The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

Two Workers Die in Digester Unit in New Mexico

FACE 8720

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 December 1, 1986, four workers at a wastewater treatment plant were attempting to repair a leak and clean out a pump in the pipe gallery (a small room containing pipes and valves between two digester units) when the accident occurred. The workers were in the process of removing the bolts from an inspection plate when the plate was forced open by raw sewage which flooded the room. Two workers died in the unit; one was hospitalized, and one was treated at the hospital and released.

Contacts/Activities:

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research DSR) was notified of these fatalities by the Water Pollution Control Federation (WPCF) and technical assistance was requested. This case has been included in the FACE Project. On January 7, 1987, a DSR research industrial hygienist conducted a site visit, met with the compliance officer investigating the accident for the state, met with the city public works supervisor, conducted comparison worker interviews, and interviewed a surrogate for the victim. Photographs were taken of the accident site.

Overview of Employer's Safety Program:

The employer in this incident was a small municipality. The victims worked for the wastewater treatment plant which is under the public works department. The public works department has 60 employees in several different divisions; parks and recreation, library, airport, water treatment, solid waste disposal, and wastewater treatment. Each division has a supervisor which reports to the city public works department supervisor. The wastewater treatment plant has five employees; a supervisor, two operators, one laboratory technician, and one trainee.

New employees are given a brief orientation which consists of a discussion of benefits and operating policy. New employee training is the responsibility of their supervisor. On-the-job training is also provided by the supervisor or experienced/certified operators. No safety training or safety meetings are conducted at the wastewater treatment plant. The employees are not trained in confined space hazards or safe entry procedures. Confined space entry procedures are included in the operating manual.

Synopsis of Events:

On December 1, 1986. the employees of the wastewater treatment plant reported for work at 8:00 a.m. and proceeded with routine daily operations. One of the first things done each day is a walk-through inspection of the plant. The two plant operators were doing the walk-through inspection when they discovered a pump was leaking in the pipe gallery. The operators reported the leak to the plant supervisor immediately. The supervisor instructed both operators and a trainee to accompany him to the digester unit to check and repair the leak. The men proceeded to the pipe gallery (approximately 13' x 15' x 13' deep), which was located between the primary and secondary digesters.

The four workmen descended the spiral staircase into the pipe gallery to repair the leaking pump. The supervisor instructed the trainee to remain on the stairs because of the tight working conditions around the pump. One of the operators closed the two valves to the secondary digester. However, the two valves to the primary digester remained opened. It was assumed all four valves were closed. The supervisor was in the process of removing the eight bolts from the inspection plate (located between the valves for the primary and secondary digesters) when the plate popped up. Some raw sewage was discharged; however, this discharge stopped. Apparently the pump, which was clogged, moved and this movement caused this momentary sewage discharge. The supervisor continued to remove the bolts from the inspection plate. All but three bolts had been removed from the inspection plate when raw sewage began spraying into the room. The trainee stated, “when the raw sewage began spraying into the room it was difficult to see because of the heavy spray and the discharge sounded like a jet engine.” The supervisor and the two operators frantically attempted to locate the open valves. However, the room was beginning to flood with raw sewage. The sewage level was three feet deep within a few minutes and the men decided to get out. The operators and the trainee climbed the stairs and exited to the outside before they noticed that the supervisor did not follow them. All three returned immediately to the pipe gallery and found the supervisor slumped over in the sewage at the bottom. One of the operators attempted to pull the supervisor out of the sewage. The operator was overcome and fell into the sewage. The other operator and trainee attempted to rescue the downed workers; however, they realized they were in trouble so they exited immediately. Upon leaving the unit, they notified the lab technician who called the fire department and rescue squad. Within five minutes the fire department and rescue squad arrived on the scene . The pipe gallery had now flooded completely (13 feet deep) and raw sewage was running out the doorway. The f ire department pumped the sewage level down in the room and removed the downed supervisor and operator. Both men were pronounced dead at the scene by the coroner.

Cause of Death:

The coroner’s report listed both deaths as drowning.

Recommendations/Discussion:

Recommendation #1: The employer should develop proper work procedures and should adequately train employees to maintain and repair the sewage system. This training should include recognition of potential hazards associated with failures within those systems.

Discussion: The workers were not provided with safe operating procedures (i.e., equipment malfunction) or training in hazard recognition. Without adequate work procedures, each worker assumed the other had shut down the digester valves. No one was assigned specific responsibilities or tasks. Therefore, only two of the four valves were closed.

Recommendation #2: The employer should develop comprehensive policies and procedures for confined space entry.

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 task be completed from the outside?

2. Has a permit been issued for entry?

3. Has the air quality in the confined space been tested?

- Oxygen supply at least 19.5%
- Flammable range less than 10% of the lower flammable limit
- Absence of toxic air contaminants

4. Has the confined space been isolated/locked out from other systems?

5. 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

6. Have employees been trained for confined space entry?

7. Is ventilation equipment available and/or used?

8. Is the air quality tested when ventilation system is operating?

Recommendation #3: Employers should provide some type of pressure sensing device(s) on lines to determine if the line is under pressure when valves are closed.

Discussion: A pressure sensing device on the sewage lines would have alerted the workers to the pressure on the line thereby requiring a check to determine what valves were not closed. Without some type of pressure sensing device on the lines it is impossible to determine line pressure, if valves are functioning properly, etc.

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