



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Three Dead in Confined Space Incident in New York

FACE 8634

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 5, 1986, three workmen were cleaning out a trichloroethylene degreasing tank when the accident occurred. The tank is only cleaned out when the plant is not in operation, therefore, only the three assigned the cleaning task were in the plant. A relative of one of the workers stopped by the plant that evening and found all three workmen down in the tank. All were unresponsive.

Contacts/Activities

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR) was notified of this incident by the NIOSH Region II Consultant and in cooperation with the Occupational Safety and Health Administration included it in the Fatal Accident Circumstances and Epidemiology (FACE) Project. A research industrial hygienist conducted an epidemiologic evaluation of this case, which included: a visit to the accident site, meeting with the compliance officer and the employer, and interviews with a surrogate for the victims and comparison workers. Photographs were taken of the accident site.

Background/Overview of Employer's Safety Program

The metal products finishing operation has two owners, a general manager (victim), a foreman (victim), a secretary, and 25 laborers. The company has been in the business of cleaning and painting metal parts for 25 years. The company has no written safety policies or procedures. Training for new employees is provided on the job by an experienced worker, the foreman and/or owner.

Synopsis of Events

On Saturday, July 5, 1986, three employees (the plant manager, the foreman, and a laborer) for a metal parts painting company reported to work to clean out a degreaser tank. The tank is always cleaned when the plant is shut down for the weekend. The plant operates on a five day work week (Monday through Friday) and when it is time to clean the degreaser tank (3 or 4 times a year), it is scheduled on Saturday.

The basic operation of the plant consists of: receiving metal parts from a vendor, hanging each part on a conveyor system which then transports them through a trichloroethylene degreaser tank (see [Figure](#)), allowed to air dry, then the parts are painted and baked and shipped back to the vendor.

The degreaser is an irregular shaped metal tank, 8 feet high by 30 feet long by 6 feet deep with a 30 X 40 inch opening at each end. The chemical degreaser used in the tank is trichloroethylene and is usually maintained at a level of 8 to 10 inches (approximately 75 gallons). The tank has steam lines along the bottom which heat the degreasing agent to 1600 F, creating a vapor action.

Every three or four months it is necessary to clean out the tank. The unwritten procedures for cleaning the tank (according to the plant owner) are as follows:

On Friday night the steam that heats the trichloroethylene to 1600 F is shut off and the trichloroethylene is drained. The bottom doors are opened and the tank is allowed to cool and vent overnight. On Saturday morning a three-man crew reports to work to clean the tank. A 20 inch house fan is used to ventilate the tank.

The cleaning procedure is to have one man enter the tank via a ladder and physically pick up metal parts and debris that has fallen off the conveyor and place them in a box to pass out to a person on the outside. The third person is a standby for whatever is needed.

After approximately five minutes, the man in the tank rotates with the man on the outside, and this continues until the tank is cleaned of all metal debris.

Since there were no witnesses to what happened, and all three workers died, the following scenario was developed: The men were found at approximately 7:30 p.m. by a relative who had stopped by to see what was the problem. The tank is cleaned out on Saturday morning and the men were still there at 7:30 that evening. The relative found all three men in the degreaser tank, unresponsive. He immediately called the fire department for help. The fire department and police department responded to the call and the men were removed from the tank. One was dead when removed, one died a few hours later at a local hospital, and one remained critical until July 17, 1986, when he died without regaining consciousness. Two police officers were also hospitalized with chemical burns.

The tank had been cleaned of metal debris. However, the trichloroethylene had not been drained off and the temperature of the chemical was 1000 F. Also, no ladder was used for entry. Therefore, this meant the men had to hand-walk the conveyor line into the tank. Several boxes of metal parts were on the floor near the degreaser.

The tank had been cleaned the same way for 25 years and the owners did not know why the procedure was changed.

Cause of Death

Not listed at this time.

Recommendations/Discussion:

Recommendation #1: Employers should be certain employees are aware of the hazards associated with the tasks they are performing and the materials they are using. Additionally, employees should be aware of all safety procedures to be followed and the reasons for these procedures.

Discussion: Although this procedure for tank cleaning had been followed for several years, it is unlikely the employees fully understood the toxicity of the substance in the tank. The procedure established (which was apparently not followed) is also hazardous. Entry into a degreaser tank without adequate ventilation, personal protective clothing, and respiratory protection subjects employees to a toxic, irritant, and potentially lethal atmosphere.

Recommendation #2: The company should develop and implement a written safety and training program. This program should include recognition of hazards and methods to work safely.

Discussion: The company has no written safety program or policy. Safety and training is practically non-existent at this plant. Any training that is done is on-the-job with little emphasis on safety and health. The company should develop a training program that would instruct employees on hazards associated with the operation of the plant, methods of working safely and the use and need of personal protective equipment.

Recommendation #3: The employer should develop comprehensive Policies and procedures for confined space entry.

Discussion: All employees who work in confined spaces should be aware of potential hazards, possible emergencies, and specific procedures to be followed, prior to entering a confined space. These procedures should minimally include:

1. Air quality testing to assure adequate oxygen supply, adequate ventilation, and the absence of all toxic air contaminants.
2. Employee and supervisory training in the selection and usage of respiratory equipment.
3. Development of site-specific working procedures and emergency access and egress plans.
4. Emergency rescue training.

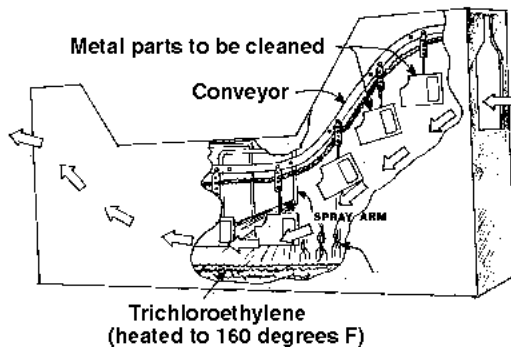


Figure. Chemical degreaser

Figure. Trichloroethylene degreaser tank

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Partly

No