

ADMINISTRATIVE REPORT
PUBLIC HEALTH SERVICE/CDC/NIOSH/DSR
FACE 98-20

Date: January 13, 1999

TO: Director, National Institute for Occupational Safety
and Health

FROM: Division of Safety Research, NIOSH

SUBJECT: Tower Erector Dies After Falling 200 feet From
Telecommunication Tower-North Carolina

SUMMARY

A 23-year-old male tower erector (the victim) died after falling 200 feet from a telecommunication tower while attached to an 80-foot section of cable tray. The victim was a member of a 9-man crew that was erecting a 240-foot-high, 3-sided telecommunication tower. The crew bolted a 140-foot section of the tower together on the ground. This section was then set in place by a crane. The men then erected the final 100-foot section on the ground, and 3 tower erectors climbed the 140-foot section. The final section was set in place by the crane and the men bolted the two sections together. The crane then lifted an 80-foot section of cable tray to the top of each side of the tower. As each section was lifted into place, an erector began to attach it to the tower using four "J" bolts every 10 feet. The victim began working down the tower, attaching the cable tray and tightening all bolted connections as he descended. After approximately 1 hour, the victim was at the 200-foot level of the tower. After the victim repositioned himself, he connected both of his lanyards to the partially attached cable tray. Shortly thereafter, the section of cable tray gave way, falling to the ground with the victim attached. Workers from the crane company initiated cardiopulmonary resuscitation (CPR), while the foreman contacted the emergency medical service (EMS) from the company truck. The victim was transported to the hospital 15 minutes away, where he was pronounced dead by the attending physician. NIOSH investigators concluded that, to prevent similar occurrences, employers should:

- *train and instruct workers to evaluate anchor points before attaching fall arresting equipment*
- *maintain 100% fall protection while on towers*
- *develop, implement, and enforce a comprehensive written safety program*

- *continually stress the importance of adhering to standard work procedures.*

INTRODUCTION

On July 16, 1998, a male tower erector (the victim) died after falling 200 feet from a telecommunications tower. On July 22, 1998, 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 September 15, 1998, a DSR occupational safety and health specialist conducted an investigation. The incident was reviewed with the company owner and the NCOSHA compliance officer assigned to the case. The incident site was visited and photographed during the investigation.

The employer was a tower erection company that had been in operation for 4 years and employed 9 workers. The employer had no written safety policy or safety program; however, the employer did have established standard operating procedures for the erection of a tower. The crew foreman held tailgate safety meetings on an as-needed basis. Training was accomplished on the job. The victim had worked for the company for approximately 1 year. This was the first fatality experienced by the company.

INVESTIGATION

The employer had been contracted by a communications company to erect a 240-foot-high telecommunications tower. Ground clearance for the project began on July 1, 1998, and included clearing the worksite and construction of the concrete base pads for the tower legs and the electrical power box. Tower erection began on July 12, 1998. A 140-foot section of tower was erected on the ground, with connections being tightened to a "full nut" (nut turned completely on the bolt but not tightened to the final torque) according to company work procedures. The section was then lifted into place by a crane and the tower legs were secured to their concrete pads. The final 100-foot section was then assembled on the ground in the same manner, lifted into place by the crane and secured, to the first section.

On July 16, 1998, the crew was to install an 80-foot section of cable tray on each of the three sides of the tower, then work down the tower tightening all bolts on the tower with the proper torque. The cable tray was shaped like a common ladder with grooved rungs into which the cable would fit (Figure).

Three workers were on the tower as the sections of cable trays were lifted into place by the crane. All three men wore two lanyards attached to a full-body harness that enabled them to remain anchored to the tower at all times, even while repositioning. Standard practice called for 60 feet of the cable tray section to be secured to the permanent tower structure with 4 "J" bolts every 10 feet before the crane cable was released. After the crane cable was released from the first section, the second section was lifted into place as one worker completed connecting the final 20 feet of the first section to the tower. The victim and a second co-worker connected the first 60 feet of the second section, then released the crane cable, and a third section was lifted into place. The victim began the connections on the third section himself, but was asked for assistance by his co-worker connecting the second section.

The victim assisted his co-worker, then returned to the third section of cable tray to resume connecting and tightening bolts as he descended. The victim had connected between 10 and 20 feet of the section to the tower when he removed the crane hook and signaled the crane operator to pull away. The victim then repositioned himself, attaching both his lanyards to the cable tray section. As the victim resumed connecting, the cable tray pulled away from the tower, taking the victim with it. The victim fell approximately 200 feet to the ground with the cable tray section. Workers from the crane company assisted the victim and initiated cardiopulmonary resuscitation (CPR) while the victim's supervisor called the emergency medical squad (EMS) from the company truck. The victim was transported to the hospital 15 minutes away, where he was pronounced dead by the attending physician.

CAUSE OF DEATH

The attending physician listed the cause of death as massive trauma.

Recommendation #1: Employers should train and instruct workers to evaluate anchor points before attaching fall arresting equipment.

Discussion: In this incident the victim attached both his lanyards to a section of cable tray that was only partially attached to the permanent tower structure by "J" bolts. As a result, the temporary connections gave way under his weight and the cable tray pulled away from the tower, falling to the ground with the victim. Employers should train and instruct workers to evaluate anchor points prior to attaching their fall arresting equipment. Had the victim attached to the permanent tower structure in this case, the fatality may have been prevented.

Recommendation #2: 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 connected his fall arresting equipment to a partially attached section of cable tray. 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, one foot or two feet, 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. In this case, a lifeline could have been attached to the highest point of a tower leg and equipped with a rope grab and a carabinier device for lanyard attachment. 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 harnesses is impractical.

Recommendation #3: Employers should develop, implement, and enforce a comprehensive written safety program.

Discussion: Although safe work procedures were in place for tower erection, the employer had no written safety program, safety policy, or safe work procedures. The development, implementation, and enforcement of a comprehensive safety program should identify and reduce or eliminate worker exposures to hazardous situations.

The safety program should include, but not be limited to employing worksite hazard assessments to enable the recognition and avoidance of fall hazards; and providing, and enforcing, the use of appropriate safety equipment such as safety nets or safety harnesses and lanyards.

Recommendation #4: Employers should continually stress the importance of adhering to standard work procedures.

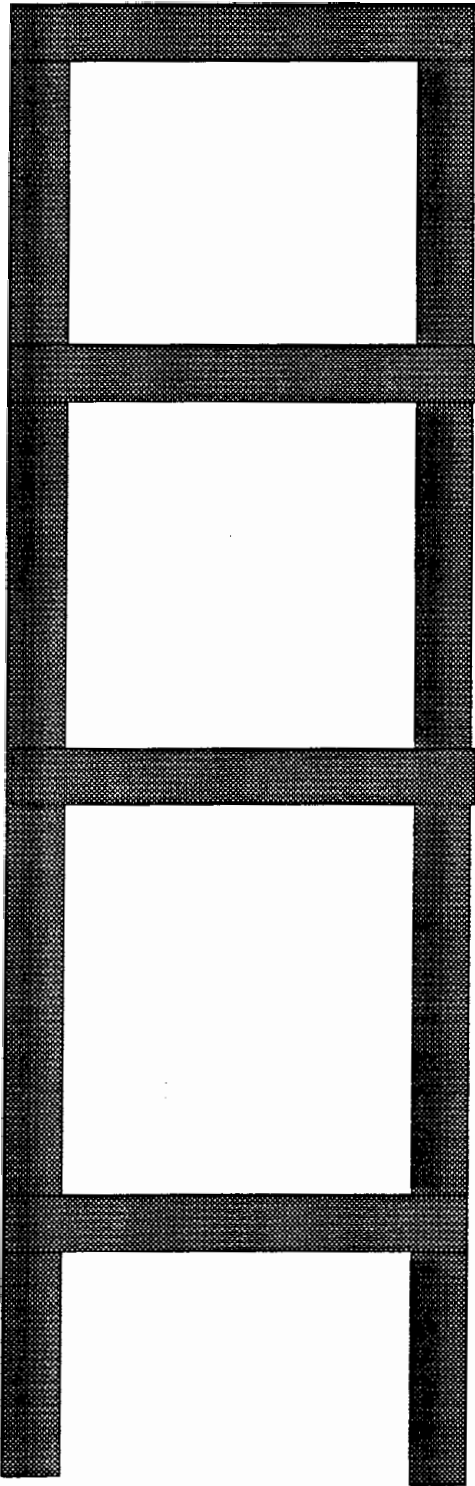
Discussion: Standard work procedures in this instance called for the crane cable to remain attached to the 80-foot section of cable tray until at least 60 feet of the cable tray had been attached to the permanent tower structure. The victim had attached only between 10 and 20 feet (4 to 8 "J" bolts) when he gave the crane the okay sign to pull away from the tower. When he hooked his lanyards to the cable tray and placed his weight on them, the section of cable tray pulled away from the tower. Had the crane cable still been attached, it could have lowered the section of cable tray to the ground, possibly preventing the fatality. The employer in this incident did have safe work procedures pertaining to tower erection that could have prevented the fatality. The fact that the incident occurred in spite of these policies clearly shows the need for employers to continually remind all employees of the importance of following established safety procedures at all times. Employees should be trained in the proper safest work procedures to perform their tasks. If retraining is necessary, it should be conducted at the necessary intervals.

REFERENCES

Code of Federal Regulations 29 CFR 1926, 1997 Edition. U.S. Government Printing Office, Office of the Federal Register, Washington, D.C.

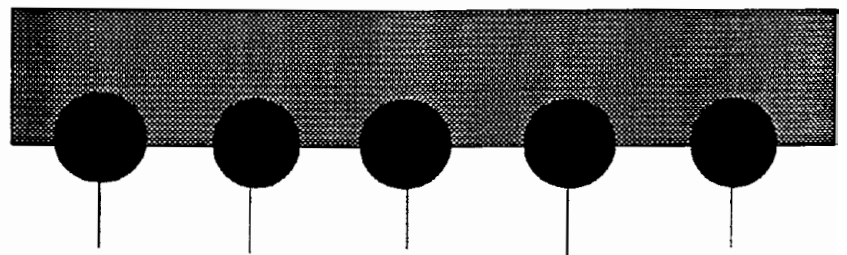
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Figure

Cable Tray Section



Cable Holder

Cable Holder Top View

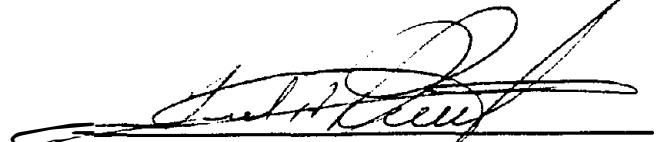


Slots into which cables are secured

Not to Scale



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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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