

**TO: Director, National Institute for Occupational Safety and Health**

**FROM: Iowa FACE Program**

**SUBJECT: Youth falls from ladder and dies while changing light bulb -- Iowa.**

**SUMMARY:**

A 17 year old retail outlet worker died after falling 18 feet from a fiberglass extension ladder. The teenager was performing general sales work for a building supply store and was in the process of changing a light bulb when he fell from the ladder and hit his head on the tiled concrete floor below. The department manager had attempted to change the bulb from the ladder without success just minutes before, then made the decision to change it after work using a forklift. Common procedure was to place a pallet on a forklift and raise a worker to the proper height so he could get two hands on the light fixture, which hung from a chain.

Instead of putting the ladder away, the youth repositioned the ladder and attempted to change the light bulb by himself. He apparently lost his balance on top of the ladder and fell head first to the floor. He received massive head injuries and died enroute to the hospital.

The 280 volt light fixture was still energized at the time of the accident and it is possible that the youth was shocked immediately prior to the fall. Subsequent investigation of the light fixture revealed nothing abnormal, however, it was determined that someone could get a shock from such a fixture while changing a bulb, if the bulb was sufficiently loose and they were grounded elsewhere on their body. A metal fire sprinkler pipe near the light fixture could have served as grounding.

**RECOMMENDATIONS following our investigation were as follows:**

- 1. *The employer should establish a safe procedure for changing lightbulbs at high elevations by: 1) Assigning this work only to qualified workers, 2) Training these workers in safe work practices, 3) Providing safe access, such as an approved aerial platform for high elevations, 4) De-energizing light fixtures before changing the lightbulbs, 5) Providing tools, such as work lights, electrical testing equipment, and any special tools for de-energizing or loosening the bulbs.*
- 2. *Workers should follow safe work procedures, not attempting to perform unassigned work duties that are potentially dangerous.*

**INTRODUCTION**

In June 1995 at approximately 6:00 P.M. a 17 year old employee for a building supply store

was killed when he fell off a ladder while changing a light bulb. The Iowa FACE program became aware of the incident from a local newspaper and began an investigation. A site visit was not conducted due to the wishes of the victim's employer, however detailed information was gathered from many sources, including Iowa Division of Labor, local police, company spokesmen, newspaper articles, the medical examiner's report, eyewitnesses, and the electrician who installed the light fixture.

The employer was member of a large chain of retail building supply stores. Corporately they had over 16,000 employees with 150 at this particular store. The company had been in business for over 30 years. The victim was employed as a part-time sales associate in the hardware department, one of over 40 employees with the same job classification and similar work duties. He had worked at this location for three months.

The company states that safety issues are incorporated within the general orientation program that each new sales associate must complete. Although many other safety related areas are mentioned, changing light bulbs was not one of them. Company officials state there is a hazard communication program at the corporate level, but the program had not been implemented at that facility because employees have only occasional exposure to paint and/or sawdust. Although they sell hazardous materials, employees are not exposed to them nor work with them.

In the 33 year history for this company there had been three other fatalities, two of which were motor vehicle accidents while making deliveries.

## **INVESTIGATION**

The burnt out light bulb was in the hardware section of the store, in the center of the aisle. The department manager had previously put this bulb on the list to be changed.

The victim and the department assistant manager had procured the extension ladder from stock in the store and set it up close to the burnt out bulb leaning it on a wooden beam or truss in the ceiling. A third man, the department manager then climbed the ladder and tried to change the bulb, but was unsuccessful, saying the bulb was too tight. It was his decision that they change the bulb after the store closed using a forklift with an empty pallet on the forks. This was the most common procedure for changing bulbs as they are difficult to handle from a ladder.

When both the department manager and his assistant left the scene they expected that the victim would put the ladder away and continue with normal business. Apparently the youth was not willing to give up so quickly and decided to reposition the ladder and attempt to change the bulb himself. A few minutes later they heard the victim yell out to them that he had got the bulb loose; then upon turning they saw him at the top of the ladder, which had been repositioned to the other side of the wooden beam. He was shaking one arm as if it had been shocked, then began waving both arms as he lost his balance and fell head first to the floor below.

At this store there was no specific safety training for workers to be qualified to work on or near electric components such as light bulbs. Officials said they did not feel changing a light bulb

should be considered electrical work. It is not a company policy to shut off power to change lightbulbs for one could not see to perform the work. Rather one manager stated that he always unplugged each individual light fixture before changing any bulb using a special pole with a hook to accomplish this. Another manager stated the store had an unwritten policy that only department managers should change light bulbs.

Other store managers delegated this chore to associate employees, who were asked to change bulbs only a few times within a year. It was not a normal procedure to change light bulbs from an extension ladder, for it is a two-handed job since the fixtures hang from chains from the ceiling. Normally the procedure is to use a forklift truck with a pallet on the front to support and elevate an employee up the 18 foot level to change bulbs.

The light bulb was a 400 watt metal halide high bay type with an open bottom, 277 volts, a very common fixture used in commercial buildings. This type of bulb has two electric circuits inside. Therefore it is possible that a non-functioning bulb may still have the potential for a completed circuit, and could shock a worker in certain situations. It was demonstrated by the electrician who installed the fixtures that if the bulb was sufficiently loose within the socket, and if a person was holding onto the collar of the bulb and touching the threaded end, and if he was sufficiently grounded, that he could get a shock from the fixture while changing the bulb. However he also said that in the many years of his business he had never heard of anyone getting a shock while changing one of these light bulbs.

There were no direct eyewitnesses of the events immediately prior to his fall, but it is assumed that the youth may have been shocked by the light fixture which caused him to lose his grip or his balance, which resulted in the fall. Autopsy results did not find any electrical burns or signs of electrical contact. Results could not prove that he was shocked, nor disprove that he was not. According to witnesses the youth was standing at the top of the ladder, and had extended his body over a wooden rafter and was laying across an iron sprinkler pipe to get two-handed control of the light fixture. If he did receive a shock, this pipe would have served as an electrical ground connection.

When emergency personnel arrived the victim was unconscious with blood coming from his ears, nose, and mouth. His heart stopped while in the ambulance and he was pronounced dead shortly after arrival at the hospital.

### **CAUSE OF DEATH**

Autopsy results from the medical examiner's office revealed the cause of death to be skull fracture with coup and countercoup brain injury due to a fall.

### **RECOMMENDATIONS / DISCUSSION**

•**Recommendation #1** *The employer should establish a safe procedure for changing lightbulbs*

*at high elevations by: 1) Assigning this work only to qualified workers, 2) Training these workers in safe work practices, 3) Providing safe access, such as an approved aerial platform for high elevations, 4) De-energizing light fixtures before changing the lightbulbs, 5) Providing tools, such as work lights, electrical testing equipment, and any special tools for de-energizing or loosening the bulbs.*

**Discussion:** Changing a lightbulb may be considered a simple procedure, which anyone can be assigned to do, however, in this case many factors made it a dangerous task. The elevation of 18 feet requires sturdy support and use of fall protective equipment. The complexity of the metal-halide light allows for a completed electrical circuit even when the bulb is non-functioning and poses a risk of shock. The hanging light fixture requires two hands to loosen the bulb. Individual light fixtures are difficult to de-energize before changing bulbs.

These conditions require a trained individual for this task in each retail store. In addition special lift equipment and/or tools are needed to do the job safely. Since the accident this company has instituted a new policy for changing lightbulbs. Only the store manager and one assigned person at each store will be responsible for this task. Each store is now equipped with a light-changing pole which allows bulbs to be changed from the floor, not requiring ladders, lift platforms or manual contact with the light fixture. This tool has an adjustable basket that grabs the lightbulb. Since each light fixture hangs from a chain, this device may not work well with very tight lightbulbs, however the convenience and safety of this device are very important factors.

**•Recommendation #2** *Workers should follow safe work procedures, not attempting to perform unassigned work duties.*

**Discussion:** The youth's determination to change the lightbulb that was too tight for his manager is commendable on one hand. However, he was unaware of the electrical danger and acted on his own putting himself into a dangerous position. It is always good practice to work in pairs when using a tall ladder. If someone was assisting the victim, they may have prevented him from putting himself into a dangerous position or lessened the severity of his fall.

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## **Fatality Assessment & Control Evaluation Program**

## **(FACE)**

The University of Iowa, in conjunction with Iowa Department of Public Health and National Institute for Occupational Safety and Health (NIOSH), is investigating the causes of work-related fatalities in the State of Iowa. FACE is a surveillance program that identifies all occupational fatalities, conducts in-depth, on-site investigations on specific types of fatalities, and makes recommendations for employers employees, farmers and others to help prevent similar fatal accidents in the future.

Iowa is a major farming state, and therefore the Iowa FACE Program deals with many occupational deaths on the farm. It is a very hazardous profession that claims hundreds of lives nationally every year. We publish detailed reports that are disseminated to agricultural leaders in Iowa to share our concern for the safety of farmers. To reach and effectively communicate with the agricultural community, which is at high risk of fatal injuries, is a worthy challenge in Iowa.

NIOSH funded state-based FACE Programs include: Alaska, California, Colorado, Georgia, Indiana, Iowa, Kentucky, Maryland, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Wisconsin, and Wyoming.



Additional information regarding this report or the Iowa Face Program is available from:

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