



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Use of Sulfuric Acid Results in Two Deaths in Waste Water Holding Tank in Pennsylvania

NIOSH In-house FACE Report 85-23

Introduction

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), is currently conducting the Fatal Accident Circumstance and Epidemiology (FACE) Project, which is focusing primarily upon selected electrical-related and confined space fatalities. By scientifically collecting data from a sample of fatal accidents, the FACE project will identify and rank factors that increase the risk of fatal injuries for selected employees.

On May 13, 1985, two 21 year-old men employed by a plumbing and heating company were unclogging two floor drains that carried water from a residence into a waste water holding tank. The two men had poured two gallons of sulfuric acid down the basement floor drains in an attempt to unclog the drains. After they poured acid into the drains, victim A entered the underground, cylindrical waste water tank (4' x 8') to replace an elbow joint that had broken off. Victim A was overcome by gases and collapsed in six inches of water. His co-worker (victim B) entered the tank in a rescue attempt. Victim B was also overcome by gases and fell into the water. The homeowner then called a local ambulance service. Victim A was pronounced dead at the scene. Victim B died two weeks later.

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Contacts/Activities

On May 14, 1985, DSR called the OSHA area office in Harrisburg, Pennsylvania, to confirm the death of one worker and the serious injury of a second worker in a waste water holding tank. OSHA invited DSR to accompany their compliance officer during his accident investigation. DSR included this incident in the FACE study. The DSR research team, consisting of a safety specialist and a safety engineer, collaborated with the OSHA officer and collected research information for the FACE project. On May 15-17, 1985, the DSR research team conducted its field activities. An opening conference was held with the employer, the site was visited, and interviews were conducted with witnesses and company employees.

On May 13, 1985, at 12:30p.m., two men from a plumbing and heating firm located in southeastern Pennsylvania drove to a client's house to unclog a floor drain that carried water into a waste water holding tank. The property owner was experiencing repeated problems with a clogged drain. The workers were attempting to do two things: unclog the floor drain

and replace an elbow joint, which had broken off inside the waste water holding tank. The elbow joint, located about 12 inches from the bottom of the tank, served as a trap to prevent back flow into the basement via the floor drains.

Shortly after arriving at the site the workers initially poured 1-1/2 gallons of sulfuric acid into the basement floor drains. Not having success in unclogging the drains, the workers attempted to work a plumber's snake from the floor drains to the holding tank and from the holding tank to the floor drains. The drains remained clogged. The workers returned to their shop, picked up an elbow joint, and returned to the holding tank. Apparently, they felt that the time it took to set the elbow joint and return to the residential site would be sufficient time for the sulfuric acid to work through the clog in the drain. Upon returning to the accident site, the employees poured the remaining two quarts of sulfuric acid into the floor drain. Victim A then entered the tank with the replacement elbow joint. After working for a short period of time to install the elbow joint, victim A stopped working and started up the ladder. However, he was unable to climb out of the tank and fell from the ladder to the bottom of the tank. The head of victim A was resting in the water in the bottom of the holding tank. Seeing this, victim B climbed down the ladder to rescue victim A. The owner of the residence witnessed the incident and offered his hand to victim B through the 18 inch opening located at the top of the tank. Victim B started up the ladder, but apparently was overcome and the owner was unable to hold onto him. Victim B fell off the ladder to the bottom of the tank.

After victim B fell into the tank, the owner of the residence called the county emergency system. Two fire departments, two hospitals, and four rescue crews responded to the accident site. One fireman entered the holding tank while another fireman handed down the tanks of the self-contained breathing apparatus to the rescuer through the 18 inch opening. The firemen extricated victim B first and then pulled victim A to the surface. Approximately 20 minutes elapsed from the start of the accident until the two men were extricated from the tank. The ambulance crew said neither worker showed vital signs, but the EMS was able to raise a pulse on victim B by the time they began to transport him to a local hospital. Victim A was dead at the scene.

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Recommendations/Discussion

Recommendation #1: Workers should be assigned tasks commensurate with their training and experience.

Discussion: Workers required to work in confined spaces should be trained to work in this environment. Victim B had been employed by the company for 2-1/2 years; victim A worked for the company for approximately six months. Neither worker had been trained in confined space entry, hazard recognition, use of personal protective equipment (PPE), or rescue procedures. Workers should never enter a confined space before it has been tested from the outside by a qualified person and declared safe for entry, (i.e. the space is gas free, O₂ level of 19.5%, flammability range less than 10% of the lower flammability level (LFL), etc.). Additionally, required PPE should be identified, provisions should be taken to provide a standby person, and rescue procedures should be established. Recommendations presented in the NIOSH Criteria Document 80-106 "Working in Confined Spaces" could help prevent accidents such as this, if implemented.

Recommendation #2: Workers should wear appropriate personal protective equipment, including respirators, while working in a confined space.

Discussion: Sulfuric acid was used to unclog floor drains leading to a waste water holding tank. The workers were exposed to indeterminate amounts of sulfuric acid when they spent time in the tank attempting to unclog the drain and to connect a 90 degree elbow on the terminal end of the floor drain. Workers entered this untested atmosphere without respiratory protection.

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