Colorado Fatality Assessment and Control Evaluation (FACE) Program

SUBJECT:

Colorado FACE Investigation 94CO006A

17-year-old worker at a plastic products manufacturing plant died as a result of an overexposure to tetrachloroethylene (also known as perchloroethylene).

SUMMARY:

On February 3, 1994, a 17-year-old laborer began work at 16:00. His assigned task was to clean the inside of metal molds used to form plastic containers. This task involved applying approximately four fluid ounces of tetrachloroethylene to a cloth rag which was then used to wipe the interior surface of the mold. The mold in which the body of the laborer was found formed a 40-gallon container and measured 19 1/2 inches in diameter and 32 inches deep. Evidence at the scene indicated that the employee had propped the mold in an upright position and leaned into the mold to clean the bottom. The deceased was discovered at 24:00 when a coworker arrived on the scene.

The Colorado Department of Public Health and Environment (CDPHE) investigator concluded that to prevent future similar occurrences, employers should:

- Explore the feasibility of replacing tetrachloroethylene with a less toxic cleaning fluid.
- Provide workers with proper tools that will enable them to reach areas to be cleaned without the need to have their head inside the vessel.
- 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 Public Health and Environment (CDPHE) performs investigations of occupational fatalities under the authority of the Colorado Revised Statutes and Board of Health Regulations. CDPHE is authorized 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 CDPHE investigation included interviews with an employer representative and employees during a workplace investigation. Representatives from other agencies investigating the incident were also interviewed.

This company employs three people. The company did not have a safety officer or a written safety program. The company had been in business for twenty years and the deceased had worked for the company for three weeks. The company did not have a training program and no personal protective equipment was in use by the deceased on the day of the incident.

CAUSE OF DEATH:

The cause of death as determined by autopsy and listed on the death certificate consistent with asphyxiation as a consequence of exposure to toxic fumes (tetrachloroethylene).

RECOMMENDATIONS/DISCUSSION:

Recommendation #1: Explore the feasibility of replacing tetrachloroethylene with a less hazardous cleaning fluid.

Discussion: Data gathered through this investigation indicate that this fatality occurred because tetrachloroethylene is heavier than air and highly volatile. Because of these traits, the chemical rapidly becomes airborne, and would not rise out of a container. In addition, the chemical causes acute toxic effects at high concentrations.

According to the Material Safety Data Sheet for this chemical, exposure to concentrations greater than 5,000 parts of tetrachloroethylene per million parts of air (ppm) can result in unconsciousness or death. Further, the National Institute for Occupational Safety and Health (NIOSH) has established that an airborne concentration of tetrachloroethylene greater 150 ppm is immediately dangerous to life and health. The short term exposure limit (STEL) for tetrachloroethylene recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) is 100 ppm.

The use of four fluid ounces of tetrachloroethylene in the interior area of the mold being cleaned could generate an airborne concentration of 92,000 ppm. The substitution of a less hazardous substance could possibly have prevented this fatality.

Recommendation #2: Provide workers with proper tools that will enable them to reach areas to be cleaned without the need to have their head inside the vessel.

Discussion: In this incident, the employee was using a hand-held cloth to clean the inside of the mold. The depth of the mold was greater than the length of his arm. In order to reach the bottom of the mold, he had to bend into the vessel so that his head was actually inside the cavity of the mold. The use of a cleaning brush or swab attached to a handle would have allowed him to reach the bottom without being partially inside the vessel.

Recommendation #3: The employer should conduct a work-site survey to assess the potential safety hazards. Once an assessment has been completed, written safety rules and procedures should be developed, implemented, and enforced.

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 abated through engineering control measures or changes in workpractices. Employers should also instruct each employee in the recognition and avoidance of unsafe conditions identified through workplace surveys.

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