Colorado FACE Investigation 93CO068

SUBJECT:

Maintenance worker dies when he falls into a railroad tank car in Colorado.

SUMMARY:

A 22-year-old maintenance worker at a railcar repair facility was fatally injured when he was overcome by diesel fumes and fell into the tank car he was inspecting. The employee was inspecting the tank car that had recently been sprayed with hot diesel fuel. When the employee knelt down and put his head into the access hatch, he was overcome by the diesel fumes in the railcar. He fell into the railcar and landed 10 feet 6 inches below the access hatch. A co-worker immediately radioed for help and then entered the tank car to assist the victim. The co-worker was overcome by the fumes and collapsed against the side of the car.

A member of the company emergency response team arrived on scene and discovered that a ladder was not available to enter the tank. A ladder was obtained, but when the rescuer attempted to enter the car, there was not enough clearance to allow entry. A second ladder was brought to the scene and the rescuer entered the tank without a respirator. He immediately had trouble breathing and exited the tank.

An escape respirator at the scene had a empty air bottle so another respirator mask was obtained. An airhose from a nearby air compressor was taped to the mask and the rescuer reentered the tank. When he stepped on the airhose, the hose separated from the mask. He then put the airhose under his shirt and attempted to continue with the rescue. This arrangement of the airhose was not functional, so he exited the tank again and obtained another air-supplied respirator. He reentered the tank and used the hose from the air compressor to give air to the two victims. He attached a strap around the coworker who was then pulled from the tank by other employees. The same procedure was used to pull the first victim from the tank. The rescuer was becoming dizzy by this time

because there was a hole in the side of his respirator that allowed fumes to enter the mask. He managed to get to the ladder and climb up 2 steps. The other employees were able to reach the rescuer and pull him from the tank. All three employees were admitted to a local hospital where the victim expired approximately 30 hours later. Both the co-worker and the rescuer recovered.

The Colorado Department of Health (CDH) investigator concluded that to prevent future similar occurrences, employers should:

- Develop and implement a comprehensive written confined space safety program.
- Provide lifelines and harnesses, and ensure that workers wear them when entering confined spaces.
- Provide air testing equipment and train employees on the proper use and maintenance of the equipment.
- Develop, implement, and enforce a written safety policy and safe work procedures designed to help workers recognize, understand and control hazards.

INVESTIGATIVE AUTHORITY:

The Colorado Department of Health (CDH) performs investigations of occupational fatalities under the authority of the Colorado Revised Statutes and Board of Health Regulations. CDH is required to establish and operate a program to monitor and investigate those conditions which affect public health and are preventable. The goal of the workplace investigation is to prevent work-related injuries in the future by study of the working environment, the worker, the task the worker was performing, the tools the worker was using, and the role of management in controlling how these factors interact.

This report is generated and distributed to fulfill the Department's duty to provide relevant education to the community on methods to prevent severe occupational injuries.

INVESTIGATION:

The investigation of this work-related fatality was prompted by a report from the Occupational Safety and Health Administration (OSHA) Area Office. The CDH investigation included interviews with the company owner, the rescuer and investigating officers.

An autopsy report was obtained from the county coroner and photographs were taken at the scene.

This company employs fifty-eight personnel. The company did not have a safety officer. Although a safety program existed, it was not enforced and lacked specific rules for confined space entry. The company had been in business for nine years and the deceased had worked for the company for five months. The company owned a GasTech atmospheric gas detector capable of measuring Oxygen, Carbon Monoxide and lower explosive limit but this instrument had not been calibrated since purchase and was not at the location of the incident.

CAUSE OF DEATH:

The cause of death as determined by autopsy and listed on the death certificate was a clinical episode of severe apnea with multiple seizures; infarction of the left and right ventricle, heart, secondary to apneic episode; pulmonary hemorrhage, bilateral, with pulmonary edema.

RECOMMENDATIONS/DISCUSSION:

Recommendation #1: Develop and implement a comprehensive written confined space safety program to address all provisions outlined in National Institute for Occupational Safety and Health (NIOSH) publications 80-106, "Working in Confined Spaces," and 87-113, "A Guide to Safety in Confined Spaces."

Discussion: Confined space entry procedures should be specific to each type of confined space; e.g. Valve vaults, wet wells, utility vaults, sewer manholes, etc. Employers should, therefore, develop, implement and enforce a confined space entry program as outlined in the recommended NIOSH publications. At a minimum, the following items should be addressed for each type of confined space:

1. Is entry necessary? Can the assigned task be completed from the outside?

2. Has a confined space safe entry permit been issued by the employer before each confined space is entered?

3. Are confined spaces posted with warning signs, and are confined space entry procedures posted where they will be noticed by employees and others? (e.g. Emergency Medical Personnel)

4. If entry is to be made, has the air quality in the confined

space been tested for safety based on the following criteria:
- Oxygen supply at least 19.5%
- Flammability range less than 10% of the lower explosive limit (LEL)
- Absence of toxic air contaminates?

5. Are workers and supervisors being continuously trained in the selection and use of:

   - respiratory protection
   - test equipment, including calibration and maintenance
   - lifelines
   - emergency rescue equipment
   - protective clothing?

6. Have workers been properly trained in working in and around confined spaces?

7. Are confined space entry, safe work practices, and rescue procedures discussed in safety meetings?

8. Is appropriate ventilation equipment available and/or used before and during entry and work?

9. Is the air quality monitored when the ventilation system is operating?

10. Is an outside observer posted and appropriate rescue equipment (safety belt/harness and lifeline) used during every confined space entry?

11. Are employees continuously trained in confined space rescue procedures?

Recommendation #2: Provide lifelines and harnesses, and ensure that workers wear them when entering confined spaces.

Discussion: In this incident, the deceased fell into the confined space. Had he been wearing a safety harness and a power winch been at the scene the co-worker could have assisted him when he first lost consciousness without entering the vault. This equipment would also have eliminated the need for the third person ((rescuer) to enter the tank. A hoisting device designed for lifting humans will not subject the individual being lifted to crushing hazards. This is especially important if any part of the body becomes caught during an emergency lift (even though in this incident crushing injuries were not apparent).

Recommendation #3: Provide air testing equipment and train

employees on the proper use and maintenance of the equipment.

Discussion: In this incident there was air testing equipment on the property but not readily available where it would be needed. In addition the lack of proper maintenance of the air testing equipment would cast doubt on the validity of any measurements taken with it. Had the air been tested the oxygen deficiency would have indicated the need for ventilation prior to entering the confined space.

Recommendation #4: Employers should develop, implement, and enforce a written safety policy and safe work procedures designed to help workers recognize, understand and control hazards.

Discussion: According to the General Duty Clause of the Occupational Safety and Health Act (Section 5 (a) 1), employers are required to provide a safe and healthy workplace for employees. To do so, employers must regularly survey the workplace to identify hazards. All identified hazards must be adequately addressed through engineering control measures or changes in workpractices. Employers should instruct each employee in the recognition and avoidance of unsafe conditions. In this and similar situations, the employer may need to provide additional training to ensure that employees understand the hazard and how to properly use equipment.

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