NIOSH

FACE

Fatality Assessment and Control Evaluation Program

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Two Hispanic Construction Laborers (Ages Fifteen and Sixteen) Die After Trench Collapse - South Carolina

SUMMARY

On January 28, 2003, two Hispanic construction laborers [15 and 16-year-old brothers] (the victims) died when the trench they were working in experienced a cave-in. The victims were members of a crew installing conduit in an eight-foot-deep by two-foot-wide trench. When work started, the jobsite foreman instructed the crew leader to operate a backhoe to dig the trench. The foreman then left the site to check on another job. After approximately an hour, the crew leader grounded the bucket, turned the machine off and walked to the company trailer to check blueprints. As he was looking at the blueprints, he heard loud voices outside the trailer from the direction of the ditch. As he exited the trailer, he was informed by one of the workers that the trench had collapsed and that the two employees had been covered up. The emergency medical squad (EMS) was summoned and responded within minutes. Coworkers had uncovered the victims and removed them from the trench as the rescue squad arrived. The victims could not be revived and the county coroner was summoned to the scene where he pronounced the victims dead.

Incident site; photo courtesy of the county coroner

Fatality Assessment and Control Evaluation (FACE) Program

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatality Assessment and Control Evaluation (FACE) investigations when notified by participating states (North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia); by the Wage and Hour Division, Department of Labor; or when a request for technical assistance is received from NIOSH-funded state-level FACE programs in Alaska, California, Iowa, Kentucky, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, New York, Oklahoma, Oregon, Washington, West Virginia, and Wisconsin. The goal of FACE is to prevent fatal work injuries by studying the work 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. FACE investigators evaluate information from multiple sources that may include: interviews of employers, workers, and other investigators; examination and measurement of the fatality site, and related equipment; and review of records such as OSHA, police, medical examiner reports, and employer safety procedures and training records. The FACE program does not seek to determine fault or place blame on companies or individual workers. Findings are summarized in narrative reports that include recommendations for preventing similar events in the future. For further information visit the FACE website at www.cdc.gov/niosh/face/faceweb.html or call toll free 1-800-35-NIOSH.

NIOSH investigators concluded that, to help prevent similar incidents, employers should

- ***ensure that a competent person conducts daily inspection of excavations, adjacent areas, and protective systems and takes appropriate measures necessary to protect workers***
- ***ensure that workers are protected from cave-ins by an adequate protective system***
- ***develop, implement, and enforce a comprehensive written safety program for all workers which includes training in hazard recognition and the avoidance of unsafe conditions***
- ***pursue every effort to ensure that documentation of age is authentic and that youth < 18 years of age are not assigned to prohibited tasks and are appropriately supervised***
- ***ensure that workers who are part of a multilingual workforce comprehend instructions in safe work procedures for the tasks to which they are assigned***
- ***ensure that only qualified rescue personnel who have assumed responsibility for rescue operations and site safety should attempt rescue operations.***

Additionally,

- ***Site project management companies should consider ensuring through contract language that contractors have a comprehensive safety and health program that addresses all aspects of the jobs they are to perform***

INTRODUCTION

On January 28, 2003, two Hispanic construction laborers [15 and 16-year old brothers] (the victims) died when the trench they were working in collapsed. On February 3, 2003, the National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), was notified of the incident by the U.S. Department of Labor, Wage and Hour Division. On February 11-13, 2003, a DSR lead occupational safety and health manager conducted an evaluation of the incident. The incident was reviewed with the Federal and State Departments of Labor; Wage and Hour Divisions; the South Carolina Occupational Safety and Health Administration; the county coroner and sheriff's offices; the company owners; and, the Director of the South Carolina Hispanic Leadership Council. A site visit was conducted, and pictures taken immediately after the incident were provided by the county coroner. The county sheriff and coroner reports were reviewed, and documentation of the victims' ages was examined.

The employer was an electrical contractor that had been in operation for 10 years and employed 65 workers, 11 at the incident site. Twenty-two new company hires started the day of the incident at various job sites. None of these employees had received any orientation or training by the company. The employer had been awarded a multi-million dollar contract to provide all electrical work at the site of a

new high school under construction. The contract was awarded by a site project management company hired by the school district. The employer was one of six companies acting as prime contractors at the site. Prior to this job, the employer specialized in residential wiring. The employer had no formal safety and health program and, until the incident, employees received only on-the-job training. Since the incident, the employer has hired a safety consultant to develop a comprehensive safety and health and training program, and employees have completed the OSHA ten-hour course and received OSHA training in trenching operations. Company policy now dictates that all employees receive this training. These were the first fatalities experienced by the company.

INVESTIGATION

The employer had been contracted to perform all the electrical work at the site of a new two-story 390,000 square-foot high school under construction. The company had been on site for two weeks and was in the process of installing electrical, data, and communication conductors encased in conduit for the schools data bank and communication system in a 2-foot-wide by 8-foot-deep trench. The composition of the soil at the site was backfill that was sandy with some clay. Soil-type classification tests had not been conducted at the time of the investigation. The electrical conduit was installed at the bottom of the trench then back-filled with 18 inches of soil. The data and communication conduit was then installed and covered (Photo 1). The plumbing would then be installed over the data and communication conduit. These would all be located underneath the footings for the foundation of the school.

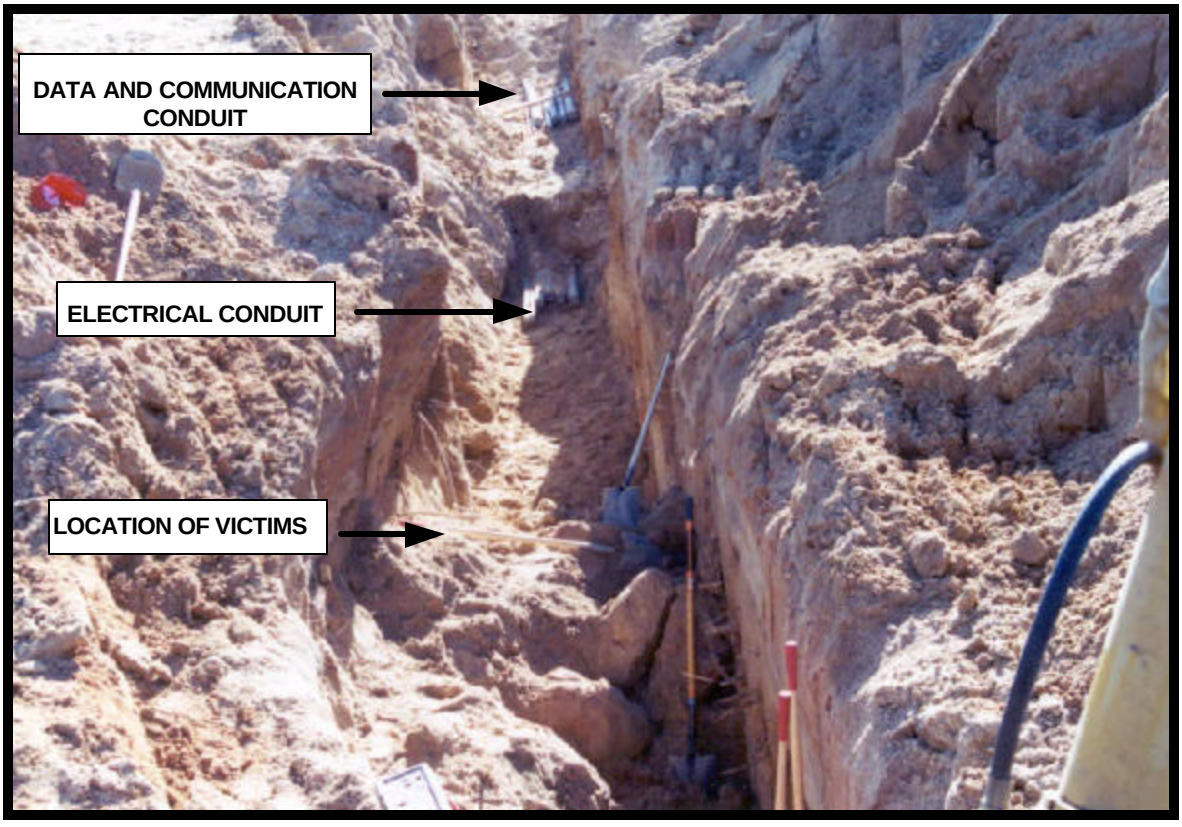

Photo 1. Location of conduit; photo courtesy of county coroner

On Monday January 20, 2003, four Hispanic workers arrived at the site and approached the job foreman to inquire about the availability of work. One of the men spoke English and acted as an interpreter for the others. The foreman informed them that there was nothing available at the time, but to check back at the end of the week. On Friday January 24, the men returned to the site and were given applications, tax forms, terms of employment paperwork, and were instructed by the foreman to complete the forms and to return to the site the following Monday for work. On Monday January 27, the men returned to the site and all four were hired by the foreman. All had resident alien and social security cards. Documents presented by the victims indicated both were 22 years old. Ages of the other two workers were listed as 21 and 29 years.

On the following day, the crew began work at 7:00 a.m. The foreman instructed the crew leader as to the work to be performed that day, including the trenching operations and the area and direction in which the conduit-encased conductors would be installed, then left the site to check on other jobs. The crew leader, who did not speak Spanish, relayed the instructions to English- speaking crew members while the bi-lingual worker translated the instructions to the Hispanic workers on the crew. The crew leader went to the company trailer to check the blueprints to determine the correct direction to excavate the trench as the rest of the crew gathered the supplies that would be needed that day.

The crew leader then began to excavate the trench as some of the crew stood along the side of the trench while others performed cleanup and various other duties. Shortly after 8:00 a.m., the crew leader grounded the bucket of the rented backhoe, shut the machine down, and returned to the trailer to double check the blueprints. While in the trailer, he heard loud voices coming from the direction of the trench. As he exited the trailer, he was informed by a crew member that the trench had collapsed and two workers had been covered up. (Photo 2) The crew leader immediately called 911, then ran to the trench to assist the crew in uncovering the trapped workers. The workers uncovered the victims and removed them from the trench. When 911 personnel arrived minutes later, they could detect no vital signs and due to the visible injuries summoned the county coroner, who pronounced the victims dead at the scene.

Photo 2. Location of the victims; photo courtesy of county coroner

The reason for the victims being in the trench could not be determined. The crew leader had not instructed anyone at that time to enter the trench. A statement that one of the other Hispanic workers had restarted the machine, which was positioned on the side of the ditch opposite the cave in, and

resumed digging could not be substantiated at the time of the NIOSH investigation or by OSHA investigators. The position of the backhoe was not considered a causative factor in the incident.

Two days after the incident, the parents arrived at the funeral home where the victims were taken and presented the funeral director with birth certificates listing the victims' ages as 15 and 16 years of age. The victims had been in the United States for a little over a year and had worked at other construction sites. This information was forwarded to the county coroner, who forwarded it to the proper authorities.

The credentials presented by the victims to the site foreman at the time of their hire were closely examined and were determined not to be authentic.

CAUSE OF DEATH

The coroner listed the cause of death for both victims as basilar hinge fractures of the skull.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that a competent person conducts daily inspection of excavations, adjacent areas, and protective systems and takes appropriate measures necessary to protect workers.

Discussion: Significant hazards are associated with trenching operations, including cave in, positioning of machinery, and changes in environmental and physical conditions. For these reasons, 29 CFR 1926.651 (k) (1)[1] requires that "daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person* for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift." 29 CFR 1926.651 (k) (2)[1] requires that "where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety." No competent person was on site or made daily inspections in this case.

Recommendation #2: Employers should ensure that workers are protected from cave-ins by an adequate protective system.

Discussion: The applicable OSHA Excavation Standard, 29 CFR 1926.652 (a) (1)[1] states that "each employee in an excavation shall be protected from cave-ins by an adequate protective system." A protective system designed for the soil conditions found in this excavation could have included a trench shield (also known as a trench box), shoring, or a combination of shoring and shielding. Sloping would not have been appropriate because of the sandy composition of the back-filled soil.

* Competent person is defined by OSHA as one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them.

Employers should consult tables located in the appendices of the OSHA Excavation Standard that detail the protection required based upon the type of soil and environmental conditions present at the site. Employers can consult with manufacturers of protective systems to obtain detailed guidance for the appropriate use of these products. In this incident, no protective system had been placed at any point in the trench.

Recommendation #3: Employers should develop, implement, and enforce a comprehensive written safety program for all workers which includes training in hazard recognition and the avoidance of unsafe conditions.

Discussion: Employers should evaluate all tasks performed by workers, identify all potential hazards, then develop, implement, and enforce a written safety program addressing these hazards. Additionally, according to 29 CFR 1926.21(b)(2)[1] "the employer shall instruct 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." Youth less than 18 years of age should receive additional training on prohibited work tasks and settings (activities deemed to be especially dangerous for youth by the employer and/or child labor regulations), as well as hazards and safe work practices that apply to work they are permitted to perform. The victims had not received any training from the employer, and there was no evidence that they had ever received any type of training. Construction sites expose workers to multiple and complex hazards. It cannot be assumed that employees, especially new hires, can recognize hazards such as working in an unprotected trench, to which they are being exposed. 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.

Recommendation #4: Employers should pursue every effort to ensure that documentation of age is authentic and that youth < 18 years of age are not assigned to prohibited tasks and are appropriately supervised.

Discussion: Employers should consider requiring applicants to report to the company office to fill out applications and present documentation of age. This documentation should be carefully examined for authenticity. Employers should also consider requiring multiple forms of official documentation of age. During examination of the victims' documentation in the coroner and sheriff's office, numerous imperfections were identified. The employer had not yet completed the U. S. Department of Justice, Immigration and Naturalization Service, Form I-9 (Employment Eligibility Verification Form) for the new employees. Employers have three business days to do so. The workers had been with the company for only two days. Guidelines for the verification of employment eligibility of new employees can be obtained from the U. S. Department of Justice, Immigration and Naturalization Service.[2]

Once the authentic age of a worker is determined, employers should not assign youth < 18 years of age to tasks considered too dangerous for youth, and should ensure that youth are appropriately and constantly supervised. The Fair Labor Standards Act provides a minimum age of 18 years for non-agricultural work which the Secretary of Labor declares to be particularly hazardous (Hazardous Orders). One of the 17

Hazardous Orders prohibits minors from performing some types of work in excavation operations (Hazardous Order No.17).[3] Specifically, this order prohibits the employment of persons less than 18 years of age from excavating, working in, or backfilling trenches that are 4 feet deep or greater at any point. Additionally, youth 15 years of age may not be employed in any occupation involved in construction, except office or sales work.

Employers who employ workers less than 18 years of age should contact the U.S. Department of Labor Wage and Hour Division and the agency in their State that regulates child labor to obtain information regarding appropriate work assignments for young workers (http://www.dol.gov/dol/esa/public/whd_org.htm). A NIOSH Alert, *Preventing Deaths, Injuries, and Illnesses of Young Workers*[4] provides additional information regarding appropriate work assignments for young workers.

Recommendation #5: Employers should ensure that workers who are part of a multilingual workforce comprehend instructions in safe work procedures for the tasks to which they are assigned.

Discussion: Companies that employ workers who do not understand English should identify the languages spoken by their employees, and design, implement, and enforce a multi-language safety program. To the extent feasible, the safety program should be developed at a literacy level that corresponds with the literacy level of the company's workforce. The program, in addition to being multi-language, 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 arise.

Recommendation #6: Employers should ensure that only qualified rescue personnel who have assumed responsibility for rescue operations and site safety should attempt rescue operations.

Discussion: Although not a factor in this incident, no rescue plan for the site existed and untrained coworkers uncovered and removed the victims from the trench before trained rescue personnel arrived at the scene. Workers should never, under any circumstances, enter a hazardous environment to attempt a rescue operation unless properly equipped and trained in the use of the equipment and methods required for rescue. In this instance, untrained workers entered the trench, uncovered the victims and removed them from the trench, placing themselves at risk of becoming victims themselves. Only those persons trained in the requirements of NFPA 1670[5] should attempt rescue operations after a trench cave in occurs. All persons at the incident site should follow the directions given by the Incident Commander or his/her designee in order to provide the most optimal circumstances for the safety of all persons on the site during rescue operations.

Additionally,

Site project management companies should consider ensuring through contract language that contractors have a comprehensive safety and health program that addresses all aspects of the jobs they are to perform.

Discussion: Site project management companies should consider using contract language that requires all contractors to identify how they intend to implement a site-specific safety and health program prior to the initiation of work. Contractors' safety and health programs should be consistent and compatible with the work to be performed. The contract should contain clear and concise language as to which party is responsible for a given safety or health issue. Any differences should be negotiated before work begins. Once the provisions for these responsibilities have been established, the respective parties should ensure that the provisions of the contract regarding safety and health are upheld.

REFERENCES

1. 29 CFR 1926 (2003) Code of Federal Regulations, Washington D.C.: U.S. Government Printing Office, Office of the Federal Register.

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4. NIOSH [2003]. NIOSH Alert: Preventing deaths, injuries, and illnesses of young workers. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2003-128.

5. NFPA [1999]. NFPA 1670, Standard on operations and training for technical rescue incidents 1999 Edition, Chapter nine, trench and excavation. Quincy, MA; National Fire Protection Association.

INVESTIGATOR INFORMATION

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