • Eye Protection • Gloves • Life lines • Emergency rescue equipment
5. Have employees been trained for confined space entry?
6. Is ventilation equipment available and/or used?

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