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Fatality Assessment and Control Evaluation Program
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Hispanic Worker Dies After Fall From Step Ladder While Cleaning Windows– North Carolina

SUMMARY

On January 22, 2009, a 33-year-old Hispanic worker was injured after a fall from an 8-foot step ladder. A bucket partially filled with a cleaning solution was tied with a rag to the top of the ladder. The victim was cleaning windows when he fell onto a tiled floor and hit his head. At approximately 1:08 p.m., a tile foreman on the site called 911 and stayed with the conscious victim. The victim became unresponsive and at 1:14 p.m., Emergency Medical Services (EMS) arrived on the scene. When emergency medical personnel arrived, the victim was unconscious and having seizures. EMS transported the victim to a local hospital. The following morning the worker died from his injuries. Key contributing factors identified in this investigation include: work at an elevation, the improper use of a step ladder and insufficient worker training.

NIOSH investigators concluded that, to help prevent similar occurrences, employers should:

- ***eliminate the need to climb a ladder in order to clean windows by implementing an engineering control measure (e.g., using extender poles with a squeegee system or the use of an aerial lift)***
- ***ensure that workers understand how to properly use ladders in a manner that minimizes the risks of injury caused by falling from a ladder***
- ***develop, implement, and enforce a comprehensive occupational safety and health program and provide worker training that includes hazard recognition and the avoidance of unsafe conditions***

Fatality Assessment and Control Evaluation (FACE) Program

The National Institute for Occupational Safety and Health (NIOSH), an institute within the Centers for Disease Control and Prevention (CDC), is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. In 1982, NIOSH initiated the Fatality Assessment and Control Evaluation (FACE) Program. FACE examines the circumstances of targeted causes of traumatic occupational fatalities so that safety professionals, researchers, employers, trainers, and workers can learn from these incidents. The primary goal of these investigations is for NIOSH to make recommendations to prevent similar occurrences. These NIOSH investigations are intended to reduce or prevent occupational deaths and are completely separate from the rulemaking, enforcement and inspection activities of any other federal or state agency. Under the FACE program, NIOSH investigators interview persons with knowledge of the incident and review available records to develop a description of the conditions and circumstances leading to the deaths in order to provide a context for the agency's recommendations. The NIOSH summary of these conditions and circumstances in its reports is not intended as a legal statement of facts. This summary, as well as the conclusions and recommendations made by NIOSH, should not be used for the purpose of litigation or the adjudication of any claim. For further information, visit the program website at www.cdc.gov/niosh/face/ or call toll free at 1-800-CDC-INFO (1-800-232-4643).

Additionally, general contractors should:

- ***consider including in the sub-contract language, the requirement that subcontractors provide them with a written comprehensive safety program that addresses safe operating procedures and documents worker training for all the tasks to be performed***

INTRODUCTION

On January 22, 2009, a 33-year-old Hispanic worker (the victim) was injured after a fall from a step ladder. He died from his injuries on January 23, 2009. On January 26, 2009, officials of the North Carolina Occupational Safety and Health Administration (NCOSHA) notified the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR) of the incident. On February 24, 2009, a DSR Safety and Occupational Health Specialist and a guest researcher conducted an investigation of the incident and reviewed the incident circumstances with the investigating NCOSHA safety compliance officer assigned to the case. Photographs of the incident site and witness statements taken by NCOSHA shortly after the incident were reviewed. The medical examiner's report and the death certificate were reviewed. On February 24, 2009, a meeting to discuss the case was conducted at the site of the incident with the victim's employer and supervisor, and the general contactor's safety manager.

EMPLOYER

The victim's employer was a Hispanic family owned cleaning company that has been in business for 23 years. The company had been used as a preferred cleaning subcontractor by the general contractor for 8 years. The company employs approximately 6 workers (includes the victim) who are general cleaners. The owner, supervisor (owner's son) and the victim who was a general cleaner, were the only ones permitted to wash windows. The owner and the supervisor were bi-lingual. The company was subcontracted for internal and external cleaning while construction on a new condominium complex was being completed. The company began cleaning at the site of the incident on February 8, 2008, and was expected to finish on February 28, 2009. The company only performs window cleaning for ground accessible projects which require the use of ladders or an aerial lift. When the employer needs an aerial lift for a window cleaning project, a lift is rented. All the training of workers was primarily done by the owner. On the day of this incident, the owner was out of town and his son was supervising the project. This was the company's first fatality.

WRITTEN SAFETY PROGRAMS and TRAINING

Employer

The employer did not have a written occupational safety and health program. According to the owner, he instructed the workers on proper cleaning techniques and the use of aerial lifts and ladders. The owner provided instructions on ladder safety which included: ladder positioning, setup

procedures, avoiding standing on the top steps, and warning against overreaching while on a ladder. The employer did not retain any documentation for safety training. During the NCOSHA interviews, the owner stated that when cleaning windows, the cleaning solution was usually placed in a two-gallon bucket and a 6-foot step ladder would be used because it had a pail shelf to hold a bucket. Additionally, according to the owner, when larger buckets were being used, workers were usually instructed to leave the bucket on the ground.

General Contractor

The general contractor required their employees and the subcontractors to attend a general safety orientation. The orientation was required to work on the construction site. The victim had attended the safety orientation in February 2008. On a weekly basis, all workers on site representing the general contractor and any subcontractors were required to attend a safety meeting on site that was provided by the general contactor's safety manager.

VICTIM

The 33-year-old Hispanic male victim spoke only Spanish and had worked for the cleaning company since February 2008. According to the employer, the victim weighed approximately 150 lbs and stood approximately 63 inches in height. His cleaning duties varied by project and he worked on an "as needed" basis. His duties at the incident site consisted of cleaning windows, vacuuming and dusting the newly constructed condominiums.

The victim received his work and safety training from the owner. According to the owner, the victim received instructions in Spanish on using ladders, safety equipment, aerial lifts, and fall protection. The owner estimated that the victim's window cleaning duties entailed working approximately 25 percent of his time on an aerial lift, and the remainder of the time working from a ladder or directly on the floor. On the day of the incident, the victim was wearing a hard hat, safety glasses and work boots. Prior to working for the cleaning company, the victim worked as a sheetrock finisher and installer for approximately four years.

INCIDENT SCENE

At the time of the incident, the victim was working in a recently finished elevator lobby in a new 10-story luxury condominium complex. The size of the lobby was approximately 12 feet by 14 feet. The floors were covered in a porous porcelain tile with a non-glossy finish. The double door entranceway wall was glass with an anti-glare coating on the outside. The top window height measured 9 feet above the floor (Photo 1). An active elevator was directly across from the entry doors. The ceiling in the lobby was more than 15 feet in height. Security cameras had been installed, but were not in operation the day of the incident. The construction project was approximately 95% completed.

EQUIPMENT

On the day of the incident, the victim was using a step ladder. The step ladder's specifications included:

- A-frame and 8-feet in height
- Fiberglass composition
- Type 1A - Extra heavy duty rating (300 lb load capacity)
- 7 Slip-resistant-type steps
- Safety floor feet

The victim was using a short-handled (approximately 7 inches in length) squeegee, a sponge and rag, and had a bucket tied to the top of the step ladder (Photo 2). The bucket was a 5-gallon capacity (13-inches in depth and 12-inches in diameter) sheetrock type bucket. According to NCOSHA, following the incident, the ladder was undamaged and the bucket was still attached.

According to the owner, the step ladder was approximately a year old. According to the NCOSHA compliance officer, there were dual language safety warning labels on the side rails of the step ladder. NIOSH was unable to view the step ladder at the time of the investigation.

WEATHER

It was daylight at the time of incident, the temperature was in the 40's, and it was partly cloudy.

INVESTIGATION

On January 22, 2009, at approximately 10:00 a.m., the cleaning company supervisor called the victim and asked if he could come in the afternoon to clean some windows in the entryway of a new condominium complex. The victim reported to work at noon and gathered his supplies to clean the windows that framed the inside entryway of the condominium complex (Photo 1). The victim told the supervisor that he needed more window cleaner, so the supervisor left the site to go purchase the solution. There were five other co-workers cleaning in another area of the building while the victim worked alone cleaning windows.

At approximately 12:25 p.m., while waiting on the elevator, a tile foreman working for another subcontractor observed the victim carrying a sponge and squeegee in his right hand and a rag in his left hand while he climbed the step ladder. According to NCOSHA, the foreman stated that during this time, the ladder was fully spread and faced the window and that the victim worked facing the ladder with his back to the tile foreman and the elevator. According to the foreman, the victim climbed up to approximately the sixth step (one step from the top) of the step ladder and began cleaning the window with a sponge and using a squeegee in his right hand. The tile foreman reported to NCOSHA that he did not notice if a bucket was being used.

Around 1:00 p.m., as the tile foreman entered the elevator from the second floor, he heard a loud crashing sound. When the elevator doors opened on the first floor, he saw the victim lying on the ground on the right side of the room from entry through the double door entranceway. The step ladder was toppled on the left side of the room and a clear liquid covered part of the floor (Photo 3). The tile foreman found the victim lying on the floor with his body shaking and attempting to get up off the floor. The tile foreman stated to NCOSHA that while looking at the toppled step ladder, he noticed that a bucket was attached to the top of the ladder.

At 1:08 p.m., the tile foreman yelled for assistance and called 911, as he instructed the victim to stay on the floor until medical help arrived. At 1:14 p.m., EMS arrived on the scene and the victim was unresponsive and was having seizures. The victim's supervisor was notified by phone shortly after the incident and he arrived at the incident scene. EMS transported the victim to a local hospital and his supervisor followed the ambulance. On the following day, January 23, 2009, the victim died at 3:14 a.m., at the hospital.

Based on photos taken following the incident and the location of the victim and ladder, the NCOSHA investigating officer determined that the following actions and events likely occurred during the time of the incident. The NCOSHA investigating officer believes that the victim had repositioned the step ladder with the rungs facing towards the windows, and that he stood backwards on the step ladder and gripped the rungs of the ladder with his boot heels while he cleaned a portion of the windows. NCOSHA concluded that the victim working backwards on the ladder, while facing the windows and working from approximately the sixth or seventh step, combined with the dynamic weight from solution in the bucket and the victim's squeegee strokes across the window, resulted in a lateral force to the step ladder that caused it to tip.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. NIOSH investigators identified the following items as key contributing factors in this incident.

- Work at an elevation.
- The improper use of a step ladder.
- Insufficient worker training.

CAUSE OF DEATH

The medical examiner listed the cause of death as blunt force trauma to the head.

RECOMMENDATIONS / DISCUSSION

Recommendation #1: Employers should eliminate the need to climb a ladder in order to clean windows by implementing an engineering control measure (e.g., using extender poles with a squeegee system or the use of an aerial lift).

Discussion: Controlling exposures to occupational hazards is the fundamental method of protecting workers. Traditionally, a hierarchy of controls has been used as a means of determining how to implement feasible and effective controls. One representation of this hierarchy can be summarized as follows: [1]

- Elimination
- Substitution
- Engineering controls
- Administrative controls
- Personal protective equipment.

The idea behind this hierarchy is that the control methods at the top of the list are potentially more effective and protective than those at the bottom. Following the hierarchy normally leads to the implementation of inherently safer systems, ones where the risk of illness or injury has been substantially reduced.[1] Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker actions. The initial cost of engineering controls can be higher than the cost of administrative controls or personal protective equipment, but over the longer term, operating costs are frequently lower, and in some instances, can provide a cost savings in other areas of the process.[1]

In this incident, a characteristic of the work that produced a significant hazard to the workers that were responsible for cleaning windows was the need to work from heights while using a ladder. This required that workers climb either a 6 or an 8-foot step ladder in order to clean windows at various heights. Such fall hazards at a worksite could be eliminated by applying an engineering control measure, such as using extender poles with a squeegee system or the use of an aerial lift. Either of these choices would remove the necessity for workers to climb ladders in order to clean windows.

Extender poles with a squeegee system allow the user to remain on the ground. These systems come in a wide variety of designs; some are able to reach three to four stories in height. Costs of these systems and resource demands vary. Water access and electrical connections for pumps are needed for the larger systems. These systems allow a worker to work on the ground which removes the need to work from heights. Aerial lifts are another option. A safety program to train workers to correctly and safely use aerial lifts and wear the required fall protection is a necessity.

Recommendation #2: Employers should ensure that workers understand how to properly use ladders in a manner that minimizes exposure to injury caused by falling from a ladder.

Discussion: The Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) data shows that of the 700 fatal falls in 2008, 119 involved falls from ladders.[2] Portable ladders are designed to support specific loads and activities. Once the correct type ladder is selected by the employer, a worker using the ladder should be familiar with the operation of the ladder and know its limitations. A formal safety program highlighting stability in proper ladder setup and the proper use should be established. The Occupational Safety and Health Administration (OSHA) has a regulation 1926.1053,[3] that addresses the safety requirements and states that ladders are to be used for the purpose for which they were designed. Many ladder manufacturers offer sample ladder safety programs for minimal or no cost which may offer some assistance to small employers. Additionally, various ladder manufacturer's web sites offer guidance in selecting and using ladders properly.

According to NCOSHA, during interviews the employer stated that when the 5 gallon bucket was used it would usually be filled with approximately 2 to 2.5 gallons of window cleaning solution. The corresponding weights for the range of 2 to 2.5 gallons of water is between 16-21 pounds. The NCOSHA investigating compliance officer performed a stability assessment on an 8-foot, A-frame step ladder and used a 5-gallon sheetrock bucket filled with approximately 2.5 gallons of water tied to the top of the ladder. According to NCOSHA, the results showed that a small amount of pressure exerted in a sideways motion rendered the ladder unstable and ready to tip over. The liquid was dynamic which increased the potential for tipping the ladder. In addition, NCOSHA reported that when the liquid was tied on the side of the step ladder, one foot of the step ladder raised off the ground.

Workers should use a tool belt or use a hand line to raise and lower necessary tools or supplies needed for tasks while working on a ladder. Some ladders are designed for small loads to be placed along the center line of the ladder on a pail shelf. Activities that require overreaching should not be performed from any ladder. Examples of the rules/practices and procedures that an employer should ensure workers clearly understand and always follow to minimize exposure to injury include: 1) Never placing heavy items on the top or side of a ladder, 2) Always using and maintaining the three-point contact climbing method (two hands and one foot or one hand and two feet), 3) Never working from the top two rungs of a ladder, 4) Always facing the step ladder treads while using a step ladder, and 5) Never overreaching or leaning to one side while using a step ladder.[4,5, 6]

In the state of North Carolina where this incident occurred, information and resources that are available and useful in assisting with ensuring that workers understand ladder safety can be found on the NCDOL website publications page: http://www.nclabor.com/pubs.htm.[7] Additionally, the NCDOL Library has "Ladder Safety" videos available at: http://www.nclabor.com/lib/libaud.htm in the *Ladder Safety* heading under the video/DVD titles.

Recommendation #3: Employers should develop, implement, and enforce a comprehensive occupational safety and health program and provide worker training that includes hazard recognition and the avoidance of unsafe conditions.

Discussion: Employers should evaluate all tasks performed by workers, identify all potential hazards, and then develop, implement, and enforce a written safety and health program that meets applicable OSHA standards and addresses these hazards. A comprehensive written occupational safety and health program must be developed for all workers and include training in hazard recognition and the avoidance of unsafe conditions. The safety and health program should include, at a minimum, an explanation on workers' 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. It should then be noted in a company's safety and health program that certain types of site-specific training (i.e., the proper setup and safe ladder use) must be conducted and documented.

Employers should conduct a worksite hazard survey to identify the potential hazards that workers are exposed to[8] so that appropriate preventive measures for these hazards can be identified and appropriate control measures can be implemented. An example of a hazard at this worksite included the potential for falls from heights associated with using and climbing on ladders. A worksite hazard survey could identify hazards with cleaning windows. Hazard recognition training should be based on an evaluation of the tasks workers will perform for all potential hazards. These identified hazards and their controls should be incorporated into hazard recognition training. The training should also include specific instructions that workers should not risk physical harm to accomplish tasks. According to 29 CFR 1926.21 (b)(2), "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 injury or illness."[9] Training in recognizing and avoiding hazards should be given to all workers, coupled with employer assessments that workers are competent in the recognition of hazards and safe work practices. It is imperative that employers immediately correct and point out to an employee any unsafe actions observed when a unsafe action is being performed. In the state where this incident occurred, information and resources that are available and useful in assisting with ensuring that workers understand various safety topics can be found on the NCDOL website publications page: http://www.nclabor.com/pubs.htm.[7]

The employer needs to train each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to their work environment to control or eliminate any hazards or other exposure to injury or illness. When the victim was hired, he did not receive any type of formal safety training by the employer. The victim was provided verbal instructions on how to climb ladders, the use of cleaning solutions, aerial lifts and fall protection. Working as a cleaner exposes a worker to multiple and complex hazards. It cannot be assumed that employees can recognize the hazards of working at heights on ladders and falling. Training in recognizing and avoiding hazards should be given to all workers, coupled with employer assessments that workers are competent in the recognition of hazards and safe work practices. Some minimum components for employers to consider when they are providing safety training to workers are the following: 1) general hazard recognition, 2) safe performance of assigned tasks, and 3) safe use and maintenance of tools or equipment. The training program content and the names and dates of employees completing the

training should be documented and retained by the employer. Employers should also ensure that the trainer who provides training is qualified through education and/or experience to conduct the training. To ensure the utility of the safety training, an employer might consider ways to ensure that the worker comprehends the important information (e.g., written testing, verbal questions, or role playing). Additionally, employers should provide periodic refresher safety training which may be done by conducting on site toolbox type meetings.

Additionally, although not a factor in this incident, but because the victim was Spanish speaking, it is important to remember that overcoming language and literacy barriers is crucial to providing a safe work environment for a multilingual workforce. Companies that employ workers who do not understand English should identify the languages spoken by their employees, and design, implement, and enforce a multilingual safety program. The safety program and training should be developed at a literacy level that corresponds with the literacy level appropriate for the company's workforce. Employers should ensure that employees who do not speak English or have limited use of English are afforded an interpreter who can clearly convey instructions, and ensure that employees clearly understand the instructions given. The program, in addition to being multilingual, should include a competent interpreter to explain worker 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. A method to ensure comprehension could be to provide testing to ensure that the information conveyed was understood.

OSHA has developed the *Compliance Assistance: Hispanic Employers and Workers* web page to assist employers with a Spanish-speaking workforce in learning more about workplace rights and responsibilities, identifying Spanish-language outreach and training resources, and learning how to work cooperatively with OSHA. In addition, the Compliance Assistance: Hispanic Employers and Workers web page provides a list of OSHA's Hispanic/English-as-a-second-language coordinators. These materials are available at: http://www.osha.gov/dcsp/compliance_assistance/index_hispanic.html [10] or they can be obtained by contacting an OSHA area office. This information can be used by employers who are developing or improving safety and training programs for their Spanish speaking employees.

In the state where the incident occurred, NCOSHA has sample safety and health programs for employers that are available by calling 1-800-NCLABOR or by visiting the website http://www.nclabor.com/osha/consult/sample_programs.htm.[11] These NCOSHA sample safety and health programs are written generically and are to be used as stepping stones toward a comprehensive safety program, not as the final product. Employers are expected to add materials and delete materials as needed to create a program that meets their company's and workers' specific safety needs.

Recommendation #4: General contractors should consider including in the sub-contract language, the requirement that subcontractors provide them with a written comprehensive safety program that addresses safe operating procedures and documents worker training for all the tasks to be performed.

Discussion: General contractors should consider including in the sub-contract language, the requirement that subcontractors have safety and health training programs in place in a language(s) their workers understand that address the tasks they are assigned to perform. General contractors should require all subcontractors to identify how they intend to implement a site-specific safety and health program before the start of work. To help foster safe work environments for contracted employees, general contractors and subcontractors should consider requiring all potential contractors to submit a written safety program in a language(s) of their workers prior to the start of any work being performed. By requiring a written safety program that addresses the safe operating procedures, documents worker training, and meets OSHA safety and health standards, subcontractors are reminded of the importance of safety and that safety is recognized and necessary for doing business. Once these responsibilities have been established, the respective parties should ensure that the safety and health aspects are upheld through regular worksite inspections.

ADDITIONAL RESOURCES RELATED TO THE CLEANING INDUSTRY

The U.S. Department of Labor's *Cleaning Industry* website provides safety and health information for workers in the cleaning industry. These workers face many hazards on the job, such as hazardous chemicals, dangerous equipment, and the physical environment where services are performed. OSHA's Safety and Health Topics Web page features information about standards for and possible solutions to hazards present in the cleaning industry. It also provides information on how to develop and implement a comprehensive safety and health management program. The U.S. Department of Labor website is available at: http://www.osha.gov/dcsp/products/topics/cleaningindustry/index.html.

The Worldwide Cleaning Industry Association (ISSA), global membership includes more than 5,500 distributor, manufacturer, building service contractor, and in-house service provider companies. ISSA offers a vast array of educational videos and resources. The Worldwide Cleaning Industry Association website is available at: http://www.issa.com/.

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INVESTIGATOR INFORMATION

The investigation was conducted and by Nancy T. Romano, Safety and Occupational Health Specialist, Fatality Investigations Team, Surveillance and Field Investigations Branch, Division of Safety Research, and Anna Allen, MD, guest researcher from the WVU Occupational Medicine Residency program.

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Photo 1. Double Door Glass Entranceway and the Windows the Victim was Cleaning at the Time of the Incident.
(Photo courtesy of NCOSHA)

Photo 2. A Step Ladder and a Bucket Represent the Items Being Used at the Time of the Incident.
(Photo courtesy of NCOSHA)

Photo 3. Photo of the Incident Scene. This photo was taken while standing in front of the elevator. The ladder is toppled on the left side of room, entry through the double door entranceway.
(Photo courtesy of NCOSHA)