The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research NIOSH

Painter Dies in a 140-Foot Fall at a Municipal Water Tower

FACE 8905

INTRODUCTION

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatal Accident Circumstances and Epidemiology (FACE) investigations when a participating state reports an occupational fatality and requests technical assistance. The goal of these evaluations is to prevent fatal work injuries in the future by studying the working environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact.

On September 22, 1988, a 34-year-old male painter died when he apparently inhaled vapors from paint containing xylene, lost consciousness, and fell 140 feet within the vertical water supply pipe of a municipal water tower.

CONTACTS/ACTIVITIES

State officials notified DSR of this fatality and requested technical assistance. On December 13, 1988, a DSR field team met with the employer, the county coroner, and local emergency services personnel; and visited and photographed the incident site.

OVERVIEW OF EMPLOYER'S SAFETY PROGRAM

The employer in this incident is a small contractor specializing in painting water towers. The contractor has been in operation for 7 years and employs seven individuals. The company has no formal safety program and all training is "on the job." The victim had been employed by the company for 3 months, and had worked as a painter for the 2 months prior to the incident.

SYNOPSIS OF EVENTS

The victim was a member of a seven-man crew involved in painting a municipal water tower. The crew consisted of a foreman, four painters and two "groundmen." The crew had worked on this tower for several days prior to the incident.

The tower is a large, elevated water tank supported by seven legs. A 5-foot-diameter riser (vertical water supply pipe) extends from the center of the tank bowl to the ground approximately 145 feet below. Access to the top of the tank is provided by a fixed ladder on one of the tank legs. A hatchway on top of the tank provides access to the interior, with a second fixed ladder leading down to the tank floor. The top of the riser, located in the center of the tank floor, is normally covered with a metal grating; however, this grating had been removed for the painting operation. The interior of the riser contains a fixed ladder leading to the bottom, and a 6-inch-diameter overflow pipe. A 24- by 15-inch port located 5 feet above the bottom of the riser provides access to the interior of the riser from the ground.

Prior to painting the interior of the tower, air lines (for supplied-air respirators) and paint lines (for the paint spray guns) had been run through the bottom port and up the riser to the tank bowl. A 3/8-inch steel lifeline had been run from the top of the riser to the bottom for use during painting of the riser interior. A boatswain's chair (a seat supported by slings attached to a suspended rope to support one person in a sitting position) was suspended at the top of the riser for the painter's use while working inside the riser.

At the time of the incident the victim was working alone, painting the inside of the riser. On previous days, he had applied two coats of paint to the interior. Three other painters were working on the exterior of the tank, and the two groundmen were handling the paint lines and air lines on the ground.

The previous afternoon the foreman had observed the victim exiting the riser in an apparently intoxicated condition. The victim had not been wearing his issued supplied-air respirator, relying instead on a bandana worn across his mouth and nose. Since the paint being used contained both xylene and methyl ethyl ketone, the victim had probably become intoxicated by breathing vapors containing these chemicals. The foreman reprimanded the victim for not wearing his respirator.

On the morning of the incident, the foreman reminded the victim that he must wear his respirator when painting inside the tank. The victim and one co-worker entered the tank to prepare the equipment for painting the interior of the riser. The victim told the co-worker that he would be painting the riser from the fixed ladder instead of using the boatswain's chair because it was "easier." Once preparations for this work were completed, the co-worker left the interior of the tank.

The victim had been painting for approximately one-half hour when one of the groundmen, who was located outside near the access port at the base of the riser, heard a noise and observed the paint line falling within the riser. Moments later the victim, who had fallen from the ladder, landed at the base of the riser.

The groundman immediately called to his co-workers that a man had fallen within the riser. Members of the local fire department rescue squad who were training in a field adjacent to the tower, immediately arrived at the scene. One paramedic, who entered the riser through the access port, examined the victim and was unable to detect any vital signs. The victim's body was removed through the access port and cardiopulmonary resuscitation (CPR) was begun. CPR was continued while the victim was transported to the local hospital where he was pronounced dead on arrival.

Fire department personnel involved in the rescue attempt reported that the victim was wearing a safety belt when they reached him inside the riser, but that the belt was not connected to the lifeline within the riser. They further reported that the victim was wearing a bandana over his face, and that no respirator was present on the body. A police department detective along with one of the victim's co-workers entered the tank approximately 1 1/2 hours after the incident occurred. The police detective reported that vapor was visible in the tank at this time. (The vapor is also visible in photographs taken by the detective.) The victim's supplied-air respirator was found lying on the floor of the tank. Later inspection revealed that the victim had painted the top 8 to 10 feet of the riser before falling.

An autopsy conducted on the victim revealed 0.2mg% xylene in a sample of blood taken from the victim's heart.

CAUSE OF DEATH

The medical examiner's office gave the cause of death as multiple fractures and internal injuries. The fall which produced these injuries was very likely a direct result of loss of consciousness due to acute xylene toxicity.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that all employees understand hazards associated with their jobs.

Discussion: The employer in this case had provided no formal training, relying instead on on-the-job training to prepare workers for the tasks to which they are assigned. Although the victim had previously been reprimanded for failure to use his respirator, he apparently did not understand that the respirator was essential for his safety during this job and he neglected to wear it, relying instead on a bandana to protect himself from the chemicals in the paint. A training program providing the employee with knowledge of the possible consequences of breathing the vapors from this paint might have increased his understanding of the potential danger involved in painting without a respirator. In addition, the victim failed to use the boatswain's chair and to connect his safety belt to the lifeline provided for fall protection. A comprehensive safety training program which stressed the importance of using the safety equipment provided by the employer, and which increased employee understanding of hazards and how to utilize protective equipment might have prevented the fatal fall.

Recommendation #2: Employers should verify that safety equipment provided is used by their employees.

Discussion: The victim in this case had been reprimanded the previous day for failure to use his respirator, and had again been reminded to wear it the day the fatality occurred. Employers should ensure that employees understand why they need to use their safety equipment at all times. Appropriate disciplinary action or additional training should be provided when employees continually neglect to use this equipment. Periodic spot checks to verify compliance with safety rules might have encouraged the victim to use his equipment and might have prevented this fatality.

Recommendation #3: Rescue considerations should be addressed by employers whenever workers are assigned to areas where the potential for falls or entrapment exist.

Discussion: In this case the victim was working at an elevation within a confined space. Because of this, the potential for falling or being overcome by chemicals within the confined space existed. Despite the hazards involved, no pre-planning for any type of rescue operation had been made. When working in similar locations employers should develop a written rescue procedure to be used in the event an incident should develop. This rescue procedure should include actions to be taken by other employees as well as prior notification of local fire department/rescue personnel.

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