The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research NIOSH

Iron Worker Dies Following an 89-Foot Fall Through an Opening in Temporary Metal Flooring in Virginia

FACE 9133

SUMMARY

A 26-year-old male iron worker (victim) died from injuries sustained after falling through an unguarded temporary floor opening to the ground 89 feet below. Workers had begun removing temporary metal flooring from the fourth floor of a new paper processing facility. The workers then left the site without safely securing a newly created 5-foot by 28-foot floor opening. The victim, who had been working on the roof deck, descended to the fourth floor to get a drink from a water cooler. While there, co-workers reminded him of some bolting he had missed on the same level. The victim was still wearing his safety belt and lanyard, but did not tie-off to the existing static lines. As he was looking upward for missed bolting locations, he walked off the edge of the flooring at the opening, and fell 89 feet to the ground. During the fall, his head and chest struck against structural steel members causing massive injuries that resulted in his death. NIOSH investigators concluded that, in order to prevent similar occurrences, employers should:

- **ensure that workers do not leave a workplace until all floor openings have been safely secured by barriers with warning signs or safety railings**
- **ensure that workers continually adhere to established safe work practices**
- **encourage all workers to actively participate in workplace safety.**

INTRODUCTION

On July 12, 1991, a 26-year-old male iron worker died from injuries sustained after falling through an unguarded opening in a temporary metal floor to the ground 89 feet below. On August 29, 1991, officials of the Virginia Department of Labor and Industries (VAOSHA), notified the Division of Safety Research (DSR) of the fatality, and requested technical assistance. On September 25, 1991, a DSR Safety Engineer traveled to the site to conduct an investigation. The fatality was reviewed with company representatives and the VAOSHA compliance officer, and police and coroner reports were obtained. Photographs of the site immediately following the incident were reviewed, and additional photographs were taken.

The employer was a steel erection company subcontracted to install the main structural steel elements of a paper processing facility. The company had been in business for 18 months and had 55 employees, including 6 iron workers. The company had a corporate safety officer, a comprehensive written safety program, written safety procedures, and occasional, unscheduled safety meetings. Upon hire, employees received general safety training with manuals and videos.

INVESTIGATION

The victim was one of six iron workers bolting-up (placing large nuts on bolts and then tightening) the structural steel at the time of the incident. The structure was six stories high with a small seventh-story penthouse (Figure). A 2-inch, wire-rope static line had been installed around the perimeter of each floor, and also across the working space in several areas, for convenient tie-off. All employees had safety belts and lanyards, and their use was rigorously enforced. Safety nets were also used, as appropriate. The work area was very noisy and windy. On the morning of July 12, 1991, the victim and a co-worker were bolting-up steel on the roof deck (sixth floor). There were several hundred bolt locations on this job and many were difficult to find.

About an hour before the fall, some of the temporary metal flooring had been removed from the fourth floor because most of the work had been completed at that level. This left an opening 5 feet wide and 28 feet long. The workers who removed the flooring left the fourth floor without safely securing the new opening. At about 11:30 a.m., the victim left the roof deck to get a drink from the water cooler on the fourth floor. Co-workers on the fifth floor shouted to the victim that he had missed a few bolts on that floor.

At about 11:55 a.m., the victim began walking along the fourth floor, looking upward for the missed bolts. He was not tied off; the last time the victim had been on the fourth floor, all the flooring had been in place. Co-workers above the victim saw him approach the floor opening and shouted warnings. The victim did not hear them and fell through the opening. His head and chest struck against steel members during the fall, and he struck the ground with such force that he was embedded six inches in the sandy soil. The site owners' emergency response team responded within 2 minutes and started cardiopulmonary resuscitation (CPR). At 12:00 p.m., an emergency medical service (EMS) arrived. The victim was completely unresponsive, and bleeding profusely from the nose and mouth. He was transported to a local hospital, by the EMS, where he was pronounced dead on arrival.

CAUSE OF DEATH

The attending physician listed the cause of death as massive injuries to the head, neck, and chest.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that employees do not leave a workplace until all floor openings have been safely secured by barriers with warning signs or by safety railings.

Discussion: When the victim had previously been on the fourth floor, it had been completely covered with the temporary metal decking. The victim was not aware of an opening in the floor, so he casually walked about. 29 CFR 1926.750(b)(1)(iii) contains specific requirements concerning floor periphery safety railing for skeleton steel erection. Additional instruction in the avoidance and recognition of hazards may be necessary to comply with 29 CFR 1926.21(b)(2) which states, "The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury." The National Safety Council also recognizes the need to guard floor openings (3).

Recommendation #2: Employers should ensure that workers continually adhere to established safe work procedures.

Discussion: In this case, the victim removed his tie-off and descended to a lower level to get a drink of water. He did not tie-off again upon reaching the lower level. Established company work practices required that he tie off at both levels.

Recommendation #3: Employers should encourage all workers to actively participate in workplace safety.

Discussion: If all workers actively participate in workplace safety, the level of awareness and avoidance of hazards will improve. In this case, co-workers above the victim could see he was not tied-off, yet did nothing to remind him to secure himself until it was to late to help. When the fall became inevitable, the victim could not hear their warnings.

REFERENCES

1. Office of the Federal Register: Code of Federal Regulations, Labor, Title 29, Subtitle B, Chapter XVII, Part 1926.21 (b) (2), p.20. July 1,1990.

2. Office of the Federal Register: Code of Federal Regulations, Labor, Title 29, Subtitle B, Chapter XVII, Part 1926.750 (b) (1) (iii), p.265. July 1,1990.

3. National Safety Council [1988]. Accident prevention manual for industrial operations: engineering and technology, 9th ed. Laing pm, ed. Chicago, Il: R.R. Donnelley & Sons, p. 25.

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