The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

Two Dead, Five Injured in Confined Space Incident in Oregon

FACE 8706

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 October 10, 1986, a self-employed contractor (specializing in backflow devices) was in the process of inspecting the backflow valve on the city water line at a sawmill when the accident occurred. The contractor descended into the underground vault which housed the water line and backflow device and collapsed. The shipping supervisor of the sawmill attempted to rescue the contractor and also collapsed.

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. Two research industrial hygienists met with the regional manager and the industrial hygienist that investigated the accident for the state and conducted a site visit at the sawmill where the accident occurred. Interviews were conducted with the manager of the sawmill, the superintendent of maintenance, two comparison workers, and a surrogate for the victim. Photographs were taken of the accident site.

Background/Overview of Employer's Safety Program:

The self-employed contractor was a one-man operation that according to the state investigators had no safety program or confined space entry procedures. The contractor was licensed and certified by the state to inspect and approve/certify backflow prevention devices.

The sawmill where the accident occurred cuts large timber into marketable sizes that are shipped around the world. The sawmill cuts approximately 7 million board feet of lumber a month and has 110 employees. The sawmill has a written safety policy and holds monthly meetings to discuss safety issues with the workers and management. A collateral duty

safety officer conducts walk-through safety inspections and reports safety problems to the management. The sawmill does not have confined space entry procedures. However, the management stated the manhole where the men died is not entered by mill employees.

Synopsis of Events:

The sawmill where the accident occurred has a city water line running underground (through a vault) along the front of their property. The below ground vault which measures twelve feet long, six feet wide, and eight feet deep with a 30 inch manhole at the ground level was installed in 1978 to house a backflow device on the city water line. A backflow device is required to protect the city water supply from possible contamination in the event of a negative pressure on the water line. The sawmill's fire protection system is connected to this water supply; therefore, a backflow device is required. The city requires the annual inspection of backflow devices by a person trained and certified in cross connection control.

The independent contractor (the victim) called the superintendent of maintenance on October 6, 1986, to set up a date and time to inspect the backflow device on the water line. The date and time mutually agreed upon was October 10th at 3: 30 p.m. The contractor arrived at the sawmill at 3:30 p.m. on October 10th and proceeded with the inspection, which he had completed annually for the past three years. The steel cover was removed by the contractor and a ladder was lowered into the eight foot deep vault. There was 14 inches of water in the bottom of the vault.

At 4:00 p.m. a truck driver stopped at the sawmill office to inquire about a load of lumber he was to pick up. When he walked out of the office he noticed the victim's truck and an open manhole close to where he would have to drive through. He walked over to the open manhole and saw a body in the water at the bottom of the vault. The driver went back to the off- ice and reported a man was down in the vault. The emergency squad was called by the secretary. After calling the emergency squad, the secretary and truck driver went outside to the manhole. The secretary called for help and the first to arrive at the scene was the shipping supervisor, who entered the vault in a rescue attempt. A few seconds later, one of the maintenance men arrived on the scene and descended into the vault to assist in the rescue. Neither man was wearing respiratory protection and within two or three minutes both men had passed out.

Two policemen arrived at the scene, entered the vault (without respiratory protection), and had to be helped out. The paramedics arrived and attempted rescue (without respiratory protection) and also had to be helped out. The firemen arrived on the scene, donned their breathing apparatus, and went in to remove the three men at the bottom. Two were face down in the water (the contractor and the shipping supervisor) and the third man (the maintenance man) was in a sitting position against the wall, his head was not in the water.

The three men removed from the hole (the contractor, the shipping supervisor, and the maintenance man), the two policemen, and the two paramedics were transported to a local hospital. The contractor and shipping supervisor were pronounced dead on arrival by the attending physician. The maintenance man was hospitalized in serious condition. The two policemen and two paramedics were treated and released.

Test of the atmosphere in the vault by the state investigators revealed the following:

02 7%

C02 > 3%

% LEL Negative

H2S Negative

NOTE: The state investigator surmised that the algae bloom and bacterial action in the water resulted in 0% free 02 in the water. C02 (waste product from bacterial action and algae growth) was liberated, displacing 02 level in the vault.

Cause of Death:

Asphyxiation due to drowning.

Recommendations/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: Companies contracting out work to be performed on their property should require as part of the contract, the contractor adhere to all safety rules. Particularly 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: If the employer has any confined spaces, comprehensive policies and procedures should be developed 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 task be completed 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?

Recommendation #3: Public service employees (i.e. police officers, emergency rescue workers, and firemen) that respond to emergency situations involving confined spaces should be trained in confined space hazards and rescue procedures.

Discussion: Public service employees are required to respond to a wide variety of emergency situations. These personnel must be trained in and be aware of the following in order to be properly prepared for emergencies involving confined spaces:

• Recognition of Confined Spaces

• Hazardous Atmospheres Oxygen deficient or enriched Flammable Toxic Irritant or Corrosive

• General Safety Hazards Mechanical/Electrical Communicative Thermal Noise Structural barriers Limited space Size of opening(s)

• Rescue Procedures Respiratory protection Protective clothing Harness Life lines Standby person

Recommendation #4: Employees, self–employed contractors, and others that are required to work in confined spaces, should be trained in confined space entry as part of the certification process.

Discussion: All employees who are required to enter or work in confined spaces should be given adequate training in confined space hazards and safe work practices. For confined space entry, the recommendations in NIOSH Publication 80-106, “Working in Confined Spaces” should be used. The certification process for the state should include training that addresses confined spaces that may be encountered while performing the duties for which the contractor was certified.

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