Massachusetts FACE • Occupational Fatality Report

Massachusetts Department of Public Health
Occupational Health Surveillance Program
Fatality Assessment and Control Evaluation Project

Immigrant Roofer Struck by a Bag of Gravel that Fell from a Roof - Massachusetts

Investigation: # 10-MA-032-01
Release Date: October 26, 2011

SUMMARY

On November 13, 2010 a 39-year-old male roofer (victim) was part of a crew repairing the roof of a building. The victim was standing on the ground when he was struck by a bag loaded with gravel from the building's roof. The bag, which weighed approximately 40 pounds, was being lowered from the roof to the ground using a portable manual rope pulley system. The bag free fell three and one half stories, striking the victim in the head. Two co-workers were positioned on the building's roof at the time of the incident. One of the co-workers immediately called the company owner after the incident. The company owner then placed a call for emergency medical services (EMS). A pedestrian who heard yells for help also called EMS. The local police arrived followed by the fire department and EMS personnel within minutes of the call. The victim was transported to a local hospital where he was pronounced dead. The Massachusetts FACE Program concluded that to prevent similar occurrences in the future, employers should:

- **Ensure that only rope pulley systems with brakes are used for hoisting and lowering tasks;**
- **Develop standard operating procedures (SOPs) for using rope pulley systems that include voice and hand signals and barricading off the pulley's fall zone;**
- **Develop, implement, and enforce a comprehensive safety and health program and provide training which includes hazard recognition and avoidance of unsafe conditions, such as the hazards associated with using rope pulley systems.**

INTRODUCTION

On November 13, 2010, the Massachusetts FACE Program was notified through the local media that earlier that same day a male roofer was struck by a falling bag of gravel. An investigation was initiated. On December 16, 2010, the Massachusetts FACE Program Director traveled to the company's attorney's office and met with the company owner and his attorney to discuss the incident and then traveled to the incident location. The police department report, death certificate, company information, and the OSHA fatality and catastrophe report were reviewed during the course of the investigation.

The employer is a roofing contractor and had been in business for sixteen years. In addition to the owner, the company had three employees, all of whom were roofers, including the victim. The two co-workers were relatives of the victim: a brother and a cousin. The victim had worked for the roofing contractor for six years. The victim came to live in the U.S. approximately 11 years before the

incident. Prior to working for the roofing company, the victim worked as a mason in the U.S. and, while living in Guatemala, the victim worked as a farmer. The company owner and the employees spoke both English and Spanish.

The company is registered with the state as a Home Improvement Contractor and the company has workers' compensation insurance coverage. Also, the company owner is licensed with the state as a Construction Supervisor. The company owner reported that he completed the Occupational Safety and Health (OSHA) 10-hour training, but his employees had not. The company holds worker health and safety briefings when time permits, such as during downtimes and inclement weather. These health and safety briefings were not documented. The company currently does not have a health and safety program, but does provide personal protective equipment (PPE) to workers, including, but not limited to fall harnesses, lanyards and other fall protection, and gloves. There is no union representation at the company.

INVESTIGATION

The job being performed was replacing a section of a building's roof that had been leaking. Built in 1915, the building is a three and one half story brick commercial building with a flat roof (Figure 1). The building has more than 10,000 square feet of space with retail on the first floor and office space on the upper floors. The building's original roof was tar and gravel, but over the years the majority of the roof had been replaced with a rubber membrane roof. The section of roof that was leaking and going to be replaced was the one remaining section that was still tar and gravel. The job was estimated to take four days to complete and the day of the incident was the first day on the job.

The morning of the incident, a Saturday, all three employees and the company owner met at the company shop, loaded up materials, tools and equipment, and traveled to the incident location where they arrived at 7:20 a.m. Once onsite, the company owner left for a prior engagement as the three employees brought a portable manual rope pulley system (gin wheel) and some tools to the building's roof via an indoor roof access. The workers set up the rope pulley system that was going to be used to lower bags of gravel removed from the roof to the ground (Figure 2). Then the workers started to shovel the roof gravel into bags. Each bag of roof gravel weighed approximately 40 pounds.

The rope pulley system was purchased by the employer from another roofer about 18 years prior to the incident. The employer was not sure of the date it was manufactured or the manufacturer of the rope pulley system and reported that it was old when he purchased it. The structural frame of the rope pulley system is metal with a tripod base and a cantilevered hoist arm. A pulley is located on the end of the hoist arm that extends out over the building's roof edge. The base of the rope pulley system has a location for adding weight to ensure that the system stays secure while in use. The rope for the pulley system is equipped with a hook that has a safety latch at one end that is used to fasten the rope to or around objects that are to be raised or lowered. The other end of the rope is held onto by a worker positioned at the lower level. It is this worker who controls the object's descent or ascent. The main advantages of using rope pulley systems are they allow the hoisting and lowering of objects to be performed by workers on the ground and that the pulley changes the direction of the required force.

In this case, the task of lowering bags of roof gravel to the ground required the two workers positioned on the roof to fill a bag with gravel and attach it to the pulley system's rope. They then would alert the victim, who was the worker on the ground next to the building and below the pulley system at the load fall zone, that they were ready to begin lowering a bag. Next the bag of gravel would be moved out

over the roof's edge to start the lowering process. During the lowering of the bag, the victim's task was to control the bag by gripping the end of the rope not attached to the bag. Once the bag was lowered to the ground, the victim would unhook the bag from the rope and empty the gravel from the bag into the company truck. Then the pulley system was used to send the empty bag back up to the roof to be filled again.

Prior to the incident, the workers had completed lowering two bags of gravel to the ground. Reportedly, after the second bag had been lowered to the ground, the victim walked over to a coffee shop to purchase coffee and snacks for the work crew. When returning from the coffee shop, the victim walked back to the rope pulley system's fall zone and bent over to place the coffee and snacks down.

It is not exactly clear what happened next. It is possible that while the victim was bent over he verbally informed the co-workers on the roof that he had returned and that the co-workers thought the victim was informing them that he was ready to continue the task. This prompted the co-workers to lift the gravel bag attached to the pulley's rope and drop it over the side of the building. The gravel bag then free fell three and one half stories striking the victim in the head while he was still bent over and knocking him to the ground.

One of the co-workers on the roof immediately called company owner to inform him of the incident. The company owner then placed a call for emergency medical services (EMS). A pedestrian who heard yells for help also called EMS. The local police arrived, followed by the fire department and EMS personnel, within minutes of the call. The victim was transported to a local hospital where he was pronounced dead.

CAUSE OF DEATH

The medical examiner listed the cause of death as blunt head and neck trauma with subarachnoid hemorrhage.

RECOMMENDATIONS / DISCUSSION

Recommendation #1: Employers should ensure that only rope pulley systems with brakes are used for hoisting and lowering tasks.

Discussion: In this case, no one was sure of the date the rope pulley system was manufactured or the manufacturer, but the employer reported that it was old when he purchased it and that the system was not equipped with a brake. Newer rope pulley systems are available that have brake systems manufactured into them. These rope pulley systems with brakes have the ability for the workers to stop the load and to suspend the load without having to hold the pulley's rope. In addition, some rope pulley systems with brakes will automatically engage the pulley brake if the load starts to free fall.

Recommendation #2: Employers should develop standard operating procedures (SOPs) for using rope pulley systems that include voice and hand signals and barricading off the pulley's fall zone.

Discussion: Employers should develop standard operating procedures (SOPs) for the tasks of hoisting and lowering items. Training should be provided to all employees who will be performing the tasks

and all employees onsite while the task is performed. It is important that the SOP includes securing the area around the pulley's fall zone with a barrier to protect workers from suspended loads and clear verbal and hand signals that are understandable to all employees so they can effectively communicate hoisting instructions. These signals will ensure that each worker knows when the others are ready for the next step in the process.

The signaling procedure can start with a verbal signal to get the attention of all of the workers performing the task. Then there should be a "ready" hand signal. This hand signal should only have one meaning, that the worker is ready for the hoisting or lowering task to begin. This hand signal should be given by each worker involved in the task prior to starting any movement of the load.

To ensure that the hoisting and lowering task is performed safely, the SOP should also include, but not be limited to:

- setting up and dismantling the pulley system properly;
- inspecting the pulley's components prior to each use;
- barricading off the fall zone of the pulley with a physical barrier to prevent others from being struck by the load;
- ensuring the weight of the load does not exceed the capacity of the pulley system;
- attaching and un-attaching the load safely;
- ensuring that the worker assigned to the fall zone never stands below a raised load and that the worker has plenty of space to stand clear of loads that are being raised or lowered;[1] and
- ensuring proper personal protective equipment is worn when using rope pulley systems, such as gloves, hardhats, and fall protection for workers exposed to a fall greater than six feet, such as unprotected roof edges.

In this case, it appears that a lack of communication between the workers on the roof of the building and the victim on the ground contributed to the incident. Having a SOP for using rope pulley systems, including both verbal and visual commands, and providing employees training on the SOP might have prevented this incident from occurring.

Recommendation #3: Employers should develop, implement, and enforce a comprehensive safety and health program that addresses hazard recognition and avoidance of unsafe conditions.

Discussion: At a minimum, a comprehensive safety and health program should include an explanation of the worker's rights to protection in the workplace, safe work practices workers are expected to adhere to, specific safety protection for all tasks performed, ways to identify and avoid hazards, and who they should contact when safety and health issues or questions arise.

As part of the development of safety and health programs, employers should evaluate tasks performed by employees for all potential hazards and incorporate information about these identified hazards and their controls into the program.[2] Employers should also use their employees' expertise throughout the program development process by seeking employee input. Once the safety and health program is developed, employers should continue to seek employees' input during the routine updating of the program. The program should be updated when safety concerns arise and when new equipment and new tasks are introduced into the workplace.

Employers should ensure that they have fully and effectively implemented their comprehensive safety and health programs by routinely performing assessments of work areas and work practices and immediately addressing any observed unsafe conditions. As part of the program's implementation, training should be provided to all employees on program topics, including hazard recognition and the avoidance of unsafe conditions.[3] All training provided to employees should be documented. Documentation should include: who provided the training and their qualifications, the content of the training, workers who were trained, and any assessments of workers' comprehension of the training. When the safety and health program is updated, employers should then provide additional training on the new and updated safety and health program topics.

The Massachusetts Department of Labor Standards (DLS) offers free consultation services to help small employers improve their safety and health programs, identify hazards, and train employees. DLS can be contacted at 617-969-7177. More information about DLS can be found on their Web site at www.mass.gov/dos/consult.

The Massachusetts Department of Industrial Accidents (DIA) has grants available for providing workplace health and safety training to employers and employees. Any company covered by the Massachusetts Workers' Compensation Insurance Law is eligible to apply for these grants. More information about these DIA grants can be found on their Web site at www.mass.gov/dia/safety.

REFERENCES

1. Code of Federal Regulations, 29 CFR 1926.554 Overhead hoists. Washington D.C.: U.S. Printing Office, Office of the Federal Register.

2. DOL. OSHA Draft Proposed Health and Safety Program, Docket No. S&H-0027. www.osha.gov/dsg/topics/safetyhealth/nshp.html. Date accessed: May 17, 2011.

3. Code of Federal Regulations, 29 CFR 1926.21 Safety training and education. Washington D.C.: U.S. Printing Office, Office of the Federal Register.

Figure 1 – Incident location

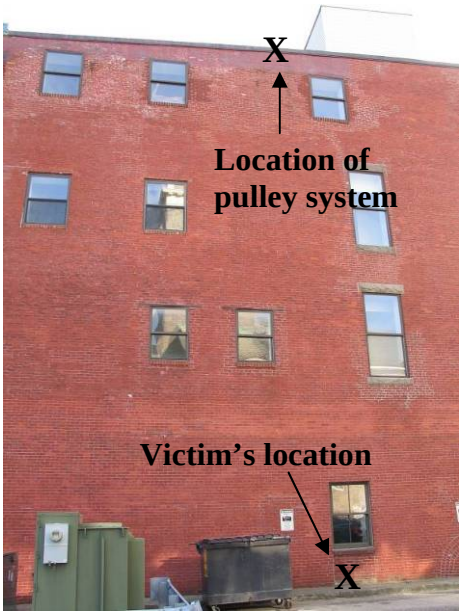

Figure 2 – Building with the pulley system being used during the incident

FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The Massachusetts Department of Public Health, in cooperation with the National Institute for Occupational Safety and Health (NIOSH), conducts investigations on the causes of work-related fatalities. The goal of this program, known as Massachusetts Fatality Assessment and Control Evaluation (Massachusetts FACE) is to prevent future fatal workplace injuries. Massachusetts FACE aims to achieve this goal by identifying and studying the risk factors that contribute to workplace fatalities, by recommending intervention strategies, and by disseminating prevention information to employers and employees.

Massachusetts FACE also collaborates with engineering and work environment faculty at the University of Massachusetts at Lowell to identify technological solutions to the hazards associated with workplace fatalities.

NIOSH funded state-based FACE Programs currently include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

Additional information regarding this report is available from:

Occupational Health Surveillance Program
Massachusetts Department of Public Health
250 Washington Street, 6th floor
Boston, Massachusetts 02108-4619
(617) 624-5627

Evaluate this report

We would appreciate your feedback on these reports so we may continue to improve the MA FACE project and our investigation reports. A feedback form can be found at: http://www.mass.gov/Eeohhs2/docs/dph/occupational_health/report_evaluation.doc
The completed form may be returned by fax to (617) 624-5676, by mail to FACE, 250 Washington Street, 6th Floor, Boston, MA 02108, or by email to ma.face@state.ma.us.