



The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces
through safety and health research



Foundry Worker Dies in Indiana

FACE 8623

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 April 5, 1986, a foundry worker died as a result of inhaling methyl chloroform vapors while spraying a solvent on a conveyor drive chain during a degreasing operation.

Contacts/Activities:

Officials of the Occupational Safety and Health Program for the State of Indiana notified DSR concerning this fatality and requested technical assistance. This case has been included in the FACE Project. On April 29, 1986, the DSR research team (consisting of two safety specialists) conducted a site visit, met with employer and union representatives, interviewed comparison workers, interviewed the next of kin, discussed the incident with the OSHA Compliance Officer, and photographed the accident site.

Overview of Employer's Safety Program:

The victim was employed by a foundry that produced molded gray iron castings for various industries. The foundry, in operation since 1911, was destroyed by fire in 1953, but was rebuilt and placed back in operation by 1955. The foundry employs 310 workers on a three-shift basis; with full production being run only on the day shift. Partial production is run on the afternoon and graveyard shifts, while maintenance is being performed on equipment.

The safety function is managed by the personnel director on a collateral-duty basis. A written safety program exists at the foundry. New employees receive training on the job. Although respirators are used throughout the foundry, no training in the proper usage of respirators exists. A safety committee, consisting of two company officials, two union officials, and a representative of the insurance carrier, meets monthly to discuss safety issues.

Synopsis of Events:

On the night of the incident the victim was performing maintenance operations. on a conveyor drive chain that required spraying a degreasing, solvent containing methyl chloroform (NIOSH recommended exposure limit 350 ppm, 15 minute ceiling – IDLH level 1000 ppm). The drive chain propelled the mold cars which carried the gray iron castings through the firing chamber. The service area, which contained the conveyor drive chain and its motors, was a pit (28' long, 14' wide, and 5' deep). A permanent ladder on one side of the pit provided access. The conveyor ran across the top of the pit, while the drive chain itself was located below the conveyor approximately two and one-half feet above the floor level of the pit. The solvent was contained in a 55 gallon drum located outside and above the service area. The solvent was dispensed by a hand-held nozzle with two manual valves; one for the gravity fed solvent, the other for the forced-air flow. The victim was to begin spraying the solvent at one end of the pit and work his way to the other end of the pit. The conveyor was not in operation at the time this maintenance was being performed. Three windows on the wall directly above the service area were covered with cardboard and a ceiling exhaust fan was not in operation due to cold weather. The victim was equipped with rubber gloves and overshoes, safety goggles, hard hat, and an air-purifying respirator with an organic vapor cartridge. He was instructed by a supervisor to change the cartridge, if the fumes became too noticeable.

The victim remained inside the service area until dinner time, reportedly between 2:00 a.m. and 3:00 a.m. The victim then proceeded to the lunch room to eat dinner. While eating dinner he complained to co-workers that the fumes were bothering him more than usual. He was advised by a co-worker to “go outside and clear your head” before reentering the service area. After eating his dinner the victim returned to the service area and resumed spraying. At the end of the shift (approximately 6:00 a.m.) a co-worker decided to notify the victim that the shift was almost over. When the co-worker arrived at the service area he found the victim lying on his side underneath the conveyor and the nozzle still spraying. The victim was lying approximately ten feet from the ladder. It was estimated that between 10 and 20 gallons of solvent were present on the floor around the victim.

The co-worker immediately went to notify a supervisor. The supervisor and co-worker returned to the service area.

The supervisor descended the ladder into the pit and was immediately overcome by the fumes. He fell to his knees, but was able to stand up and climb back up the ladder. The co-worker and supervisor then attempted to enter the pit while holding their breath, but again had to leave the pit. on their third attempt they managed to drag the victim from the pit. Mouth-to-mouth resuscitation was begun and continued until the emergency service arrived. The victim was pronounced dead at the scene by the deputy county coroner.

Cause of Death:

Preliminary findings of the medical examiner indicate the victim died as the result of inhalation of methyl chloroform vapors.

Recommendations/Discussion:

Recommendation #1: Employers should initiate comprehensive policies and procedures for confined space entry.

Discussion: All employees who work in or around 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 the following:

1. Air quality testing to assure adequate oxygen supply, adequate ventilation, and the absence of all toxic air contaminants;
2. Monitoring of the space to determine a safe oxygen level is maintained;
3. Employee and supervisory training in confined space entry;
4. Employee and supervisory training in the selection and usage of respiratory protection;

5. Emergency rescue procedures;

6. Availability, storage, and maintenance of emergency rescue equipment.

The air quality was not determined before the worker entered the pit and ventilation was not maintained. Also, the vent windows were covered with cardboard and the exhaust fan was not utilized. The air quality was not monitored for toxic air contaminants and oxygen level. Respirator training and proper maintenance procedures should be required of all employees and supervisors. The employee in this case received no training in the proper use of respiratory equipment. The air-purifying respirator used in this case was not the proper respirator for this application. NIOSH recommends a supplied-air or self-contained breathing apparatus when working in the presence of methyl chloroform. Emergency rescue procedures for confined spaces should be stressed to all employees. The supervisor and co-worker should never have entered the pit without proper respiratory equipment, which should have been readily available. They greatly enhanced the possibility of this incident becoming a multiple fatality.

The personnel manager was provided the following:

- NIOSH Document Criteria for a Recommended Standard, Working in Confined Spaces. DHEW, NIOSH Publication No. 80-106.
- NIOSH Alert on Confined Spaces. DHHS Publication No. 86-110.
- Confined Spaces Hazard Recognition. Article by Ted A. Pettit. Reprinted from occupational Health and Safety (July 1983), 52:17-45.
- NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 85-114.

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Partly

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