

FATALITY ASSESSMENT AND CONTROL EVALUATION**Mechanic Dies after being Pulled into a Snow Thrower****Case Report: 07NY013****SUMMARY**

In February 2007, a 63 year-old male mechanic (the victim) sustained fatal injuries after being pulled into a snow thrower at a ski resort. The snow thrower was temporarily parked in the Snowmaking Department garage. The victim was working alone at the time of the incident and there was no witness. At approximately 8:15 pm, two co-workers went to the garage to look for the victim after receiving a phone call from the victim's wife who reported that he had not come home. When they arrived at the garage, they saw the victim's pick up truck parked outside the garage door, the garage door opened 12 inches, and the victim caught in the auger of the snow thrower. The engine of the snow thrower was stalled. It appeared that the victim had tried to move the snow thrower out of the garage. He started the engine, engaged the PTO, got off the tractor, and positioned himself between the garage door and the auger to open the door. The clearance between the door and the auger was 14.5 inches. His flannel shirt was caught by the rotating auger and he was pulled into it. The victim did not receive any training on how to operate the snow thrower, nor was he authorized to operate or move the machine. The local emergency rescue squad responded and arrived on site within ten minutes. The victim was pronounced dead at the scene. The Medical Examiner reported in the toxicology report that the victim's blood alcohol concentration (BAC) was 0.12%. The legal limit of BAC for operating motor vehicles in New York State is 0.08%.

New York State Fatality Assessment and Control Evaluation (NY FACE) investigators recommend the following measures to help prevent similar incidents from occurring in the future, employers should:

- *ensure that all snow removal equipment is equipped with operator-presence controls that are functioning properly;*
- *ensure that any equipment taken out of service for repair or service is locked out and tagged out and carries a warning sign;*
- *ensure that all snow throwers have warning signs to alert operators or maintenance staff of the life threatening consequences of working on or near a snow thrower without disconnecting the power to the impeller and auger;*
- *provide safety training to both operators and maintenance employees who work with snow removal equipment; and*
- *address the issues related to drug and alcohol in workplace through enforcing a clearly defined company policy.*

Additionally:

- *Employees should strictly follow the company's drug and alcohol policy; and*
- *Manufacturers should warn snow thrower users of the hazards associated with operating a machine without a dead man safety control/operator presence safety control.*

INTRODUCTION

In February 2007, a male mechanic (the victim) sustained fatal injuries after being pulled into the auger of a snow thrower at a ski resort. The New York State Fatality Assessment and Control Evaluation (NY FACE) staff learned of the incident from a newspaper article. The Occupational Safety and Health Administration (OSHA) investigated the incident. The NY FACE investigator discussed the case with the OSHA compliance officer and contacted the ski area that employed the victim to collect additional information. The NY FACE developed this report based on the information provided by OSHA and the employer.

The ski resort employs approximately 2,000 workers during the ski season. The victim had worked for the ski resort for over 20 years as a laborer and a mechanic. At the time of the incident, he worked in the Snowmaking Department that employed approximately 50 workers at the peak of the snowmaking season. The employer had provided some basic employee training on operating mobile equipment including snow groomers, snowmobiles, backhoes and lawn mowing equipment. The Snowmaking Department had developed a written lockout/tagout program that was required by OSHA and provided training to maintenance personnel.

INVESTIGATION

The snow thrower involved in the incident was an attachment snow thrower: a 4-wheel drive 57-horsepower tractor with a snow thrower attachment (Photo 1). The snow thrower attachment was powered by a power-take-off (PTO) shaft from the tractor's engine. It was a two-stage snow thrower collecting snow with an auger and ejecting snow with an impeller through the discharge chute. It was manufactured in 1993 and purchased new by the ski resort in the same year. The snow thrower was used to remove snow on sidewalks in the winter. During summer, the snow thrower attachment was replaced with a lawnmower attachment. The only workers who were authorized to operate the snow thrower were two trained operators. The victim was not one of the trained operators.



Photo 1. The ride-on attachment snow thrower that was involved in the incident (Photo courtesy of OSHA).

On the Friday before the incident, a wire cable on the discharge chute snapped. The operator reported the incident to management and was instructed to park the machine temporarily in the Snowmaking Department garage. The snow thrower was to be moved on Tuesday to the vehicle maintenance shop for repair.

The operator reported that she had disengaged the auger prior to parking the snow thrower in the garage with the auger next to the garage door in an angled position. The width of the garage door was 124 inches; it was a manual door with a latch on the right side. The auger was 72 inches wide. The clearance between the left front end of the auger and the door was measured 3.75 inches; the clearance between the right end of the auger and the door was 14.5 inches (Photo 2).



Photo 2. The victim was caught on the side where the clearance between the door and the rotating auger was 14.5 inches (Photo courtesy of OSHA).

The victim had talked to several workers about the parked snow thrower. He told them that the snow was melting off the snow thrower onto the garage floor and making it slippery. The victim stated that he had slipped and fell twice and he wanted it moved out of the garage. According to the snow resort management, the victim had not received training on how to operate the snow thrower and was not authorized to operate or move the machine.

The incident occurred on Monday; the victim was working alone and there were no witnesses. At approximately 8:15 pm, two co-workers went to the garage to look for the victim after receiving a phone call from the victim's wife who reported that he had not come home. When they arrived at the garage, they saw the victim's pick up truck parked outside the garage door. There was a backhoe parked behind the victim's truck. The garage door was opened 12 inches. They entered the garage through a side door and saw that the victim was caught in the right side of the auger. The engine of the snow thrower was stalled. It appeared that the victim had

tried to move the snow thrower out of the garage. He started the engine, engaged the PTO, got off the tractor, and positioned himself between the garage door and the auger to open the door. The clearance between the door and the auger was 14.5 inches. His flannel shirt was caught by the rotating auger and he was pulled into it. The co-workers immediately called 911 and notified the resort management. The local emergency rescue squad and ambulance services responded and arrived on site within ten minutes. The victim was pronounced dead at the scene. It was estimated that the victim had been dead for several hours. The Medical Examiner reported in the toxicology report that the victim's blood alcohol concentration (BAC) was 0.12%. The legal limit of BAC for operating motor vehicles in New York State is 0.08%.

According to the American National Standard (ANSI B71.3-2005), all snow throwers should be equipped with an operator presence control (a.k.a. an interlock or dead man switch) that automatically stops the impeller or shuts down the engine when the operator leaves the operator position. The ski resort had five walk-behind type snow-throwers that were all equipped with operator presence controls. When an operator releases the lever at the handle without disengaging the auger/impeller control, the engine automatically shuts off and stops the snow collecting mechanisms. However, the ride-on attachment snow thrower that was involved in the incident did not have the operator-presence control. The employer was aware of the situation, but did not contact the manufacturer for retrofitting the control. According to the manufacturer, this particular model was specifically designed for operating on sloped terrains. When operating on slopes, an operator may lose contact with the seat momentarily due to uneven and bumpy slope surfaces. An operator-presence interlock, which is often located in the operator's seat, may cause the engine to stall even when the operator remains on the seat. There was no warning sign on the machine to alert the users that the tractor did not have the dead man switch. The newer models are all equipped with the operator-presence controls.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: *Employers should ensure that all their snow removal equipment are equipped with operator-presence controls that are functioning properly.*

Discussion: According to the Consumer Product Safety Commission, there are approximately 5,740 emergency room visits in the United States for injuries related to using snow throwers every year. Many operators suffer serious injuries such as finger and hand amputations and even deaths after having contact with or being caught by rotating impellers or augers. According to the American National Standard for Snow Throwers-Safety Specifications, all snow throwers should have an operator-presence control that automatically stops the engine within five seconds when the operator leaves the operator position. The power to the snow removing/collecting mechanisms (the impeller and auger) should be interlocked with the operator controls of these mechanisms. For a snow thrower that is attached to a tractor, the safety interlock is usually located in the operator seat. The interlock will automatically stop the auger/impeller blades once the operator leaves the operating position.

Although a safety interlock is required by American National Standard Institute (ANSI), not all tractors are equipped with the interlock. Employers should consult the manufacturers to ensure that their snow throwers have the operator-presence controls. If a snow thrower does not have the control, the employer should consult with the manufacturer for retrofitting. Employers should ensure that the safety features on the snow removal equipment are working properly. Equipment with a malfunctioning safety interlock should be immediately removed from service. It should not be allowed back into service until it is repaired.

Recommendation #2: *Employers should ensure that any equipment taken out of service for repair or service is locked out and tagged out and carries a warning sign.*

Discussion: Any equipment taken out of service for repair or service should be stored in a designated area and should be locked out and tagged out by the trained operator or the maintenance person who is assigned to the repair or service. A warning sign should be attached to the equipment to warn workers not to operate the machine without authorization. No worker should attempt to operate the equipment without authorization.

Recommendation #3: *Employers should ensure that their snow removal equipment have warning signs to alert operators of the life threatening consequences of working on or near a snow thrower without disconnecting the power to the impeller and auger.*

Discussion: ANSI requires that all snow thrower manufacturers provide durable warning labels to alert operators of safety practices in normal operating and servicing of the vehicle and power-driven attachments. Signs alerting users of the life threatening consequences of working on or near a snow thrower without disconnecting the power to the impeller and auger should be printed on or attached to all snow removal equipment. For snow removal equipment that does not have the safety warning signs, employers should contact the equipment manufacturers or suppliers for the warning signs and install them on the machines.

Recommendation #4: *Employers should provide safety training to both operators and maintenance employees who work with snow removal equipment.*

Discussion: Most serious snow thrower injuries are associated with operators coming into contact with rotating impellers or augers. Serious injuries and deaths occurred due to missing or malfunctioning operator-presence safety switches and operating errors such as 1) leaving the engine running and blade engaged while attempting to clean the discharge chutes; and 2) not waiting until the coasting blades stopped rotating after turning off the engine. According to CPSC, some snow throwers take up to 8 seconds for the blade to completely stop after the auger/impeller was disengaged or engine turned off. Injuries have also been reported when users came into contact with the blades that recoiled when blockages were removed.

Employers should provide training to both operators and maintenance staff who work with snow removal equipment. The training should cover the following topics:

1. The hazards associated with snow throwers and injuries most likely to be caused by snow throwers;
2. The safety features of the snow throwers and a list of specific hazards they are intended to prevent;
3. Procedures to follow when a safety device is malfunctioning, damaged or missing; and
4. Standard safe procedures for clearing a jammed machine. These procedures are: a) stop the engine, b) do not start unclogging until the blade stops completely, c) never use hands to unclog a snow thrower since the blade may recoil, and d) use a long stick to unclog wet snow and debris from the discharge chute.

Recommendation #5: *Employers should address the issues related to drugs and alcohol in the workplace by enforcing a clearly defined company policy.*

Discussion: Alcohol misuse is associated with loss of productivity, increased tardiness and absenteeism, and increased severity and frequency of workplace injuries and work related fatalities. Employers should develop a drug and alcohol policy to ensure a safe work environment that is free of drugs and alcohol, and require the workers to comply with the company policy.

Recommendation #6: *Employees should strictly follow the company's drug and alcohol policy.*

Discussion: Alcohol and work do not mix. Every employee should strictly follow the company's drug and alcohol policy. No worker should report to work under the influence of alcohol or drugs or consume alcohol or drugs at work or during lunch and breaks.

Recommendation #7: *Manufacturers should warn snow thrower users of the hazards associated with operating a machine without a dead man safety control/operator presence safety control.*

Discussion: The attachment snow thrower in this case did not have the ANSI required operator-presence control because the tractor was designed to operate on sloped terrains. For specialized tractors, manufacturers may consider installing the operator presence safety control that can be disabled when the safety interlock poses hazards in special operating conditions. In that case, the operators can use the safety interlock under normal operating conditions. Manufacturers should warn the users through the warning labels on the machine and in the operator/maintenance manuals of the danger of operating a snow thrower without a safety interlock.

Keywords: *snow thrower, snow collecting mechanism, impeller, auger, operator-presence control, dead man switch, safety interlock.*

REFERENCES

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3. American National Standard Institute. ANSI B71.3-2005. "American National Standard for Snow Throwers-Safety Specifications".

The New York State Fatality Assessment and Control Evaluation (NY FACE) program is one of many workplace health and safety programs administered by the New York State Department of Health (NYSDOH). It is a research program designed to identify and study fatal occupational injuries. Under a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH), the NY FACE program collects information on occupational fatalities in New York State (excluding New York City) and targets specific types of fatalities for evaluation. NY FACE investigators conduct fatality investigations to identify the causal and contributing factors. Findings are summarized in narrative reports that include recommendations for future prevention. These recommendations are distributed to employers, workers, and other organizations interested in promoting workplace safety. The NY FACE program does not determine fault or legal liability associated with a fatal incident. Names of employers, victims and/or witnesses are not included in written investigative reports to protect the confidentiality of those who voluntarily participate in the program. Additional information regarding the NY FACE program can be obtained from:

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