MIFACE INVESTIGATION #06MI209

SUBJECT: Heavy Equipment Operator Dies After Being Pinned Between the Boom and Cab of an Excavator

Summary

On December 4, 2006, a 51-year-old male heavy equipment operator was killed when he was pinned between an excavator boom and an excavator cab. A demolition company (site contractor) had been hired by the site owner to demolish the building on the incident site and clear the site of debris. The decedent was a subcontractor for the site contractor. On the day of the incident, the decedent was at the incident site waiting for the site contractor to arrive. After speaking with the decedent and giving instructions to the excavator operator he had hired, the site contractor left the location. The excavator hired by the site contractor was operating a Caterpillar Model 225 DLC excavator. The excavator cab was positioned perpendicular to the tracks of the excavator with the boom in an upright position (Figure 1). The cab window adjacent to the excavator boom was broken. The decedent jumped onto the excavator tracks under the raised boom and leaned through the cab window. His torso/arm contacted the excavator boom joystick-type control lever and the boom lowered pinning the decedent between the boom and the cab frame. Emergency response was called and arrived and transported the decedent to a local hospital where he was declared dead.

Figure 1. Position of excavator boom and cab at time of incident

RECOMMENDATIONS

- Equipment owners should ensure machines are red-tagged and taken out of service immediately when safety features are compromised or the machine is in poor condition.
- Employers should ensure that excavator operators have been trained on the use of the equipment. This training should include safety training in the importance of lowering the boom to a safe position with the bucket on the ground before permitting any site worker (including subcontractors) on foot to approach the machine.

Key Words: Machine-related, Excavator, Construction

- Employers should instruct and ensure that any worker (including subcontractors) on foot approach the excavator only after they signal the operator to lower the bucket and the bucket is lowered to the ground, and the machine turned off.
- 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.

INTRODUCTION

On December 4, 2006, a 51-year-old male heavy equipment operator was killed when he was pinned between an excavator boom and an excavator cab. On December 27, 2006, MIFACE was informed by the Michigan Occupational Safety and Health Administration (MIOSHA) personnel, who had received a report on their 24-hour-a-day hotline that a work-related fatality had occurred on December 4, 2006. MIFACE interviewed the site contractor hired to perform the demolition work at the incident site on April 4, 2007 at a different worksite. During the course of writing this report, the medical examiner's report and MIOSHA file were reviewed. All pictures used in the report are courtesy of the MIOSHA compliance officer.

The decedent was the sole owner of a demolition company and had been performing demolition work for about 20 years according to the site contractor. The site contractor stated that the decedent had operated excavators in the past and was familiar with the location of cab controls. The site contractor had owned his demolition company since 1988. The decedent had worked for the site contractor periodically over the last couple of months as well as having demolition contracts using his own company. The site contractor stated that the excavator operator he had hired had on-the-job training and many years of experience operating an excavator. The site contractor did not know if the decedent had any "formal" heavy equipment operator training.

INVESTIGATION

The site contractor had purchased the Caterpillar 225 DLC excavator involved in the incident in new condition in 1989. Figure 2 illustrates the condition of the excavator at the time of the incident. According to the site contractor, the excavator's maintenance schedule was determined by the number of days of service.

Figure 2. Cab condition and location of controls

The site contractor had procured the contract to demolish the building on the site in early November 2006. The building had been demolished, and the site was in the first day of the clean-up phase.

In addition to the decedent who was working as a subcontractor for the site contractor, there were four other workers on the site. One of the workers was an excavator operator who was hired by the site contractor to operate the CAT 225DLC excavator. The site contractor told the excavator operator to move debris to prepare a path for the dump trucks so they could be loaded and leave the site. The site contractor also informed the excavator operator that he was to help the decedent unload the decedent's broken-down truck bed so the decedent could weld parts onto the bed to fix it.

Previously, the decedent asked and received permission from the site contractor to unload debris from another demolition site onto this site so it could be hauled away. As the decedent was unloading the debris from his truck bed, the dump truck broke-down. The decedent called the site contractor and asked him when he would be at the incident site so they could talk about how to complete unloading the debris from his broken-down truck. The site contractor told the decedent the day and time he would be there. When the site contractor arrived at 9:00 a.m., the decedent was waiting for him.

After speaking with the decedent and the excavator operator, the site contractor left the location. The excavator operator began moving debris to clear a path for the dump trucks to enter and leave the site. The decedent got the attention of excavator operator and climbed up onto the excavator tracks and spoke with the excavator operator through the operator's cab right window opening. The decedent informed the excavator operator that he was going to leave the site to get some torches so he could fix his truck. The main boom of the excavator extended almost straight up. The decedent also asked the excavator operator if he could get his dump truck bed emptied in order to repair the vehicle. The decedent jumped off the machine and began to walk away. Only a few feet away, the decedent stopped and turned and jumped back onto the track in the same position as before. He once again told the excavator operator that he was going to get some torches. The relationship between the decedent and the excavator operator is unknown. For reasons unknown, the decedent "fell" into the cab (perhaps a slip on a dirty or muddy track) and his arm pressed the right lever, resulting in pulling the lever forward and causing the boom to come down, pinning him (Figure 3). The hydraulic cylinders and the boom pushed and twisted the decedent in between the cab and the boom. The excavator operator, after several attempts, was

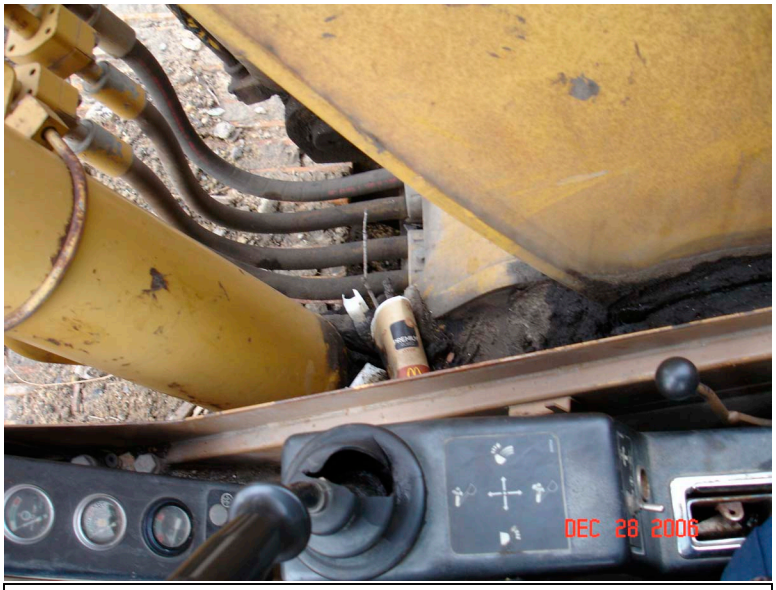

Figure 3. Position of excavator boom, boom control lever, and cab window area

able to move the decedent's body from the lever and was able to move the boom up. It is unknown if the excavator operator warned the decedent about standing on the tracks.

Once the decedent was freed, the excavator operator and two of the other laborers on site laid the decedent down on the track of the machine. One of the workers called 911 and an ambulance arrived 15 minutes later. The decedent was transported to a local hospital and pronounced dead on arrival.

CAUSE OF DEATH

The cause of death as listed on the death certificate was multiple injuries. Toxicological tests indicated a blood alcohol level of 0.03%, which is below the legal limit of intoxication. Blood tests were negative for illicit drugs.

RECOMMENDATIONS/DISCUSSION

- Equipment owners should ensure machines are red-tagged and taken out of service immediately when safety features are compromised or the machine is in poor condition.

Employers should ensure that the materials in windows (e.g., glass, plexiglass, etc) of heavy machinery are intact to prevent inadvertent contact with machinery controls. The excavator at the incident site did not have an intact window material (glass) adjacent to the boom, which allowed the decedent enter into the cab and contact the machinery controls while standing on the tracks. Although some equipment manufacturers provide the option to remove some of the cab's front glass to provide a better sight line, or the driver's side door glass to assist in ventilating the cab, the cab glass or other window material next to the boom is usually permanent and should not be removed by the operator. When the side window material is not intact or deemed unsafe, employers should red-tag the machine, remove it from service and replace the material (Figure 4).

Figure 4. No glass in window of cab

- Employers should ensure that excavator operators have been trained on the use of the equipment. This training should include safety training in the importance of lowering the boom to a safe position with the bucket on the ground before permitting any site worker (including subcontractors) on foot to approach the machine.

The experience level of the excavator operator was unknown. Excavator operators should receive training that includes the equipment manufacturers' recommendations for safe equipment operation, including the requirement to lower the boom placing the bucket on the ground before permitting workers on foot to approach the cab and/or the machine.

- Employers should instruct and ensure that any worker (including subcontractors) on foot approach the excavator only after they signal the operator to lower the bucket, the bucket is lowered to the ground, and the machine turned off.

There are many safe work practices associated with excavators, for both the excavator operator and workers on foot working near the excavator. One of the safety practices that should be emphasized for any worker on foot is that they should approach the excavator only after they signal the operator to lower the bucket and the bucket is lowered and the machine turned off. Though the decedent was an experienced excavator operator, it is possible that his knowledge of the hazards associated with being a worker on foot near an excavator was not adequate. Workers, including subcontractors, who operate or work near hydraulic excavators and backhoe loaders are at risk of being struck by the machine or its components. Although workers may be experienced in their trade, periodic re-training and updates on new procedures and equipment are necessary. Employers should instruct and reinforce the importance of safe work procedures and the expectation that they would be followed is an important element the prevention of injuries.

- 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.

The site contractor did not have a written safety and health program. Given the known hazards associated with construction sites (e.g., hazards of being struck by or run over by vehicles and/or equipment), employers should provide their workers with a comprehensive safety program and training that addresses standard operating procedures (SOPs) that are to be followed when working on or near vehicles and/or equipment. Employers should develop, communicate, implement, and enforce safe SOP that address and control these hazards.

Prior to allowing any worker to operate an excavator, employers should ensure that the worker receives proper training. It is important that employers obtain and keep the operation and safety manuals from equipment manufacturer, and require operators to review the manuals and follow manufacturer's instructions and requirements when operating the machine.

REFERENCES

MIOSHA Standards can be directly accessed from the Michigan Department of Labor and Economic Growth, MIOSHA website www.michigan.gov/mioshastandards. The Standards may

also be obtained for a fee by writing to the following address: Michigan Department of Labor and Economic Growth, MIOSHA, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan, 48909-8143. MIOSHA Standard Section phone number is (517) 322-1845.

- NIOSH "Workplace Solutions" NIOSH Publication No. 2004-107: Preventing Injuries When Working with Hydraulic Excavators and Backhoe Loaders. Internet Address: http://www.cdc.gov/niosh/docs/wp-solutions/2004-107/default.html

8/24/07

MIFACE
Investigation Report #06 MI 209
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To improve the quality of the MIFACE program and our investigation reports, we would like to ask you a few questions about this report:

Please rate the report using a scale of:

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1	2	3	4

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1	2	3	4

Was the report…	**Excellent**	**Good**	**Fair**	**Poor**
Objective?	1	2	3	4
Clearly written?	1	2	3	4
Useful?	1	2	3	4

Were the recommendations …	**Excellent**	**Good**	**Fair**	**Poor**
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Practical?	1	2	3	4
Useful?	1	2	3	4

How will you use this report? (Check all that apply)

- ❑ Distribute to employees
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- ❑ Will not use it
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