



The National Institute for Occupational Safety and Health (NIOSH)

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Construction Laborer Killed After A Backhoe Slid into an ExcavationMassachusetts

Investigation: # 00-MA-55-01

Release Date: May 20, 2002

SUMMARY

On September 28, 2000, a 21-year-old male construction laborer (the victim) was fatally injured when he was struck by a backhoe while working inside an excavation. The victim was operating a gas-powered compactor with his back towards the backhoe. The operator had been repositioning the backhoe when the backhoe slid into the excavation striking the victim in the head and back. Co-workers, who witnessed the incident, immediately called for emergency assistance and tried to help the victim. The victim was freed from underneath the bucket and CPR (cardiopulmonary resuscitation) and first aid were administered. Emergency medical personnel arrived within minutes of the telephone call and the victim was pronounced dead at the construction site. The Massachusetts FACE Program concluded that to prevent similar occurrences in the future, employers should:

- **ensure employees are not inside excavations while construction equipment is in close range to the excavation edge**
- **have a competent person conduct daily site inspections including inspections of excavations**
- **ensure that employees and operators receive health and safety training**
- **implement a warning system at excavation edges to help minimize injuries to workers from mobile equipment falling into excavations**
- **develop, implement and enforce a comprehensive health and safety plan that includes hazards associated with excavations**

INTRODUCTION

On September 29, 2000, the Massachusetts FACE Program was notified by the Occupational Safety and Health Administration (OSHA) through the 24-hour Occupational Fatality Hotline, that on September 28, 2000, a 21-year-old male construction laborer was fatally injured when a backhoe fell into the excavation in which he was working. An

investigation was immediately initiated. On October 26, 2000, the Massachusetts FACE Program Director traveled to the job site where the victim's employer was interviewed. The police report, death certificate, corporate information and OSHA fatality/catastrophe report were obtained during the course of the investigation.

The victim's employer, one of two subcontractors onsite the day of the incident, had been in business approximately five years. The employer, a small contractor, employed four people, three of whom were onsite. Two other individuals were present at the time of the incident, a representative from the general contractor and the backhoe operator; the second subcontractor. The employer did not have written safety procedures or a health and safety plan but did have a booklet about construction safety given to him from his insurance agency, which he had with him on the day of the investigation. The project's general contractor had a comprehensive health and safety plan and held regular on site toolbox safety meetings.

The victim had been employed with the company for approximately 6 weeks at the time of his death. It was reported that he had over one year of experience as a front-end loader operator. The victim's construction laborer training with this company was on-the-job. The employees of the victim's company, including the victim, were not represented by a union.

INVESTIGATION

The victim's employer specialized in renovations and small additions and was hired to complete some demolition, foundation work, and framing of a new addition for a commercial building. The company had been onsite approximately one month performing the demolition and foundation work.

During the foundation work, some "peat type" soil was discovered and the project architect requested that the soil be removed and replaced with "suitable fill". The general contractor hired a second subcontractor, the backhoe operator, to perform this additional excavation work.

The excavation size was approximately 4 feet deep by 18 feet long. The width of the excavation was approximately 19 $\frac{1}{2}$ feet at one end and tapered to approximately 6 $\frac{1}{2}$ feet at the other end, which abutted against the existing building. A section of an old foundation that protruded a few inches above the soil was located a few feet outside the wider end of the excavation. The soil grade between the protruding old foundation and the edge of the excavation sloped towards the excavation.

The day before the incident, all of the "peat type" soil had been removed and back filling the excavation with "suitable fill" had begun. The excavation subcontractor was placing piles of fill inside the excavation with the rear backhoe attachment, while two employees from the victim's employer, including the victim, and one employee from the general contractor were inside the excavation spreading the fill. The victim had been using a gasoline-powered compactor while the other two workers were using shovels to spread the fill.

On the day of the incident, the onsite construction crew consisted of three employees from the victim's employer, one employee from the general contractor, and one employee from the excavation subcontractor. The same configuration of workers were located inside the excavation spreading the fill as described above for the day before. The backhoe operator was positioning the backhoe near the excavation edge in preparation to empty a load of new fill into the excavation. It had been reported that the operator had stopped the backhoe after the rear wheels passed over the protruding section of old foundation, did not put down the stabilizers and did not engage the parking brake.

Occupants of the existing building heard the commotion and placed a call for emergency assistance. The construction crew members with help from the building occupants began to dig the victim out from underneath the bucket. Emergency medical personnel arrived within minutes of the call and immediately administered first aid and CPR (cardiopulmonary resuscitation). The victim was pronounced dead at the construction site.

CAUSE OF DEATH

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

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure employees are not inside excavations while construction equipment is in close range to the excavation edge.

Discussion: When mobile equipment is being operated in close proximity (within two feet) to the excavation edge (including equipment being driven by an excavation edge) the employer should ensure that all employees, both their own and subcontractors, are outside of the excavation. (29CFR1926.651).

In this case, workers were located inside an excavation while the backhoe, positioned at the excavation edge, was dumping fill inside the excavation. Removing workers from the excavation before the backhoe drove up to and started to dump fill inside the excavation would have eliminated the risk of serious or fatal injuries to the victim when the backhoe fell into the trench.

Recommendation #2: Employers should have a competent person conduct daily site inspections of excavations.

Discussion: The incident occurred on the second day of back filling an excavation with a backhoe while workers were inside the excavation spreading and compacting new fill. During excavation work, OSHA requires that a competent person must be on site to conduct daily site inspections (29CFR1926.651).¹ OSHA defines a person who is competent in excavations on construction sites 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 authorization to take prompt correction measures to eliminate them.”

The competent person for excavation work is required to conduct inspections prior to starting work for the day and routinely throughout the day. Additional inspections should be performed after storms, when changes in soil occur, including cracks and water seepage. These inspections should identify unsafe conditions including, the lack of shoring and shielding and the soil grade at the excavation edge, which should be graded away from the excavation to help reduce the possibility of equipment falling into the excavation.¹

In addition, a competent person must conduct inspections of the adjacent areas, and protective systems for evidence of a situation that could result in possible cave-ins, hazardous atmospheres, or other hazardous conditions, such as equipment located at the excavation edge while workers are inside the excavation.

Recommendation #3: Employers should ensure that employees and operators receive health and safety training.

Discussion: All workers on construction sites should go through construction safety training. One way employers can be sure employees know important excavation health and safety information, such as the hazard of equipment falling into the excavation, would be to provide health and safety training that specifically addresses excavations. All training should be refreshed annually.

In addition, employers should include excavation related health and safety in their equipment operator training. Specifically, backhoe excavation related health and safety operator training should include an outline of the proper steps to follow for operating and stopping a backhoe at an excavation edge. These steps would include but not be limited to:

- Ensuring the excavation area is clear of all workers.
- Engaging the parking brake.
- Lowering the front mounted equipment to the ground.
- Shifting the transmission controls to neutral.
- Lowering the stabilizers and level the machine. ²

In this case, it was reported that the backhoe's parking brake was not engaged and the stabilizers were not lowered to the ground. Following the above steps and the manufacturer's recommendations for the proper procedure to follow when stopping a backhoe would have reduced the possibility of the backhoe falling unexpectedly into the excavation.

Recommendation #4: Employers should implement a warning system at excavation edges to help minimize injuries to workers from mobile equipment falling into excavations.

Discussion: Construction sites tend to have multiple tasks occurring at once which increases the number of events that might distract an equipment operator. A warning system would help equipment operators maneuver around excavations and make excavation work safer for all workers on site. In this case, there was no warning system. Prior to excavating, a warning system should have been established to help reduce the risk of mobile equipment falling into the excavation. The warning system could include barricades, stop logs, hand or mechanical signals. ¹

Recommendation #5: Employers should develop, implement and enforce a comprehensive health and safety plan that includes hazards associated with excavations.

Discussion: Employer should develop, implement and enforce a comprehensive health and safety program with employee input, which will ensure that employees participate in their own safety. A health and safety program should include but not be limited to the hierarchy of responsibility for health and safety, especially on construction sites with subcontractors, training requirements, written procedures for tasks, hazard identification, assessment, control and prevention of these hazards. For this incident, the comprehensive health and safety program should include control of hazards associated with excavations, such as the hazard of equipment falling into an excavation.

In this case, the employer was a small contractor that, on average, employed four people, did not have a written comprehensive health and safety program, and did not supply employee training. The National Institute for Occupational Safety and Health (NIOSH) has a recent publication "Safety and Health Resource Guide for Small Businesses" available on their web site at www.cdc.gov/niosh/ (Link updated 3/27/2013) (publication number 2000-148). OSHA also has health and safety information for small businesses also available on their web site at www.osha.gov  (<https://www.osha.gov>). Both of these publications are

geared towards small businesses and supply valuable health and safety information. In addition, a summary of OSHA's draft proposed safety and health program rule, which has a section on multi-employer work sites, has been included at the end of this report.

REFERENCES

1. Code of Federal Regulations, 29 CFR 1926.651 (f) and (k) (1). Specific excavation requirements, Washington DC: U.S. Government Printing Office, Office of Federal Register.
2. Equipment Manufacturers Institute (EMI), Backhoe/Loader, Chicago, Illinois, Revised 1989. Form #BL10-3.
3. NIOSH [2000]. Safety and Health Resource Guide for Small Businesses. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, DHHS Publications No. 2000-148.
4. U.S. Department of Labor, OSHA, Technical Manual, Section V: Chapter 2, Excavations: Hazard recognition in trenching and shoring. Washington DC: U.S. Government Printing Office.



Figure 1 – Backhoe inside the excavation



Figure 2 – Backhoe buck that struck the victim

**SUMMARY OF OSHA'S DRAFT PROPOSED
SAFETY AND HEALTH PROGRAM RULE FOR EMPLOYERS
(29 CFR 1900.1 Docket No. S&H-0027)**

Core elements <ul style="list-style-type: none">Management leadership and employee participationHazard identification, assessment, prevention and controlAccess to information and trainingEvaluation of program effectiveness Basic obligations <ul style="list-style-type: none">Set up a safety and health program, with employee input, to manage workplace safety and health to reduce injuries, illnesses and fatalities.Ensure that the safety and health program is appropriate to workplace conditions taking into account factors such as hazards employees are exposed to and number of employees.Establish and assign safety and health responsibilities to an employee. The assigned person must have access to relevant information and training to carryout their safety and health responsibilities and receive safety and health concerns, questions and ideas from other employees. Employee participation <ul style="list-style-type: none">Regularly communicate with employees about workplace safety and health matters and involve employees in hazard identification, assessment, prioritization, training, and program evaluation.Establish a way and encourage employees to report job-related fatalities, injuries, illnesses, incidents, and hazards promptly and to make recommendations about appropriate ways to control those hazards. Identify and assess hazards to which employees are exposed	Safety and health program record keeping <ul style="list-style-type: none">Keep records of identified hazards, their assessment and actions taken or the plan to control these hazards. Hazard prevention and control <ul style="list-style-type: none">Comply with the hazard prevention and control requirements of the OSHA standards by developing a plan for coming into compliance as promptly as possible, which includes setting priorities and deadlines for controlling hazards and tracking the progress. Information and training <ul style="list-style-type: none">Ensure each employee is provided with safety and health information and training.If an employee is exposed to hazards, training must be provided on the nature of the hazards to which they are exposed to and how to recognize these hazards. Training must include what is being done to control these hazards and protective measures employees must follow to prevent or minimize their exposures.Safety and health training must be provided to current and new employees and before assigning a job involving exposure to a hazard. The training should be provided routinely, when safety and health information is modified or a change in workplace conditions indicates a new or increased hazard exists. Program evaluation and maintenance <ul style="list-style-type: none">Evaluate the safety and health program at least once every two years or as often as necessary to ensure program effectiveness.Revise the safety and health program in a timely manner once deficiencies have been identified. Multi-employer workplaces
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<ul style="list-style-type: none">Conduct inspections of the workplace at least every two years and when safety and health information change or when a change in workplace conditions indicates that a new or increased hazard may be present.Evaluate new equipment, materials, and processes for hazards before introducing them into the workplace and assess the severity of identified hazards and rank those hazards that cannot be corrected immediately according to their severity. <p>Investigate safety and health events in the workplace</p> <ul style="list-style-type: none">Thoroughly investigate each work-related death, serious injury, illness, or incident (near miss).	<ul style="list-style-type: none">The host employer's responsibility is to provide information about hazards and their controls, safety and health rules, and emergency procedures to all employers at the workplace. In addition, the host employer must ensure that assigned safety and health responsibilities are appropriate to other employers at the workplace.The contract employer responsibility is to ensure that the host employer is aware of hazards associated with the contract employer's work and how the contract employer is addressing them. In addition, the contract employer must advise the host employer of any previously unidentified hazards at the workplace.
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Date issued November 23, 1998. Full text available on

<https://www.osha.gov/dsg/topics/safetyhealth/nshp.html> 
(<https://www.osha.gov/dsg/topics/safetyhealth/nshp.html>). (Link updated 3/20/2013)

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