

FACE 87-47: Worker Dies Inside Filtration Tank in Michigan

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 May 12, 1987, a city worker died while checking the inside of an empty filtration tank at a sewage treatment plant.

CONTACTS/ACTIVITIES

The Water Pollution Control Federation (WPCF) notified the Division of Safety Research (DSR) of this fatality and requested technical assistance. This case has been included in the FACE Project. On June 15-16, 1987, a DSR research industrial hygienist conducted a site visit, collected incident data, photographed the site, and interviewed representatives of the employer and comparison workers.

OVERVIEW OF EMPLOYER'S SAFETY PROGRAM

The employer in this incident is a municipality with a resident population of approximately 160,000. The victim worked at the wastewater treatment plant (in the wastewater treatment department) which has a total of 56 employees, primarily plant operators and plant maintenance personnel. Additionally, there are five lab technicians, three plant foremen, a chemist, a civil engineer, office personnel, and a plant supervisor.

New employees are given a half-day orientation concerning the operating policy of the city. Time off is provided for mandatory reading of safety booklets. All employees are given formal training in hazardous communication, material safety data sheets/"right to know", and the use of self-contained breathing apparatus. Continual on-the-job task training also addresses various hazards encountered on a day-to-day basis. Workplace safety is stressed as a responsibility of each employee. A wastewater treatment plant safety committee which consists of the plant superintendent, two union stewards (a plant maintenance worker and a plant operator), a maintenance foreman, and the civil engineer meets monthly. Accident reports, safety equipment, safety complaints from employees, the implementation of safety directives from management, etc. are discussed at these committee meetings. The two union stewards are given additional time to evaluate employee complaints and safety concerns in the plant. No training is given on confined space entry; however, plant supervisors have necessary testing equipment available to test a confined space atmosphere for oxygen (O₂), hydrogen sulfide (H₂S), and explosive gases. The plant also has several self contained breathing apparatus (SCBA) throughout the plant facility.

SYNOPSIS OF EVENTS

A 55 year-old wastewater treatment plant operator (the victim) with 25 years of experience was inspecting one of twelve open-top concrete filter tanks (used for tertiary wastewater treatment) when this incident occurred. Each filter tank is 15 feet wide x 24 feet long x 12 feet deep and is divided vertically in the middle by a concrete baffle. The bottom of each tank contains a filter bed (several feet of filter media composed of graduated sized stone, covered by approximately 12 inches of wheat-sized anthracite coal). Four trough-

like weirs spaced equally apart span the width of each tank half, three feet above the top of the filter media. A concrete walkway with steel safety rails is located around the top of each tank. Each tank operates with approximately nine feet of wastewater and is backwashed three times per day. During this process, a small amount of the filter media (i.e. coal) is washed away. In order to determine the amount of filter media lost, the victim (or other plant operators, when assigned) periodically drain each tank and measure the depth of the filter media. To do this employees are required to lower an aluminum ladder into the tank, positioning the feet of the ladder inside a weir, climb into the tank with a steel tape, measure the depth of the filter media, climb back out, and place the filter tank back in operation. This process is repeated for all the filter tanks. The victim had been assigned to inspect the depth of the filter media in all of the filter tanks (a task which he had done at least twice before). Four days prior to the day of the accident the victim had inspected six tanks. The acting plant foreman (the victim's supervisor) was not aware of the victim having experienced any ill effects from these tank inspections.

On May 12, 1987, the victim reported to work at 8:00 a.m. and was asked by the plant foreman if he required any assistance in the completion of the remaining six tank inspections. The victim said "no" and completed the inspection of one tank and, although there were no eye witnesses, it is presumed that he was in the process of climbing either into or out of a second tank when he fell from the ladder into the weir. The victim struck his head on a ladder rung or on an edge of the weir.

At approximately 10:55 a.m. the victim's supervisor noticed that the filter tank being inspected had no filter tank valve changes documented on the computer for several minutes. The supervisor left the control room and entered the tertiary filter tank building to check on the victim. The supervisor found the victim lying unconscious inside a weir at the bottom of the tank. The supervisor immediately notified office personnel in the plant, who notified the city fire department emergency rescue squad and then summoned a maintenance worker for help. The supervisor and the maintenance worker entered the filter tank, but did not attempt cardiopulmonary resuscitation (CPR). The rescue squad arrived on the scene approximately two and a half minutes after being called, entered the tank, hoisted the victim out, and began to administer CPR. Resuscitation efforts were unsuccessful. The county medical examiner arrived on the scene at about 1:00 p.m. and pronounced the victim dead at the scene.

CAUSE OF DEATH

An autopsy was conducted and the cause of death listed by the medical examiner was hypertensive and arteriosclerotic heart disease. Also, according to the medical examiner: "Advanced emphysema of the lungs may have contributed to the death. The deceased was considerably overweight . . .", the ". . . laceration of the left side of the head was sustained as a result of the terminal fall.", and "Yellow discoloration of the skull may have been related to diabetes mellitus."

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Workers who are required to enter confined spaces to perform tasks as part of their job responsibilities should receive pre-placement and periodic physical examinations to determine that they are physically capable of performing these duties.

Discussion: Simply entering and exiting the filter bed placed a great deal of stress on the victim's cardiopulmonary system. Because of pre-existing medical problems (emphysema, arteriosclerotic heart disease, obesity, and diabetes), which were apparently unknown to the victim, he was unable to withstand

this stress. This fatality underscores the advisability of pre-placement and periodic physical examinations for any strenuous work, especially in a confined space.

Recommendation #2: The employer should develop a written comprehensive safety program that clearly documents procedures for safe entry into confined spaces.

Discussion: All employees who work in or around confined spaces (wastewater treatment plant employees) should be aware of potential hazards, possible emergencies, and specific procedures to be followed prior to entering a confined space. These procedures should include, but not be limited to:

1. Air quality testing to determine adequate O₂ level.
2. Ventilation of the space to remove air contaminants.
3. Monitoring of the space to determine a safe oxygen level is maintained.
4. Employee training in confined space entry, testing, and use of personal protective equipment (respirators, clothing, etc.).
5. Standby person outside the confined space for communication and visual monitoring.
6. Emergency rescue procedures.

Even though there were no dangerous air contaminants in the confined space and normal oxygen levels were found in air samples taken inside the filter tank by the DSR research industrial hygienist at the time of the on-site evaluation, entry into confined spaces should not be attempted until atmospheric testing of the confined space insures that the atmosphere is safe. This testing requirement applies to all confined spaces, including the inside of open-top tertiary filter tanks. Testing must be done by a qualified person prior to entry. Specific recommendations regarding safe work practices in confined spaces can be found in the NIOSH Publication No. 80-106, "Working in Confined Spaces". This publication also defines and provides recommendations on hot work, isolation, purging, ventilation, communication, entry and rescue, training, posting, safety equipment, clothing, etc.

Recommendation #3: A trained standby person should remain outside of the confined space when a worker enters or works inside. The standby person should visually monitor the tasks being performed inside and should be able to communicate with the worker(s) inside the confined space.

Discussion: A person trained in emergency rescue procedures, assigned to remain on the outside of the confined space for communication and visual monitoring of the person inside is of utmost importance.

Recommendation #4: Employees should be trained in cardiopulmonary resuscitation (CPR).

Discussion: CPR should begin as soon as possible, minimally within 4 minutes (in accordance with American Heart Association guidelines) in order to achieve the best results. To meet this criteria for successful resuscitation, workers should be trained in CPR to support the victim's circulation and ventilation until trained medical personnel arrive. While some employees had apparently received CPR training in the past, employees who arrived at the scene of the accident (prior to the arrival of emergency

medical personnel) did not begin CPR on the victim. Retraining in CPR is necessary, usually on an annual basis.

Recommendation #5: The procedure used to measure the level of filter media present in a tank should be evaluated to determine if the procedure could be modified to eliminate the need to enter the confined space.

Discussion: Prior to entry into a confined space one of the first questions that needs to be addressed is whether entry is necessary. The procedure used to measure the level of filter media present in a tank should be evaluated to determine if it could be modified to eliminate the need for entry into the tank.

FACE 88-14: Labor Foreman Falls to His Death Inside Municipal Water Tank in Indiana

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 March 21, 1988, a 28-year-old male labor foreman died when he fell 50 feet inside a 700,000-gallon municipal water tank.

CONTACTS/ACTIVITIES

Officials of the Occupational Safety and Health Program for the State of Indiana notified DSR of this fatality and requested technical assistance. A research safety specialist discussed this case with the OSHA compliance officer and on April 4 met with the employer's representatives. On April 5 a meeting was held with municipal officials and with responding ambulance personnel. The incident site was also photographed on this date.

OVERVIEW OF EMPLOYER'S SAFETY PROGRAM

The employer in this incident is a multistate corporation specializing in cathodic protection systems which provide a form of protection against electrolytic corrosion. Of the company's 250 employees, 16 perform the same type of work as the victim. The company has a written safety policy which prescribes the use of fall protection where there is potential that a worker may fall in excess of 10 feet. This policy also calls for testing the atmosphere prior to entering any confined space, and for the use of a lifeline, safety harness, and appropriate respirator when working inside a confined space. The victim was employed as a tank department foreman and served as supervisor at various sites where work on cathodic protection systems for water tanks was being performed.

SYNOPSIS OF EVENTS

The victim and a co-worker were assigned routine maintenance work on the cathodic protection system within an elevated municipal water tank. Approximately 2 months prior to this incident, the tank developed a leak and was drained. A small amount of water remained in the tank at a level below the riser which serves as the tank drain. There was ice on the surface of the water.

The cylindrical tank is approximately 40 feet wide by 60 feet high. A ladder on one of the legs supporting the tank provides access from the ground to a catwalk on the tank. The catwalk circles the tank approximately 125 feet above the ground. A second permanently mounted ladder extends from the catwalk to the top of the tank. At the top of the tank, a 2-foot-square door provides entry to the tank.

On the day of the incident, the victim and his co-worker arrived at the jobsite at 11:00 a.m. Prior to climbing the tank, they noticed an entry hatch on the side of the tank bowl at the level of the catwalk. They decided not to use this entry hatch because they weren't sure they could properly seal it at the conclusion of the work.

At approximately 12:15 p.m., the two men climbed to the top of the tank and found the entry door locked. The men descended the tank, obtained a key from city officials, climbed again to the top of the tank, and opened the door. They suspended a rope ladder through the door to provide access to the tank floor.

The maintenance work on the cathodic protection system required that they replace a fitting which was below the level of the water in the tank. The victim used a section of garden hose to begin siphoning the water from the bottom of the tank and routing it down the wet riser at the center of the tank bowl. Because the water would not be removed by the end of their shift, they performed other necessary maintenance work, planning to return the following day to finish the job.

At approximately 5:10 p.m., the co-worker exited the tank and stopped on the catwalk to wait for his supervisor. When the supervisor did not follow after 4 to 5 minutes, the co-worker climbed to the top of the tank in search of him. The co-worker saw the supervisor inside the tank approximately one quarter of the way up the ladder. The supervisor stated that he was tired and that his arms were numb. The supervisor then continued to climb the ladder.

The co-worker noticed that the supervisor "was climbing wrong and had a funny look on his face." (The supervisor was facing the ladder, as opposed to the standard procedure for climbing a rope ladder from the side thereby producing less swaying motion.) The co-worker asked the supervisor if he needed help. Upon receiving a positive response, the co-worker descended the ladder to assist him. The co-worker managed to grasp the supervisor's hand, however the supervisor was unresponsive to the co-worker's repeated calls to grasp the ladder. The co-worker was unable to retain his grip, and the supervisor slipped from the ladder and fell approximately 50 feet to the bottom of the tank. The co-worker descended the ladder to aid the victim and moved him slightly from the facedown position near the water where he landed. He returned to the top of the tank where he cried out for help. He got the attention of several individuals located at a business establishment across the street who, in turn, summoned help.

The local fire department received the report of the accident via telephone at 5:15 p.m. and were on the scene at 5:19 p.m. Two firefighters and an EMT from the local ambulance company entered the tank through the manway located at the catwalk. The victim was found to be bleeding from the mouth and nose, with noticeable deformation of his forearm and right upper leg. No vital signs were detected. The victim was secured to a back board and lowered to the ground. The ambulance departed the scene at 5:54 p.m. and arrived at the local medical center at 6:00 p.m. where the victim was pronounced dead shortly after arrival.

Neither the co-worker nor the responding rescue personnel noted any unusual odors in the tank, nor did they experience any symptoms indicative of possible oxygen deficiency.

CAUSE OF DEATH

The Medical Examiner gave the cause of death as a skull fracture and lacerations of the brain, along with contusions to the lungs.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should periodically re-evaluate company confined space work procedures to ensure that the following areas are addressed:

- *atmospheric testing is performed prior to entry*
- *safe climbing devices are employed where needed*
- *safety harness and lifeline are used in all cases (for rescue as well as fall protection when working at elevations)*
- *an observer outside of the confined space is available to summon help if needed.*
- *communication devices are available to ensure adequate communications between workers in confined spaces and those outside.*

Discussion: The company that employed this foreman has written safety procedures that require the testing of the atmosphere of any confined space prior to entry. In addition, the procedures specify that a lifeline and safety harness are to be worn while working in a confined space, and that an appropriate respirator be worn when indicated by the atmospheric testing. None of these procedures were followed in this case, nor was any provision made for the use of safe climbing devices. In addition no observer was present, nor was any means provided for communication between the tower and anyone on the ground. If an oxygen deficient atmosphere existed within the tank, it could have proved fatal to both workers.

Recommendation #2: Employers should provide periodic refresher training which stresses the hazards that exist within confined spaces to all employees who work in or around confined spaces.

Discussion: Although the victim in this case was a supervisor who had received training in confined space entry procedures, he elected to forego written company safety procedures regarding atmospheric testing and the use of safety harnesses and lifelines. His failure to follow standard written procedures concerning confined space work was an important factor in this incident.

Recommendation #3: Company management (safety) personnel should conduct periodic worksite evaluations to ensure that written procedures are being followed in the field.

Discussion: In this case a foreman apparently chose to ignore company procedures regarding work in confined spaces. Since safety is an inherent function of management, workers cannot be expected to follow safety procedures if their supervisors do not. Periodic inspection of worksites by company safety personnel would serve to show management's interest in the safety program and reinforce within all workers the need to follow company standard operating procedures.

Recommendation #4: An evaluation of the worksite should be performed prior to the start of all operations to determine potential safety and health hazards as well as concerns which would affect the efficiency of the operation.

Discussion: An evaluation of the worksite prior to the start of work would permit safety hazards to be identified and plans for corrective action to be prepared prior to employee exposure. In the above case such an evaluation might have enabled the workers to avoid the initial climb up the tower to unlock the door at the top of the tank. In addition, a thoughtful evaluation might have convinced the supervisor to utilize the

hatch at the catwalk rather than the opening at the top of the tank. Such action may have eliminated the need for the rope ladder and thus prevented the fall.

Recommendation #5: Rescue personnel entering confined spaces should utilize appropriate protective equipment.

Discussion: In the above case, rescue personnel entered a confined space where a victim became ill and had fallen for unknown reasons without either checking the atmosphere first or utilizing self-contained breathing apparatus. In similar situations rescue personnel themselves often become victims. NIOSH investigations of 41 confined space incidents have revealed that 18 (31%) of the 59 victims were would-be rescuers.

FACE 89-05: Painter Dies in a 140-Foot Fall at a Municipal Water Tower

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.

FACE 90-07: Laborer Dies After Fall From Ladder in South Carolina

SUMMARY

A masonry contractor had been contracted to construct a life center building across the road from a hospital complex. A construction laborer (victim) had been instructed by his foreman to prepare a batch of mortar on the second level of a new construction project, and carry it to the third level. The mortar was carried by pails from the second level via stairs to the third level. For some unknown reason, the victim decided to use the top section of an aluminum extension ladder (without safety feet). He placed one end of the ladder on the wet concrete floor, leaned the other end against a wall, and started to climb. The ladder apparently slipped on the wet floor causing him to fall approximately 12 feet. NIOSH investigators concluded that, in order to prevent future similar occurrences, employers and employees must:

- *ensure that ladders are used in accordance with existing safety standards*
- *instruct workers that upper sections of extension ladders should not be used as single ladders*
- *train employees in the proper use of tools and equipment needed to perform their assigned tasks*
- *designate an individual as the company safety officer to visit the various jobsites, identify potential hazards, and ensure that those hazards are eliminated.*

INTRODUCTION

On September 21, 1989, a 46-year-old male construction laborer fell while climbing a ladder. He died on September 24, 1989, from injuries sustained in the fall.

On October 11, 1989, the South Carolina Occupational Safety and Health Administration notified the Division of Safety Research (DSR) of the incident and requested technical assistance.

On October 19, 1989, a DSR safety engineer conducted an investigation. The investigator visited and photographed the incident site, reviewed the case with company officials, talked with employees who were present at the time of the incident, and contacted the county medical examiner's office for information about the incident.

The employer is a masonry contractor who has been in business for 30 years and has 267 employees. Although the company has written safety rules and procedures and company officials conduct regular safety meetings, it has no company safety officer. The company places a safety flier in the weekly pay envelope to try to keep the employees aware of proper safety practices. Safety information is primarily conveyed via on-the-job training. The victim had worked for the employer for about 12 months as a laborer prior to this incident.

INVESTIGATION

A masonry contractor had been contracted to construct a life center building across the road from a hospital complex. At the time of the incident, the victim was preparing a batch of mortar as instructed by the foreman. The victim's duties included mixing mortar and transporting it to the desired location in pails. The rest of the crew,

including the foreman, went up to the third level of the building, which was about 12 feet above the second floor where the victim was working. The workers used a stairway to access the third floor work area.

Although no one saw the victim fall, evidence at the site suggested that the victim took the top portion of an aluminum extension ladder (without safety feet), placed one end on the wet concrete floor, and leaned the other end against a wall to reach the third floor area. Without attempting to tie off the ladder or secure it in any fashion, the victim began to climb the ladder. The bottom of the ladder apparently slipped on the wet floor, causing the victim to fall. There were no indications at the scene that the victim was carrying a pail of mortar when he fell.

The victim was discovered by an employee of another contractor on the site. This individual said that the victim was conscious, but was talking incoherently and bleeding from his ears. By the time the emergency rescue squad arrived 15 minutes after the fall, the victim had lost consciousness. He was transported to the hospital where he died 3 days later.

During the interviews, the employer could offer no reason why the victim used the ladder, which belonged to another contractor, instead of the stairway to access the work area. The general contractor stated that the victim's employer did not have any extension ladders at the jobsite. There was no indication that the victim had used a ladder in this way prior to the incident. The incident occurred on the employer's last day of work at the site.

CAUSE OF DEATH

The medical examiner's report listed multiple traumatic injuries sustained from the fall as the cause of death.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that ladders are used in accordance with requirements of existing Federal safety standards.

Discussion: Occupational Safety and Health Administration (OSHA) construction standards require that the base, or feet, of portable metal ladders be placed on a substantial base (1926.450(a)(6)); that they be set up at a proper angle (1926.450(a)(7)); and that ladders in use be tied, blocked, or otherwise secured to prevent displacement (1926.450(a)(10)). Employers should be familiar with the Federal safety standards that apply to their businesses, including those that relate to the tools and equipment they use.

Recommendation #2: The upper sections of extension ladders should not be used as single ladders.

Discussion: Although referring to wooden sectional ladders, 29 CFR 1910.25(d)(2)(xvii) (which is a General Industry Standard) prohibits the use of top sections of such ladders unless equipped with safety feet. It would be prudent to follow this requirement whether the ladder is wooden or metal. The upper sections of extension ladders are not regularly equipped with safety feet and are not intended to be used as single ladders. Using sections of extension ladders in this manner creates potential hazards that can result in serious injuries or death.

Recommendation #3: Employers should train workers in the proper use of tools and equipment used to perform their assigned tasks.

Discussion: Had the victim been trained in the proper use of ladders, he would have known to use a ladder with safety feet, to place it at a safe angle, and to secure the ladder in compliance with existing standards. The victim placed a ladder without safety feet on a wet surface and did not secure it before starting to climb the ladder. A review of safety procedures involving ladders would be a good topic for a training session at a company safety meeting. Training sessions should be conducted and documented by company officials.

Recommendation #4: The employer should designate an individual as the company safety officer.

Discussion: At present the safety function is not overseen by one individual. Assigning one individual the responsibility for coordinating all of the safety activity of the company would most likely result in a better overall safety program. The company safety officer should be required to routinely visit the various jobsites, identify potential hazards, and ensure that those hazards are eliminated. This person should also discuss pertinent safety issues with the foreman on the jobsite on a regular basis.

REFERENCES

1. 29 CFR 1926.450(a)(6) Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register
2. 29 CFR 1926.450(a)(7) Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register
3. 29 CFR 1926.450(a)(10) Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register
4. 29 CFR 1910.25(d)(2)(xvii) Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register

FACE 93-22: Roofer Dies After Fall From Ladder--North Carolina

SUMMARY

A 56-year-old male roofer (the victim) died after falling approximately 15 feet from a ladder he was ascending. The victim was part of a five-man crew that was replacing a 35,000 square-foot office complex roof, which was 27 feet above ground. The workers were using a 40-foot fiberglass extension ladder tied off at roof level to access their work area. They began work at 8:30 a.m. and had only to install the flashing around the roof perimeter to complete the job. Three workers were already on the roof. The victim stopped at the tar kettle and asked the tar kettle attendant for a rag, then began to climb the ladder to the roof. The tar kettle attendant watched the victim climb the ladder approximately half-way up. The attendant turned away from the ladder, then heard something hit the ground behind him. When he turned around, he saw the victim lying face up on the ground. The emergency medical service (EMS) was summoned by phone from the office complex and one co-worker ran up the hill to the local hospital to summon help. The EMS arrived within 5 minutes, administered first aid, and transported the victim to the local hospital where he was pronounced dead by the attending physician. NIOSH investigators concluded that, to prevent similar occurrences, employers should:

- *stress to all employees the importance of exercising caution when climbing ladders to their workplace*
- *develop and implement a comprehensive written safety program.*

INTRODUCTION

On June 11, 1993, a 56-year-old male roofer (the victim) died after falling approximately 15 feet from a 40-foot extension ladder. On June 14, 1993, officials of the North Carolina Occupational Safety and Health Administration (NCOSHA) notified the Division of Safety Research (DSR) of this fatality, and requested technical assistance. On August 11, 1993, a safety specialist from DSR investigated the incident and reviewed the circumstances with a company representative, and the NCOSHA compliance officer and supervisor assigned to the case.

The employer in this incident was a roofing contractor that employed 8 workers and had been in operation for 30 years. The employer had a general safety program but no written safety procedures. All workers had received documented training in roofing and ladder safety. The victim had worked for the company as a roofer for 25 years. This was the first fatality the company had experienced.

INVESTIGATION

The company had been contracted to replace a 35,000 square-foot, 27-foot-high built-up roof on an office complex. A five-man crew was performing the work. The workers had been at the site for 1 week and work had progressed to the point that the only task remaining was the installation of the flashing around the perimeter of the roof. The day of the incident was to be the last day at the site.

At 8:30 a.m. on the morning of the incident, the foreman and two of the roofers climbed the ladder to the roof. The 40-foot fiberglass extension ladder had a 300-pound load limit rating.

On his way to the ladder, the victim passed the tar kettle where he asked for, and obtained from the attendant, a rag to use for the day. The attendant watched the victim climb the ladder to a height of approximately 15 feet, then turned away to prepare the tar kettle for transport from the site. The attendant heard something hit the ground behind him and thought the workers on the roof were throwing waste to the ground; however, when he turned, he saw the victim lying on his back on the gravel driveway.

The attendant yelled to the foreman, who, with one of the co-workers, descended the ladder to the ground. The co-worker went into the office complex to have someone summon the emergency medical service (EMS). The co-worker then ran to the hospital, which was located up the hill from the complex, to summon help.

The foreman began cardiopulmonary resuscitation but stopped when he realized the victim had broken ribs. The EMS arrived within 5 minutes and transported the victim to the hospital where he was pronounced dead by the attending physician.

Although the tar kettle attendant saw the victim ascend the ladder to approximately 15 feet above ground level, the event was unwitnessed. It is not known whether the victim slipped or tripped, then fell from the ladder. The steps of the ladder were clean and dry.

The medical examiner stated that there was no evidence of any physical condition that might have contributed to the incident. Blood alcohol and toxicology reports were negative. No citations for non-compliance with occupational safety and health standards were issued by NIOSH for this incident.

CAUSE OF DEATH

The medical examiner listed the cause of death as pericardial tamponade and right ventricle rupture.

RECOMMENDATIONS/ DISCUSSION

Recommendation #1: Employers should stress to all employees the importance of exercising caution when climbing ladders to their workplace.

Discussion: The ladder in this incident was clean and there was no evidence of a foreign substance that might have been a factor in the incident. Additionally, the workers had received training in ladder safety. Employers should constantly stress to employees the importance of exercising caution when climbing or working from ladders.

Recommendation #2: Employers should develop and implement a comprehensive written safety program.

Discussion: The written safety program should include, but not be limited to, ladder safety, the recognition and avoidance of fall hazards, and address appropriate worker training in the proper selection and use of fall protection equipment.

FACE 93-23: Painter Dies After Fall Inside 250,000 Gallon Water Tank--North Carolina

SUMMARY

A 20-year-old male painter (the victim) died after falling from an undetermined height inside a 250,000 gallon municipal water tank. The victim was part of a four-man crew painting the interior and exterior of the tank. Three painters, including the victim, were sandblasting and priming the exterior of the tank and the steel-grate catwalk around the circumference of the tank. The men were working from the catwalk, 112 feet above ground level. The crew foreman was inside the tank at floor level spraying an epoxy primer on the walls. A worker on the outside of the tank would periodically climb 25 feet to the top of the tank, using a permanently fixed side ladder, to check on the foreman through the 24-inch top opening at the crown of the tank. At approximately 3 p.m., the foreman, wearing a supplied-air respirator hood, heard a nearby noise and turned to see the victim lying on the floor of the tank. The victim was semi-conscious and having difficulty breathing. The foreman called to the outside workers for help. The victim was fitted with a body harness and lowered 85 feet to the ground through the 4-foot-diameter tank riser, located at the bottom of the tank body. The victim was then loaded by co-workers into a van and transported to the local hospital. The victim received no first aid at the site, nor was the EMS summoned. The victim arrived at the hospital at 4:18 p.m., was life flighted to a major trauma center at 5 p.m., and was pronounced dead at 9:13 p.m. NIOSH investigators concluded that, to prevent similar incidents, employers should:

- *develop and implement a comprehensive written confined space entry program*
- *develop and implement a comprehensive written safety program*
- *train all workers in the administration of basic first aid*

Additionally, property owners should:

- *require that all contractors have a written safety program specific to the work to be performed.*

INTRODUCTION

On July 2, 1993, a 20-year-old male painter (the victim) died after falling from an undetermined height inside a 250,000 gallon municipal water tank. On July 9, 1993, officials of the North Carolina Occupational Safety and Health Administration (NCOSHA) notified the Division of Safety Research (DSR) of this fatality, and requested technical assistance. On August 11 and 12, 1993, a safety specialist from DSR conducted an investigation of the incident and reviewed the circumstances of the incident with the NCOSHA district supervisor and health compliance officer assigned to the case, along with employer representatives. NCOSHA photographs of the scene following the incident were reviewed during the investigation.

The employer was a painting contractor that had been in operation for 8 years and employed 6 workers. The contractor specialized in refinishing steel structures such as municipal water tanks. The contractor had a basic confined space entry program; however, workers had not received confined space entry training or training in the proper use of respirators. Workers received training for sandblasting and painting on the job. The victim had worked for the contractor for 2 months. The contractor had experienced no previous fatalities.

INVESTIGATION

The company had been contracted by a local municipality to sandblast, prime, and paint the interior and exterior of a 250,000 gallon water tank that served as a fresh water reservoir for the municipality. The tank was 140 feet high at its summit, and was encircled by a steel-grate catwalk 112 feet above ground. A 4-foot-diameter riser extended from the tank bottom, 85 feet to the ground. The riser had a 24-inch-diameter portal located 30 inches above the ground (Figure). Both the air lines for the supplied-air respirator hood and the sandblaster, and service ropes, ran from the ground through the riser to the interior of the tank. The men climbed up to the interior entrance of the tank through the riser, by means of fixed steel steps.

The crew had been at the jobsite for 3 weeks. The entire interior and exterior of the tank body had been sandblasted. Three painters (including the victim) were working on the catwalk, sandblasting the exterior surface and applying an epoxy primer. The crew foreman, equipped with an air-line respirator hood, was inside the tank spraying the interior walls with primer. No artificial interior lighting or additional ventilation was used.

Approximately every 30 minutes, one of the painters would climb a fixed ladder approximately 25 feet to the top of the tank to look through the 24-inch-diameter opening and check on the foreman. At approximately 3 p.m. the victim, without notifying the other workers, climbed to the top of the tank and entered. The foreman, spraying the epoxy primer, heard a noise and turned to see the victim lying on the tank floor. The foreman went to the victim and found him unconscious and breathing with some difficulty. The foreman yelled to the other workers, who entered the tank to help assist the victim. The men placed a full body harness on the victim, then placed him on the foreman's back. The foreman climbed down the fixed steps in the tank riser, assisted by the two other workers, who lowered the victim with a rope attached to the body harness. When the foreman reached the ground, he pulled the victim through the portal at the base of the riser. When the other workers reached the ground, the victim was loaded into a van. The victim was given no first aid at the site and the emergency medical service (EMS) was not summoned. The three men drove the victim to the hospital, arriving at 4:18 p.m. At 5:00 p.m., the victim was life flighted to a major trauma center where he died at 9:13 p.m.

The event was unwitnessed; however, it is possible that the victim entered the tank and either slipped or tripped and fell from the fixed ladder inside the tank. It is also possible that the victim entered the tank and was affected by epoxy vapors, causing him to become dizzy and fall.

The Material Safety Data Sheet (MSDS) for the epoxy primer warned against inhalation of the vapors, stating that inhalation of vapors would affect the brain or nervous system, causing dizziness. The MSDS also advised the epoxy primer be applied in a well-ventilated area with workers wearing airline respirators. An atmospheric testing meter was on-site; however the oxygen sensor was not functioning.

CAUSE OF DEATH

The coroner listed the cause of death as excessive pooling of blood in the brainstem. The victim had also sustained fractures of the fifth and sixth cervical vertebrae.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should develop and implement a comprehensive written confined space entry program.

Discussion: Employers should develop and implement a written confined space entry program to address all provisions outlined in the following NIOSH publications: Working in Confined Spaces: Criteria for a Recommended Standard [Pub. No. 80-106]; NIOSH Alert, Request for Assistance in Preventing Occupational Fatalities in Confined Spaces [Pub. No. 86-110]; A Guide to Safety in Confined Spaces [Pub. No. 87-113]; and NIOSH Guide to Respiratory Protection [Pub. No. 87-116].

A confined space entry program should contain the following:

- written confined space entry procedures
- evaluation to determine whether entry is necessary
- issuance of a confined space entry permit
- evaluation of the confined space by a qualified person
- testing and monitoring the air quality in the confined space to ensure:
 - oxygen level is at least 19.5 %
 - flammable range is less than 10% of the LFL (lower flammable limit)
 - absence of toxic air contaminants
- training of workers and supervisors in the selection and use of:
 - safe entry procedures
 - respiratory protection
 - environmental test equipment
 - lifelines and retrieval systems
 - protective clothing
- training of employees in safe work procedures in and around confined spaces
- training of employees in confined space rescue procedures
- conducting regular safety meetings to discuss confined space safety
- availability and use of proper ventilation equipment
- monitoring of the air quality while workers are in the confined space.

Recommendation #2: Employers should develop and implement a comprehensive written safety program.

Discussion: The safety program should include, but not be limited to, the recognition and avoidance of fall hazards. When employees are required to work from elevations, employers should provide appropriate fall protection equipment and include appropriate worker training in the proper selection and use of fall protection equipment.

Recommendation #3: Employers should ensure that supervisors and workers are aware of the potential hazards of all substances with which they are required to work.

Employers should ensure that Material Safety Data Sheets (MSDS) are available for all chemicals, paints, solvents and other substances that are used, and that supervisors and workers are aware of their potential hazards and appropriate protective measures. It is unclear whether the workers were familiar with the hazards associated with the epoxy primer that was being sprayed inside the tank.

Recommendation #4: Employers should train all workers in the administration of basic first aid.

Discussion: All workers should be trained in the administration of basic first aid, and instructed to summon the Emergency Medical Service (EMS) prior to moving an injured person if the possibility of serious injury exists.

Recommendation #5: Employers should require that all contractors have a written safety program specific to the work to be performed.

Discussion: Although the contractor had a basic confined space entry program, the contractor was not required to have a written safety program or confined space entry procedures specific to the work being performed in the water tank. The contract language should address specific safety and health requirements for any contractors. Additionally, worker safety and health issues should be included as one of the evaluation criteria for selecting the appropriate contractor.

REFERENCES

National Institute for Occupational Safety and Health, Working in Confined Spaces: Criteria for a Recommended Standard. DHHS (NIOSH) Publication No. 80-106, December 1979.

National Institute for Occupational Safety and Health Alert, Request for Assistance in Preventing Occupational Fatalities in Confined Spaces. DHHS (NIOSH) Publication No. 86-110, January 1986.

National Institute for Occupational Safety and Health, A Guide to Safety in Confined Spaces. DHHS (NIOSH) Publication No. 87-113, July 1987.

National Institute for Occupational Safety and Health, Guide to Respiratory Protection. DHHS (NIOSH) Publication No. 87-116, September 1987.

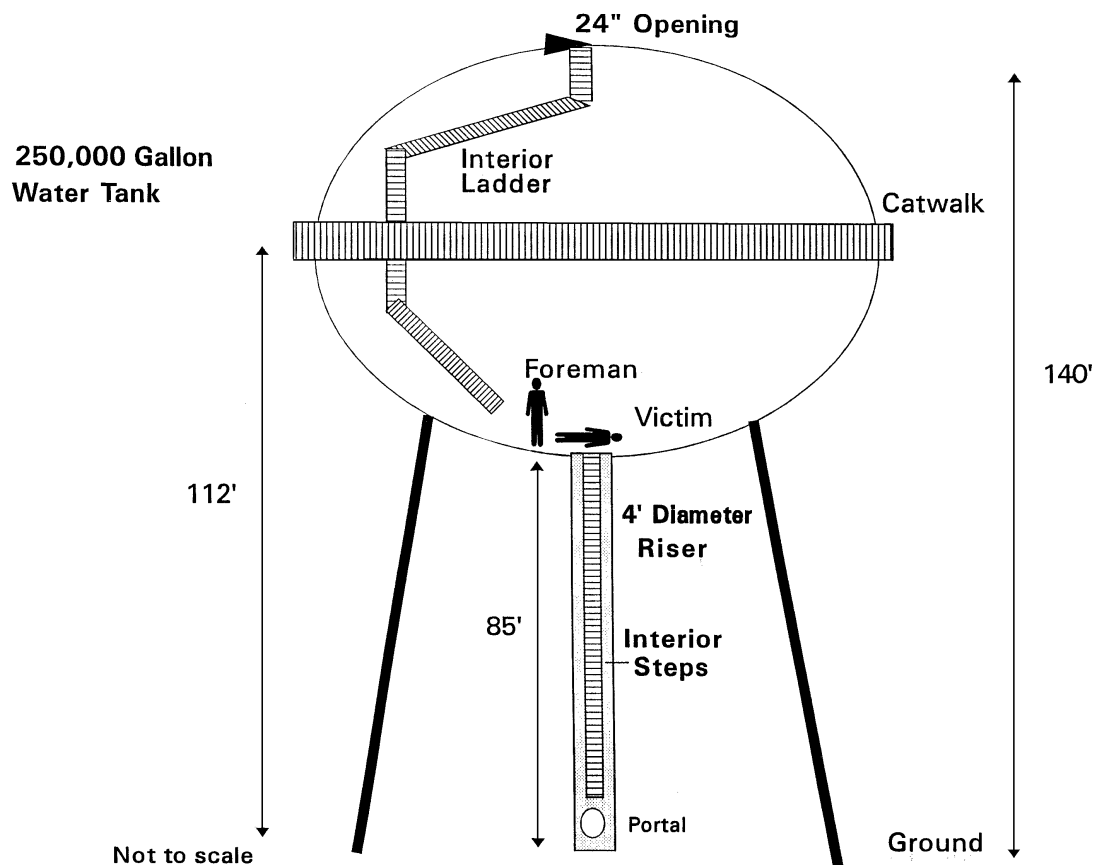


Figure.

FACE 94-01: Hotel Grounds Maintenance Man Dies After 16-Foot Fall From Ladder--South Carolina

SUMMARY

A 53-year-old male hotel grounds maintenance man (the victim) died after falling 16 feet from a ladder and striking his head on a concrete parking lot surface. The victim and a co-worker were trimming palm trees and shrubbery located on a concrete island in the hotel parking lot. The victim was using pruning shears to trim the trees while working from a 32-foot aluminum extension ladder 16 feet above ground. The co-worker was facing away from the victim while trimming shrubs at ground level. The co-worker heard a thud and turned to see the victim lying on his back in the concrete parking lot. The co-worker ran to the victim, who was not breathing, and initiated cardiopulmonary resuscitation (CPR). A worker exiting the hotel office saw the co-worker administering CPR and told management personnel in the office to summon the emergency medical squad (EMS). The victim was transported to the local hospital, then transferred to a major trauma center where he died 4 days later. NIOSH investigators concluded that, to prevent similar occurrences, employers should:

- *stress to all employees the importance of exercising caution when working from ladders*
- *develop and implement a comprehensive written safety program.*

INTRODUCTION

On October 23, 1993, a 53-year-old hotel grounds maintenance man (the victim) died of injuries sustained in a 16-foot fall from an aluminum extension ladder on October 19, 1993. On October 28, 1993, officials of the South Carolina Occupational Safety and Health Administration (SCOSHA) notified the Division of Safety Research (DSR) of this fatality, and requested technical assistance. On December 20, 1993, a safety specialist from DSR investigated the incident and reviewed the incident with a company representative, and the SCOSHA compliance officer and supervisor assigned to the case.

The victim had been employed at a resort hotel as a grounds maintenance man and painter. The hotel had been in operation for 30 years and employed 40 workers. The employer had no written safety program or procedures; however, training was provided on the job. Maintenance workers were provided with safety glasses and gloves. This was the first fatality experienced by the employer.

INVESTIGATION

The victim and co-worker began work daily at 6 a.m. by hosing down and straightening up the area around the outdoor swimming pool. On the day of the incident, after these tasks were completed, the two men were instructed to trim three 25-foot-high palm trees and the shrubbery located on an island in the hotel parking lot.

At approximately 7:45 a.m., the victim, working from a 32-foot aluminum extension ladder, began to trim the palm trees (using pruning shears), while the co-worker remained at ground level to trim the shrubbery.

Two trees were trimmed without incident. As the co-worker continued trimming the shrubbery, with his back to the victim, he heard the victim positioning the aluminum extension ladder against the third tree. The

co-worker turned to see the victim climb to the 16-foot level, then turned back to his work. He immediately heard a thud, then the sound of the ladder striking the parking lot. He turned to see the victim lying on his back in the concrete parking lot, 10 feet from the base of the tree. The co-worker ran to the victim, who was not breathing, and initiated cardiopulmonary resuscitation (CPR). A worker exiting the hotel office noticed the co-worker administering CPR to the victim and told management personnel to summon the emergency medical service (EMS). The EMS arrived within 5 minutes and transported the victim to the local hospital. The victim was transferred to a major trauma center where he died 4 days later.

CAUSE OF DEATH

The attending physician listed the cause of death as closed-head trauma.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should stress to all employees the importance of exercising caution when working from ladders.

Discussion: The event was unwitnessed but evidence suggests that the ladder and victim fell together away from the tree. The ladder in this incident was clean and there was no evidence of a foreign substance that might have been a factor in the incident. Employers should constantly stress to employees the importance of exercising caution when climbing or working from ladders, and should ensure that employees adhere to 29 CFR 1910.26 (c)(3)(iv), which regulates the proper use of extension ladders. Additionally, a strap or rope cradle could be used to fasten a ladder to an uneven surface, such as the tree in this incident.

Recommendation #2: Employers should develop and implement a comprehensive written safety program.

Discussion: Enforcement of this safety program should reduce and/or eliminate worker exposures to hazardous situations. The safety program should include, but not be limited to, ladder safety, the use of safety equipment, and the recognition and avoidance of fall hazards.

REFERENCES

29 CFR 1910.26 (c)(3)(iv) Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register.

FACE 94-12: Carpenter Dies After Falling 10 Feet From A Step Ladder/Porch Floor--South Carolina

SUMMARY

A 37-year-old male carpenter (the victim) died after falling 10 feet and striking his head on a concrete block retaining wall. The victim and two co-workers had been assigned clean-up work at a private residence that was under construction. The victim was working out of sight of co-workers when the incident occurred. The victim was last observed by his co-workers standing on a step ladder affixing blocks of wood to the ceiling rafters of a covered porch. Although the incident was unwitnessed, it can be assumed that the victim either lost his balance and fell from the ladder, or was descending the ladder and stepped backwards off the ladder and off the edge of the porch. The victim struck his head on a concrete block retaining wall, located about 6 feet below the open-sided porch floor. Guardrails around the porch floor perimeter were not present at the time of the incident. When the co-workers found the victim he was unconscious but breathing. One co-worker ran across the lot to another residence that was under construction, and asked the foreman to call for an ambulance. The ambulance arrived in less than 10 minutes, the victim was stabilized and transported to the local hospital. Two days later the victim was pronounced brain dead, all life support systems were removed and consequently he died that day. NIOSH investigators concluded that, to prevent similar occurrences, employers should:

- *provide adequate guarding for open-sided floors, platforms, and runways*
- *review and revise, where applicable, existing safety programs*
- *routinely conduct scheduled and unscheduled workplace safety inspections*
- *encourage workers to actively participate in workplace safety.*

INTRODUCTION

On March 23, 1994, a 37-year-old male carpenter (the victim) died from injuries received in a 10-foot fall from a step ladder/porch floor on March 21, 1994. On April 21, 1994, officials of the South Carolina Occupational Safety and Health Administration (SCOSHA) notified the Division of Safety Research (DSR) of this fatality, and requested technical assistance. On May 18, 1994, a DSR safety specialist conducted an investigation of this incident. The incident was reviewed with the employer, county coroner, and SCOSHA compliance officer assigned to the case. Photographs of the incident site were taken during the investigation.

The employer was a house-framing contractor that had been in business for 19 years and employed five workers, three of whom were carpenters. The employer had a written safety program, but the program was incomplete regarding specific guardrail requirements. The victim had been employed for 2 days prior to the incident; however, he had worked for the employer for a 2-year period about 1 year previously. He had about 15 years experience as a carpenter. This was the first fatality experienced by the employer.

INVESTIGATION

The employer had been subcontracted to do the framing work for a new residence under construction at a private residential housing community. The house was a three-story wooden structure with a covered

porch located at the second story level. The porch was located about 10 feet above ground level and a 4-foot concrete block retaining wall was located directly below the porch. Work had been in progress for 6 weeks, and the day of the incident was to have been the last day on the job. The workers (the victim and two co-workers), had been assigned clean-up work for the day.

On the day of the incident, the workers started work around 7 a.m. and proceeded to different parts of the house to clean up. The victim was last observed by his co-workers standing part way up an 8-foot-high fiberglass step ladder on the porch floor. The ladder was positioned with the ladder steps facing toward the open side of the porch, about 1-foot from its edge. The ladder was apparently being used by the victim to access the porch ceiling rafters. He had been using a hammer and nails to affix pieces of wood to the porch ceiling rafters in preparation for the hanging of sheetrock. Although the incident was unwitnessed, it is assumed the victim either lost his balance and fell from the ladder, or was descending the ladder, stepped backwards off the edge of the porch, and fell and struck his head on the concrete block retaining wall. The porch floor was located about 6 feet above the top of the concrete block retaining wall, and guardrails around the porch floor perimeter were not present at the time of the incident.

The co-workers found the victim unconscious but breathing about 10:30 a.m. One co-worker ran across the lot to another residence that was under construction, and asked the foreman to call for an ambulance. The ambulance arrived in less than 10 minutes, the victim was stabilized and transported to the local hospital. Two days later the victim was pronounced brain dead and all life support systems were removed.

CAUSE OF DEATH

The coroner's report listed the cause of death as subdural hemorrhage.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should provide adequate guarding for open-sided floors, platforms, and runways.

Discussion: The victim was using a stepladder positioned on the floor of a porch about 1 foot from its edge. The floor was open-sided and unguarded. Also, the porch was 10 feet above ground level; a 4-foot-high concrete block retaining wall had been erected directly below the porch area where the victim was working. Guarding of the open-sided porch floor with a standard railing as required by CFR 1926.500 (d)(1)(i) was not present. **NOTE:** Since the incident, the employer has revised the safety program to require the guarding of all open-sided floors, platforms, and runways prior to the commencement of any work being performed.

Recommendation #2: Employers should review and revise, where applicable, existing safety programs.

Discussion: Although the employer had a written safety program, there was no procedure regarding the protecting of open-sided floors with guardrails and handrails. Safety programs should be periodically reviewed and revised, as necessary, to reduce and/or eliminate worker exposures to hazardous situations. The safety program should include, but not be limited to, protecting open-sided floors with appropriate guardrailing and handrails, ladder safety, the use of safety equipment, and the recognition and avoidance of fall hazards.

Recommendation #3: Employers should routinely conduct scheduled and unscheduled worksite safety inspections.

Discussion: Scheduled and unscheduled safety inspections should be conducted by a competent¹ person to ensure that worksites are free of hazardous conditions. Regardless of how comprehensive, a safety program cannot be effective unless implemented in the workplace. These inspections may not guarantee the elimination of occupational hazards, but they do demonstrate the employer's commitment to the enforcement of the safety program and to the prevention of occupational injury.

Recommendation #4: Employers should encourage workers to actively participate in workplace safety.

Discussion: Employers should encourage all workers to actively participate in workplace safety and should ensure that all workers understand the role they play in the prevention of occupational injury. In this instance, the victim was working in an area without sufficient guarding. Workers and co-workers should look out for one another's safety and remind each other of the proper way to perform their tasks. Employers must instruct workers of their responsibility to participate in making the workplace safer. Increased worker participation will aid in the prevention of occupational injury.

REFERENCES

29 CFR 1926.500 (d)(1)(i) Code of Federal Regulations, Washington, D.C.: U.S. Government Printing Office, Office of the Federal Register.

¹Competent person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authority to take prompt corrective measures to eliminate them.