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PUBLIC HEALTH SERVICE/CDC/NIOSH/DSR
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TO: **Director, National Institute for Occupational Safety and Health**

FROM: **Division of Safety Research, NIOSH**

SUBJECT: **Tower Erector Dies After Falling 125 Feet From Cellular Phone Tower--South Carolina**

SUMMARY

A 26-year-old male tower erector (the victim) died after falling 125 feet from a cellular phone tower. The victim was a member of a five-man crew that was erecting a 250-foot cellular phone tower. The victim was on the tower with another tower erector working from top to bottom, securing flexible electrical cables to two of the tower legs. The cables would supply power for the tower's satellite and beacon lights. The victim and foreman climbed down diagonal and horizontal tower cross-members from the 145-foot level to the 125-foot level and began to secure their positioning lanyards to the horizontal tower members. The victim was holding onto a horizontal tower member as he reached to secure his lanyard to the tower. The other erector, located 8 to 10 feet from the victim, heard the victim yell and saw him fall to the ground. The victim struck a metal electrical switch box and its concrete mounting pad prior to hitting the ground. A worker on the ground ran to the truck and called the emergency medical service (EMS). The county EMS and county coroner responded, and the coroner pronounced the victim dead at the scene. NIOSH investigators concluded that, to prevent similar occurrences, employers should:

- ***instruct workers to maintain 100% fall protection while on towers***
- ***instruct workers to take sufficient rest periods to decrease the risk of fatigue.***

INTRODUCTION

On March 29, 1998, a 26-year-old male tower erector (the victim) died after falling 125 feet from a cellular phone tower. On April 6, 1998, officials of the South Carolina Occupational Safety and Health Administration (SCOSHA) notified the Division of Safety Research (DSR) of the fatality, and requested technical assistance. On April 14, 1998, a DSR Occupational Safety and Health Specialist conducted an investigation of the incident. The incident was

reviewed with the SCOSHA compliance officer assigned to the case, the president and vice-president of the company, and the county coroner. The incident site was visited and photographed during the investigation.

The employer was a tower erection contractor that had been in operation 3 years and employed eight workers. The company had a written safety policy and manual that covered all aspects of general construction. Since the incident, the employer is working with the safety directors of other tower erection contractors to develop a fall protection plan specific to tower erection. Pre-construction site surveys were conducted by the vice-president and the crew foreman. Tailgate safety meetings were conducted prior to work beginning on each job and on an as needed basis thereafter. The victim had worked for the employer for 6 days, but had 6 years of documented experience as a tower erector.

INVESTIGATION

The employer had been sub-contracted to erect the steel structure for a three-legged, 250-foot-high cellular phone tower. Site preparation had been completed. This included clearing the ground, pouring the concrete footers for the tower legs, setting an electrical switch box for the tower's beacon lights and satellite, and erecting an 8-foot chain link fence around the perimeter of the tower.

The five-man crew consisted of three tower erectors(including the victim), a groundman, and a foreman. The crew assembled 20-foot sections of the tower on the ground prior to the arrival of a crane that would lift the sections into place. Each section consisted of three 20-foot legs, with horizontal and vertical cross braces between the legs, forming three faces on each section. After the crane arrived on site, two erectors worked on the tower, while the third erector, groundman, and foreman assembled the remaining 20-foot tower sections.

At the time of the incident, the tower structure had been completed, and the tower's beacon lights and satellite had been installed. The only remaining task was to install the flexible electrical cables that would power the lights and satellite and secure them to the tower legs from the top to the bottom. Electricians would then wire the cables into the switch box.

Prior to leaving the site, the crane lifted the cables to positions near the satellite and the beacon lights. The two tower erectors then wired the cables into the satellite and lights.

The two tower erectors (including the victim) started at the top of the tower and climbed down, attaching the cables to the tower legs

at approximately 15-foot intervals with plastic zip ties. The tower erectors each wore a 6-foot lanyard equipped with a large pelican hook attached to their body harnesses, which they used as positioning devices to attach to the tower when they stopped to secure the cables. The men free-climbed down the vertical and horizontal cross braces on their way down the tower.

The men secured the cables at the 140-foot level and climbed down to a level approximately 125 feet above ground. The victim was standing on a horizontal cross brace and holding onto the tower leg with his left hand while trying to attach his lanyard to a horizontal cross member with his right hand. The other tower erector, positioned 8 to 10 feet from the victim, heard the victim yell and looked over to see the victim fall away from the tower. The victim fell to the ground, striking the electrical switch box and the concrete pad on which the switch box was mounted. The foreman summoned the emergency medical service from a mobile phone in his truck. The county EMS responded with the county coroner, who pronounced the victim dead at the site. During interviews with the OSHA compliance officer, the tower erector who was on the tower with the victim at the time of the incident, stated that it looked like the victim's left hand cramped as he was attempting to attach his lanyard to the tower. The victim's left hand drew away from the tower, leading to the fatal fall.

CAUSE OF DEATH

The county coroner listed the cause of death as massive trauma to the head and trunk.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should instruct workers to maintain 100% fall protection while on towers.

Discussion: In this case, the employee fell from the tower after he apparently was attempting to connect his fall protection in order to be tied off while securing the electrical cables. Employers should instruct tower workers to maintain 100% fall protection during tower construction. One hundred percent fall protection is defined as follows: every employee at risk of fall from work levels over 6 feet above the ground or working surface must be protected by some conventional means of fall protection, which may include an integral fall-arrest system. This applies to ascending, descending, moving point to point, or any tower construction or alteration work activity conducted at an elevated work station. Employers should also require a minimum of three-point contact (two hands and one foot or two feet and one hand) at all times.

Traditional fall protection for this job is more effective when the employee is stationary and tied onto the structure. It is recommended that other methods of fall protection be used that protect employees while they are moving as well as when stationary. Employees should be equipped with two lanyards so that while moving from point to point, one lanyard will be connected to the tower at all times. Additionally, a lifeline system or cable safety-climb device attached to the highest point of the tower leg provides a tie-off point for the employee to hook onto, and provides fall protection coverage at all times. For a tower leg or similar vertical structure, a fall arrester (e.g., rope grab) should be worn by the employee and attached to the lifeline, enabling the worker to move freely without interference until a free fall is detected. If these types of fall protection are not feasible, safety nets should be installed at the worksite in accordance with 29 CFR 1926.105(a)which states that safety nets shall be provided when workplaces are more than 25 feet above the ground where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or safety belts is impractical.

Recommendation #2: Employers should instruct workers to take sufficient rest periods to decrease the risk of fatigue.

Discussion: In this instance, the victim's arm may have cramped, causing him to lose his grip on the tower. When a climber is prepared to begin a climb, they should attach to a functional safety climb device. The techniques involved in ascending or descending a tower are very basic. When a climber moves up or down a permanent step or a member of the tower structure, the climber's legs should carry most of the weight. The arms and hands should be used only to maintain balance and the climber's position. Whenever possible, a climber should remain on the outside of the graduated slope of the tower. Using this method, the climber is naturally pulled toward the structure, lessening the effects of fatigue. Climbers should be instructed to limit their climbing runs (distances without stopping) to a comfortable distance, stopping before they begin to feel the effects of fatigue.

REFERENCES

Code of Federal Regulations 29 CFR 1926, 1997 edition. U.S. Government Printing Office, Office of the Federal Register, Washington DC.

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Fatality Assessment and Control Evaluation (FACE) Project

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatality Assessment and Control Evaluation (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.

States participating in this study: North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia.

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