Massachusetts FACE • Occupational Fatality Report

Massachusetts Department of Public Health
Occupational Health Surveillance Program
Fatality Assessment and Control Evaluation Project

Truck Driver Suffocates when Engulfed while Clearing Jammed Woodchips being Unloaded from an Open Top Trailer with a Movable Floor Unloading System – Massachusetts

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SUMMARY

On January 10, 2008 a 47-year-old male truck driver (victim) was fatally injured while unloading woodchips from his open top tractor-trailer unit via a movable floor unloading system. During the unloading process, it appears that the victim climbed to the top of the open trailer because the woodchip load had become jammed and he was going to clear the jam. Although the incident was un-witnessed, it appears that the victim stepped from the top of the trailer onto the woodchip pile. The woodchip pile gave way as he stepped onto it and he was engulfed and suffocated by the woodchips. A co-worker realized that the victim had not been seen in approximately 20 minutes and walked over to the victim's trailer. The co-worker found the victim in the discharged pile of woodchips at the rear of the trailer. A call was placed for emergency medical services (EMS) and to the local police department. EMS and the local police department arrived within minutes. The victim was pronounced dead at the incident location. The Massachusetts FACE Program concluded that to prevent similar occurrences in the future, employers should:

- **Minimize product jamming by ensuring that trailers equipped with both cross stability bars and movable floor unloading systems are not loaded up to or above the cross stability bar.**
- **Ensure that trailers with movable floor unloading systems are either equipped with automatic sweeping tarps or that manual sweeping does not begin until after the entire trailer has been offloaded.**
- **Conduct routine hazard assessments of equipment and how tasks are completed to identify potential hazards to which workers are exposed.**
- **Identify all confined spaces and develop, implement, and enforce a permit space program for permit-required confined spaces, such as trailers loaded with woodchips.**
- **Provide employees frequent training on loading, unloading, and clearing jammed product from tractor trailers.**

Manufacturers of movable floor unloading systems should:

- **Consider providing safety decal(s) that address the hazards of engulfment, clearing jams, and overloading trailers.**

INTRODUCTION

On January 10, 2008, the Massachusetts FACE Program was notified by a local police department through the 24-hour Occupational Fatality Hotline that earlier that same day a 47-year-old male truck driver had died when he was covered by woodchips in the back of his trailer. An investigation was initiated. On February 20, 2008, the Massachusetts FACE Program Director held a telephone conference call with a representative of the wholesale mulch company. The Occupational Safety and Health Administration (OSHA) fatality and catastrophe report, police report, death certificate, company information, and the movable floor manufacturer's information were reviewed during the course of the investigation.

The employer is a wholesale mulch company and has been in business for 13 years. The company has its main location in a neighboring state and has had an additional location for five years in Massachusetts. The victim had been employed by the company for 10 years as a truck driver. There were a total of 13 employees and ten of these employees, including the victim, held the job title truck driver. At the time of the incident the company owner and two employees, the victim and a machine operator, were at the incident location. Employees were not part of a collective bargaining unit.

The company had a written employee manual that included health and safety information and a health and safety committee. Initial on-the-job training was provided to employees when hired. The company did not have a confined space entry program for when employees needed to enter permit-required confined spaces, such as tractor trailers loaded with woodchips. There were written company protocols on how to operate the movable floor system and how to clear any potential jams during use of the movable floor system. The protocol to clear jams included directions to shuffle the movable floor unloading system by having the system move in the forward and reverse directions in quick successions. The protocol states that employees should not walk on top of a load while the movable floor is in operation.

INVESTIGATION

The victim was driving an 18-wheel tractor trailer truck equipped with a sleeper bunk on the day of the incident. The trailer was manufactured in 2002 and the trailer's dimensions are eight feet six inches high; seven feet nine inches wide and 45 feet long (Figure 1). The trailer has an open top for loading the trailer and one cross stability bar. This cross stability bar runs the width of the trailer and is centrally located at the top of the trailer. A fixed ladder is attached to the exterior of the trailer at the front driver's side for access to the top of the trailer. Another fixed ladder is located inside the trailer directly opposite of the exterior fixed ladder. This fixed interior ladder is used for entering and exiting the trailer. The rear of the trailer is equipped with a gate.

The trailer is equipped with a movable floor unloading system (Figure 2) that was manufactured in 2002 and purchased by the company at the same time the trailer was purchased. The movable floor system is designed to replace the flooring furnished by the trailer manufacturer. The

movable floor unloading system is a hydraulic-based system with three cylinders, which allows various sections of the floor to move at different times. The flooring of the movable floor system is made of narrow aluminum slats that run approximately the length of the trailer. Underneath the aluminum floor slats are cross pieces that run the width of the trailer. Every third cross piece is attached to one of the three cylinders and every third aluminum floor slat is attached to the same cross piece. There are a total of 26 floor slats.

To unload the trailer, the movable floor system is switched on and the first of the three cylinders is engaged. The cross pieces associated with this cylinder move towards the front of the trailer, the section closest to the truck's cab. Given that every third aluminum floor slat is attached to these cross pieces, every third floor slat also moves towards the front of the trailer. This does not cause the load inside the trailer to move. This sequence continues for the second and the third cylinders until all of the floor slats are in the same position, at their most forward point. Then all three cylinders engage at the same time in the reverse direction moving all cross pieces and all of the floor slats at once towards the rear of the trailer. This motion causes the entire floor of the trailer and the product on the trailer's floor to move towards the rear of the trailer. This process is then continuously repeated and eventually the entire product inside the trailer is offloaded.

The day before the incident the victim had worked ten hours, mostly driving from the neighboring state into Massachusetts. After the ten hour day of driving, the victim had eight hours off. It was reported that some of these eight hours were spent sleeping overnight in the sleeper bunk of his truck's cab in a Massachusetts rest area. The morning of the incident, the victim drove a short distance to pick up a load of woodchips and then drove approximately one hour to the company's Massachusetts location to unload the woodchips. The victim had been scheduled to pick up another load of woodchips and then travel to another neighboring state where that load was to be delivered.

When the victim arrived at the company location in Massachusetts, he positioned the truck to unload the woodchips. The victim unlocked and opened the trailer's rear gate and activated the movable floor unloading system. There were eye witnesses who observed the victim climb the exterior fixed ladder on the trailer and walk along the top edge of the trailer towards the rear of the trailer. This was reported as a common practice, especially when entering the trailer to clear woodchips jammed at the trailer's cross stability bar. It was reported that the incident was not witnessed after this point in time. It appears that the victim stepped from the top edge of the trailer onto the woodchip pile and that a void within the woodchip pile caused the pile to give way. When the woodchip pile gave way the victim fell through the pile and was engulfed and suffocated by the woodchips. The movable floor unloading system continued operating offloading the woodchips. Eventually the victim was offloaded from the trailer through the trailer's rear gate along with the woodchips.

Approximately twenty minutes had gone by when the company owner and a co-worker realized that they had not seen the victim. The company owner went over to the trailer and noticed that the movable floor unloading system and the truck were still running. A pile of woodchips had

accumulated on the ground and was now blocking the rear gate opening and stopping the remaining woodchips from being offloaded. The company owner then moved some woodchips from the top middle section of the pile and noticed the victim's head.

The company owner turned off the movable floor unloading system and placed a call for emergency medical services (EMS). The local police arrived at the incident location within minutes. The local police then placed calls to the local fire department and the medical examiners office. The victim was pronounced dead at the incident location.

Although it appears that the victim was entering the trailer to clear jammed woodchips, there was another common practice that brought workers inside loaded trailers. This was entering the trailer to start sweeping the front section of the trailer's floor. This was performed while the moveable floor unloading system was operating.

CAUSE OF DEATH

The medical examiner listed the cause of death as cardiac arrest due to compression asphyxia.

Recommendation #1: Employers should minimize product jamming by ensuring that trailers equipped with both cross stability bars and movable floor unloading systems are not loaded up to or above the cross stability bar.

Discussion: In this case, it was reported that when using the movable floor unloading system to offload woodchips, these woodchips would routinely jam at the cross stability bar, which is centrally located at the top of the trailer. Employers transporting products, such as woodchips, that have the potential to jam using trailers that are manufactured with cross stability bars and equipped with movable floor unloading systems can reduce jamming during unloading by ensuring that these trailers are not loaded up to or above the cross stability bar.

An option to minimize product jamming while unloading is for employers to use movable floor unloading systems only in trailers designed without cross stability bars. Trailers designed without these bars, although they weigh more, would allow woodchips and other loaded products to flow continuously from the front to the rear of the trailer when being offloaded. However, cross stability bars should **never** be removed from a trailer without first consulting the trailer's manufacturer or an engineer.

Recommendation #2: Employers should ensure that trailers with movable floor unloading systems are either equipped with automatic sweeping tarps or that manual sweeping does not begin until after the entire trailer has been offloaded.

Discussion: Although it appears that the victim was not accessing the trailer to start sweeping, it was reported that it was common practice for employees to start sweeping the trailer's floor before unloading was complete. Employees would enter the trailer while the movable floor unloading system was operating and unloading product. A safe and quick way to sweep the floor of a trailer equipped with a movable floor unloading system is to have an automatic sweeping tarp installed as part of the unloading system. Automatic sweeping tarps are designed to sweep a trailer's floor, reducing the number of times employees have to enter the trailer. If trailers are not equipped with automatic sweeping tarps and need to be swept manually, employers should ensure that employees do not enter the trailer until the trailer is completely offloaded and the movable floor unloading system is turned off.

Recommendation #3: Employers should conduct routine hazard assessments of equipment and how tasks are completed to identify potential hazards to which workers are exposed.

Discussion: Employers should conduct hazard assessments of equipment and how tasks are completed. These assessments should occur routinely especially when safety concerns arise to identify any potential hazards to which the workers might be exposed. When hazards are identified, steps to control these hazards should then be undertaken.

In this case, a hazard assessment could have identified that employees were routinely entering trailers that were loaded with loose material to clear jams resulting in the employer taking steps to controls these identified hazards. These steps could include, but would not be limited to, updating and enforcing the company's protocols for clearing jams and developing a confined space entry program (Recommendations # 4 and 5).

Recommendation #4: Employers should identify all confined spaces and develop, implement, and enforce a permit space program for permit-required confined spaces, such as trailers loaded with woodchips.

Discussion: Workplaces sometimes contain confined spaces. OSHA defines a confined space as a space that is large enough for employees to enter fully and perform assigned work, but is not designed for continuous occupancy by employees and has limited or restricted means of entry or exit. Confined spaces fall into two categories:

1) **Non-permit confined spaces.** Non-permit confined spaces are confined spaces that do not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

2) **Permit-required confined spaces.** Permit-required confined spaces are confined spaces that have one or more of the following additional characteristics (hazards): [1, 2]

- Contains a material with the potential to engulf someone who enters the space (such as woodchips)

- Has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward or tapers to a small cross section
- Contains or has a potential to contain a hazardous atmosphere
- Contains any other recognized serious safety or health hazard.

OSHA requires written procedures on how to enter permit-required confined spaces called permit space programs. Employers must develop a permit space program if employees will enter these permit-required confined spaces. A permit space program has several requirements, which include but are not limited to:

- Implementing necessary measures to prevent unauthorized entry
- Establishing and implementing the means, procedures, and practices to eliminate or control hazards necessary for safe permit space entry operations, and allowing only qualified workers to enter the permit space
- Ensuring that at least one attendant is stationed outside the permit space for the duration of entry operations
- Implementing appropriate procedures for summoning rescue and emergency services, and preventing unauthorized personnel from attempting rescue
- Establishing and implementing, in writing, a system for the preparation, issue, use and cancellation of entry permits
- Reviewing established entry operations annually and revising the permit space entry program as necessary. [2]

In this case employees were entering permit-required confined spaces in the form of open top trailers loaded with loose material. Therefore the employer should have identified all confined spaces, developed a permit space program, informed employees the locations of the confined spaces, and provided employees training about these spaces. In addition, employers should post permit-required confined space signs at all confined space locations, both permit-required and non-permit confined spaces.

While the incident did not involve workers entering the trailer when it was unloaded, this was also a common practice. When employees enter these non-permit confined spaces, employers still have responsibilities. These include identifying these confined spaces and providing training to employees about them, including their locations and the potential hazards that could be created inside the confined spaces.

The complete list of requirements for written permit-required confined space programs can be found in the OSHA standard 29 CFR 1910.146, titled Permit-required confined spaces.[1] Additional recommendations regarding safe work practices in confined spaces can be found in multiple NIOSH publications listed at the end of this report in the references section.[3,4,5,6] These publications may be useful in developing confined space safety programs and in training workers to identify hazards found in confined spaces. Specific information provided in these publications includes recommendations for control of hazardous energy, communication procedures, entry

and rescue procedures, posted warning signs, and required safety equipment and clothing. NIOSH publications are available through the NIOSH web site at www.cdc.gov/niosh/ or by calling 1-800-356-4674.

Recommendation #5: Employers should provide employees frequent training on the procedures of loading, unloading, and clearing jammed product from tractor trailers.

Discussion: In this case, the company provided new employees a written employee manual and initial on-the-job training. The employee manual included some health and safety information, such as outlines on how to operate the movable floor system, and it also included how to clear product jams that occur when using the movable floor system.

Employers should provide training to employees at least annually. In this case, the training should include the appropriate procedures for loading and unloading trailers and information provided in the employee manual, such as the procedures for clearing jammed product safely. The training should also include procedures developed in the permit space program (Recommendation #4), including the hazards of engulfment while inside a trailer. Trainings should be routinely updated to include any hazards identified during routine hazard assessments (Recommendation #3) and new procedures to be implemented.

Employers should ensure that the trainer who provides training is qualified through education and/or experience to conduct training. The training programs' content, dates and the names of employees completing the training should be documented and retained by the employer. In addition, training is not going to be effective if the employer does not strictly enforce the training content. Enforcement should include random inspections of employee work habits related to the trainings content.

Recommendation #6: Manufacturers of movable floor unloading systems should consider providing safety decal(s) that address the hazards of engulfment, clearing jams, and overloading trailers.

Discussion: In this case, the manufacturer provided safety decals that warn employees of potential hazards associated with using the movable floor unloading system. Manufacturers of movable floor unloading systems should consider providing additional safety decal(s) focusing on the following hazards:

1. Engulfment – Engulfment hazard that exists inside trailers loaded with loose material
2. Jammed product - Never enter trailers when clearing jammed product
3. Overloading - Never overload trailers

It should be made clear that the decals are to be placed on trailers in which movable floor unloading systems are installed.

REFERENCES

1. Code of Federal Regulations [1998]. 29 CFR 1910.146. Permit-required Confined Spaces. Washington, DC: U.S. Printing Office, Office of the Federal Register.

2. Permit-required confined spaces. Occupational Safety and Health Administration (OSHA) Publication No. 3138-01R 2004.

3. NIOSH [1979]. Criteria for a recommended standard: Working in confined spaces. Cincinnati, OH: U.S. Department of Health, Education, and Welfare, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHEW (NIOSH) Publication No. 80-106. OSHA [2004].

4. NIOSH [1986]. NIOSH Alert: Request for assistance in preventing occupational fatalities in confined spaces. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 86-110.

5. NIOSH [1987]. A guide to safety in confined spaces. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 87-113.

6. NIOSH [1994]. Worker deaths in confined spaces: A summary of NIOSH surveillance and investigative findings. 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. 94-103.

Figure 1 – Truck and trailer involved in the incident.

Figure 2 – Trailer's movable floor unloading system.

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The Massachusetts Department of Public Health, in cooperation with the National Institute for Occupational Safety and Health (NIOSH), conducts investigations on the causes of work-related fatalities. The goal of this program, known as Massachusetts Fatality Assessment and Control Evaluation (Massachusetts FACE) is to prevent future fatal workplace injuries. Massachusetts FACE aims to achieve this goal by identifying and studying the risk factors that contribute to workplace fatalities, by recommending intervention strategies, and by disseminating prevention information to employers and employees.

Massachusetts FACE also collaborates with engineering and work environment faculty at the University of Massachusetts at Lowell to identify technological solutions to the hazards associated with workplace fatalities.

NIOSH funded state-based FACE Programs currently include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

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Additional information regarding this report is available from:

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