MIFACE INVESTIGATION: #04MI066

SUBJECT: Landscaper Died When the Arms of a Skid-Steer Loader Crushed His Upper Body and Head.

Summary

On May 27, 2004, a 27-year-old male landscape supervisor was killed when the lowering arms of a skid-steer loader crushed his head and upper body. See Figure 1. The victim and his crew were clearing the back yard and uprooting small diameter trees and tree stumps for a newly constructed house. The victim was operating a Case brand model 1845C skid-steer loader equipped with a 73-inch bucket to uproot small diameter (one to two inches) trees and tree stumps. Although this was an unwitnessed incident, the following scenario has been developed based on routine work practices as indicated by company personnel. To uproot the tree involved in this incident, he wrapped a 16-foot 3/8-inch binder chain around the base of the tree and wrapped the other end of the chain around the bucket's stabilizing bar. He placed the skid steer in reverse. As he was backing up, he raised the bucket to lift the tree roots from the ground. After removing the tree and with the bucket in the air, he raised the skid steer's safety bar and exited the cab. Standing on the ground under the raised bucket, he attempted to unwrap the chain from the tree. He was unable to remove the chain because of the tension on the chain caused by the raised bucket. He reached into the cab, lowered the safety bar, and began to operate the controls to lower the bucket. As the bucket lowered, he was unable to remove himself from beneath the raised arms of the skid steer and he was crushed between the skid-steer loader's arms and frame. A fellow worker heard a sound, turned around and saw the victim. He notified another worker, who ran to the residence where the crew was working. The homeowner called 9-1-1. His fellow workers raised the skid-steer loader arms and began CPR. Emergency response arrived and declared the victim dead at the scene.

Figure 1. Skid-steer loader at scene

RECOMMENDATIONS

- Construction employers should develop, implement, and enforce a comprehensive accident prevention program that includes, but is not limited to, training in hazard recognition and avoidance.
- Operators of skid-steer loaders should be trained in and follow the manufacturer's recommended procedures to safely operate, service, maintain, and exit the skid-steer loader.

Key Words: Machine-Related, Skid-Steer, Construction, Landscaping

- Employers should ensure that skid-steer loader operators follow the procedures for which they have been trained, including prohibiting them from working underneath raised lift arms if an approved lift arm support is not available.
- Company management should consider developing a joint health and safety committee.
- Employers should establish and enforce a thorough vehicle maintenance and inspection program.

INTRODUCTION

On May 27, 2004, a 27-year-old male landscape supervisor was killed when he was crushed between the skid-steer loader arms and the frame of the skid-steer loader. On May 28, 2004, the Michigan Occupational Safety and Health Administration personnel who had received a report on their 24-hour-a-day hotline that a work-related fatal injury had occurred on May 28, 2004 notified MIFACE investigators of the fatality. On September 15, 2004, the MIFACE researcher interviewed the company owner at the site. The company owner also agreed to take the MIFACE researcher to another landscaping site to view a similar skid-steer loader and interview co-workers of the deceased. The company permitted the MIFACE researcher to photograph the skid-steer loader, the type of chains used at the incident site as well as a bucket similar to that the victim would have been using on the day of his death. During the course of writing the report, the autopsy results, death certificate, police report, MIOSHA citations and police department pictures were obtained. Figure 1 and Figure 3 are police pictures taken at the scene. The MIFACE researcher took the picture used in Figure 2 at the time of the site visit.

The company had a total of five workers at the site. They had been at the site for approximately one week. The employer was a seasonal employer and employed 10 to 18 workers over the course of the year. The company was involved in landscape development, site development and construction. The employee was an hourly full-time employee and his job responsibility was as a supervisor or foreman at the work site. The victim's work schedule depended upon what the job required because of the nature of the seasonal work. They usually worked 10 to 12 hours. They were paid time and a half for over a 40-hour week. The victim's shift started at approximately 7:00 a.m. and he was killed approximately two hours into his work shift. The victim had approximately four years of experience in operating a skid-steer loader with this employer. The employer stated the victim had previous experience operating a skid-steer loader at his previous job. The victim did work with a family member after hours and on weekends at another business. The employer told the MIFACE researcher that the victim had been involved with other equipment accidents. The victim had an injured shoulder and appeared to be on pain medication for that shoulder.

The company did not have written safety rules and procedures in place for the task the victim was performing at the time of the incident. The company had an "oral" safety plan; there was no written safety plan. All safety issues were discussed at the company headquarter's location and all equipment maintenance issues were taken care of at the company headquarters.

The safety program consisted of site visits by the supervisor or company management who would audit the work practices. If someone were conducting work that would be considered unsafe, the supervisor/company management personnel would say something to the worker and site foreman. There was no written disciplinary procedure in place for safety and health violations. It was the responsibility of the foreman on site to relay concerns to the owner of the company or resolve the safety issues on site.

The company conducted an in-house skid-steer training program. The victim operated the skid steer and was given a simple loading task under the supervision of the nursery foreman before being allowed to operate the skid-steer on a job-site.

The MIOSHA investigation resulted in two Serious citations being issued to the employer under Construction Safety and Health Division, General Rules, Part 1. The employer did not develop, maintain or coordinate with employees a written accident prevention program and did not make a copy of the program available at the worksite (Rule 114(1)). The employer did not have a certification of the training given to employees required to operate the Case 1845C skid-steer loader (Rule 115(2)).

INVESTIGATION

The victim was operating a Case brand 1845C Skid-steer loader equipped with a 73" utility bucket. The skid-steer loader was bought new in 1998, and the required safety labels were affixed. The machine was not equipped with an operator manual. The machine was equipped with a functioning operator restraint system that consisted of a lap safety bar that was placed across the lap of the operator. If the lap bar was in the down position, the bucket could be moved up and down and the skid steer could be moved in either direction. If the safety bar was in the raised position, then the hydraulic mechanism for the bucket and movement of the skid steer itself were rendered inoperational.

Figure 2. Wooded area behind home at time of MIFACE visit

No environmental factors played a role on the day of the incident. The victim was the crew leader. There were four co-workers at the worksite, which was a residential home. Two individuals were in the front yard working on a rock wall, one individual was in the backyard clearing a wooded area by chopping brush and cutting and/or removing small diameter (one to two inches) trees. (See Figure 2). The victim was operating the skid-steer loader to remove trees and tree stumps. The following scenario was developed based on employee and company management interviews. The victim wrapped a 16-foot 3/8-inch binder chain at least twice around the trunk of the tree and wrapped the other end of the chain around the bucket's stabilizing bar. (See Figure 3). After attaching the chains, he entered the skid steer cab, lowered the safety lap bar, and placed the skid steer in reverse. While moving in reverse, he raised the bucket so he could pull and lift the tree roots from the ground. After uprooting the tree, he raised the safety bar and

Figure 3. Chain wrapped around tree and bucket stabilizing bar

exited the cab while the skid steer was still running and the bucket still raised above the ground. He attempted to loosen the chain from the tree so he could unwrap the chain from around the tree. He was unable to remove the chain because of the tension on the chain caused by the raised bucket. While standing on the ground under the raised bucket, he reached into the cab and lowered the safety lap bar. He was positioned on the operator's right side of the cab. The operating controls for raising and lowering the bucket were located on the operator's left side of the cab. He reached into and across the cab to lower the bucket and the bucket arm came down, crushing him. His fellow workers heard a noise and turned around and saw the victim. One of the employees who was chopping trees in the vicinity of the victim notified another employee who went to the residence for help. The employee who originally saw the victim attempted to reach Emergency Response with his cell phone but was unsuccessful. The homeowner called 9-1-1. The employee who went to the home to notify the homeowner to call 9-1-1 entered the cab, lifted the safety bar and sat on the seat, lowered the safety bar and raised the bucket from the ground. This employee stated to the police that the skid steer front tires were off of the ground when he entered the cab. When he raised the bucket from the ground, the skid steer rolled back approximately two to three feet. Employees performed CPR until Emergency Response arrived. Emergency Response declared the victim dead at the scene.

Although not pertinent to the cause of the fatality, the following deficiencies were noted by the firm who conducted an inspection of the skid-steer loader after the fatality:

- the back up audible alarm wire was cut,
- the skid steer's right headlight was broken and the lights did not work, and
- with the safety bar in the raised position the operator could slightly raise the loader arms but could not lower the arms or tilt the bucket.

After the incident, the employer equipped the skid steers with the operator's manual and has retrained employees concerning proper exiting of skid-steer loaders.

CAUSE OF DEATH

Cause of death was multiple injuries received by being crushed beneath a falling front-end loading extension on a machine. Principle injuries were skull fractures and crushing injuries of the right chest with rapid blood loss around the right lung. Toxicology results indicated 0.024 gm/dl (%?) of ethanol in the victim's blood. This level is above the level allowable for a person in a safety sensitive transportation job. The use of alcohol and pain medication may have contributed to the individual's death. The urine was positive for nicotine, naproxen, and oxycodone with no values listed.

RECOMMENDATIONS/DISCUSSION

- Construction employers should develop, implement, and enforce a comprehensive accident prevention program that includes, but is not limited to, training in hazard recognition and avoidance.

The employer did not have a comprehensive accident prevention program as required by Construction Safety and Health Division, General Rules, Part 1. The employer did not provide employee safety education and training that included hazard recognition. There were no written procedures for the landscaping activities performed by any of the crewmembers, including the victim. The employer should conduct a job hazard analysis for existing and new work procedures as well as provide employee job hazard analysis training. Job hazard analysis training should be conducted so employees can recognize unsafe work practices and potentially hazardous work conditions when performing a task. The employer (or outside consultant) can provide hazard analysis training as part of the development and implementation of the company's health and safety program.

A hazard analysis may have identified the potential problem of chain tension on the tree when the bucket was in a raised position. A copy of the OSHA Job Hazard Analysis publication is included with this report as Attachment A. This document may also be found and downloaded from the OSHA website: www.osha.gov/. Click on the Newsroom Publications link, and scroll down the OSHA publications until the "Job Hazard Analysis" document is found.

In addition, ongoing hazard recognition and evaluation should be conducted. When new hazards are recognized, effective preventive measures should be included in a formalized safety-training plan. This training should be ongoing, and should be a requirement for all workers as well as for new workers and trainees. The safety-training program could be supplemented using the daily 5-minute safety talks given daily jobsite foreman.

- Operators of skid-steer loaders should be trained in and follow the manufacturer's recommended procedures to safely operate, service, maintain, and exit the skid-steer loader.

In violation of the manufacturer's recommended safety procedures, the operator exited the cab with the lift arms in a raised position without the use of a lift arm support. The safety decals were present in the skid-steer loader cab. Employers should take advantage of training materials offered by the equipment manufacturer and/or other organizations to inform and teach employees about the equipment, hazards and machine safeguards in place for their protection.

Skid steer operators should frequently review the operator's manual to refresh their memory concerning safe use of the equipment. The operator's manual should be present in the skid – steer loader's operator cab.

- Employers should ensure that skid-steer loader operators follow the procedures for which they have been trained, including prohibiting them from working underneath raised lift arms if an approved lift arm support is not available.

An approved lift arm support is required by the manufacturer to work under raised lift arms. If an employer does not have available an approved lift arm support, the employer's safety program should strictly prohibit employees from working underneath the raised lift arms of a skid-steer loader.

The company did not have a written disciplinary policy to address unsafe work practices by employees and should develop one that provides for timely disciplinary action when any employee acts or performs work in an unsafe manner and/or does not follow the established health and safety policy procedures. Management representatives on-site should have a thorough understanding of all aspects of the health and safety policies, and ensure that compliance with these policies occurs during task performance. The disciplinary policy should ensure that the employee knows what the problem is as well as understand what a supervisor's expectations are in order for him/her to correct the unsafe action. The policy should also provide appropriate disciplinary action and consequences for unsafe work behavior/conduct and provide a record of corrective action taken.

- Company management should consider developing a joint health and safety committee.

The main incentive for developing a Health and Safety (H&S) committee is to encourage and heighten employee involvement in the company safety program. Employee input is a critical part of a successful safety program. An H&S Committee is one way to obtain that input. The level of involvement by employees and degree of management commitment will determine if an H&S Committee is successful.

- Employers should establish and enforce a thorough vehicle maintenance and inspection program.

Although the equipment deficiencies noted on the skid-steer after the incident did not play a role in this work-related fatality, the lack of an audible back-up alarm, lack of equipment lights and the ability of the operator to move the loader arms if the safety bar was raised could be factors in future tragedies. The deficiencies noted on inspection would have been identified if the employer had a vehicle maintenance and inspection program. Generally, skid-steer service schedule is broken down into daily, weekly, monthly, semi-annual and annual service checks. Employers should establish and enforce a vehicle maintenance schedule according to the equipment manufacturer's recommendations to ensure a vehicle is safe to operate and avoid equipment downtime.

REFERENCES

MIOSHA Standards cited in this report can be directly accessed from the Michigan Department of Labor and Economic Growth, MIOSHA website www.michigan.gov/mioshastandards.

The Standards can 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.

Michigan Department of Labor and Economic Growth, MIOSHA, Construction Safety and Health Division, General Rules, Part 1.

Occupational Safety and Health Administration. Job Hazard Analysis. OSHA 3071, 2002 (Revised). Internet resource: http://www.osha.gov/Publications/osha3071.pdf

APPENDIX A

JOB SAFETY AND HEALTH ANALYSIS

MIFACE

Investigation Report # 04 MI 066

Evaluation

To improve the quality of the MIFACE program and our investigation reports, we would like to ask you a few questions regarding this report.

Please rate the following on a scale of:

Excellent	**Good**	**Fair**	**Poor**
1	2	3	4

What was your general impression of this MIFACE investigation report?

1 2 3 4

Was the report…

Objective?	1	2	3	4
Clearly written?	1	2	3	4
Useful?	1	2	3	4

Were the recommendations …

Clearly written?	1	2	3	4
Practical?	1	2	3	4
Useful?	1	2	3	4

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

- o Distribute to employees/family members
- o Post on bulletin board
- o Use in employee training
- o File for future reference
- o Will not use it
- o Other (specify) _____

Thank You!

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