Investigation # 98WV029-01
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Dump Truck Driver Dies in West Virginia After Being Pinned Between Dump Body and Truck Frame During Trouble Shooting Inspection

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SUMMARY

On July 20, 1998, a 28-year-old male dump truck driver (the victim) died of injuries sustained when he was pinned between the dump body and frame of his truck. Just prior to the incident, the victim had finished hauling for the day and returned to the shop. It was reported that earlier the victim had problems with the dump body sticking in the elevated position. He elevated the dump body and then tried to lower the dump body using the hand control within the cab. The dump body stuck in an elevated position. This had occurred on previous occasions. When he could not lower the dump body, he got out of the cab leaving the control valve in the down position. The victim then climbed up on top of the truck frame placing himself directly behind the cab of the truck and under the elevated dump body. The victim tried to free the stuck dump body by placing one end of a binder chain on the dump body and attaching the other end to the truck frame. The dump body suddenly lowered pinning him between the dump body and the truck frame. At approximately 7:00 a.m. the next morning the company's owner (victim's father) found the victim pinned between the dump body and truck frame. The victim was crushed by the dump body. The victim's father called 911 and then attempted to jack the dump body off of the victim. The local EMS used a system of jacks and chocks to elevate the dump body enough to permit the extrication of the victim. The EMS transported the victim to a local hospital where he was pronounced dead. The coroner estimated the time from injury to death to be minutes.

The WV FACE Investigator concluded that to reduce the likelihood of similar occurrences, employers should:

- ***ensure that before making inspections, adjustments, or repairs strong, heavy, positive supports are used to secure the dump body and prevent it from lowering.***
- ***develop, implement, and enforce a written safety program which includes, but is not limited to, task specific safety procedures and worker training in hazard identification, avoidance, and control.***
- ***develop and implement a preventative maintenance program which includes, but is not limited to, pre-shift inspections of all of the vehicle's operational systems and safety devices and the correction of identified defects prior to placing vehicle in service.***

Additionally, manufacturers should:

- ***provide end users with a comprehensive dump bed system owner's manual, including, but not limited to, the proper inspection and maintenance of the system and the safe work practices concerning system inspection and maintenance.***
- ***consider re-engineering current body prop systems so they provide a full range of protection during all phases of inspection and preventative maintenance operations.***

INTRODUCTION

On July 20, 1998, a 28-year-old male dump truck driver (the victim) died of injuries sustained when he was pinned between the dump bed and frame of his truck. On August 8, 1998, the West Virginia FACE Investigator was notified of the death by the West Virginia Department of Health and Human Resources via a death certificate. On August 19, 1998, the WV FACE Investigator conducted an on site investigation of the incident. The investigator reviewed the incident with the county sheriff's department, local EMS, and city police. The victim's brother, who also worked for the company, was interviewed. The incident site was visited, but the dump truck involved in the fatality was unavailable for inspection and photography. Photographs within this report are for illustrative purposes only and do not represent the vehicle involved in the incident. Other informational sources and contacts included: medical examiner's report, newspaper articles, National Truck Manufacturers Association, an accredited Auto-Diesel College, two West Virginia-based dump bed manufacturers and repair shops, a West Virginia dump truck distribution and repair business, a heavy hauling company, and the West Virginia Division of Highways.

The employer in this incident was a heavy truck repair and hauling company that had been in business for seven years and employed six employees. None of the employees were present the evening of the incident. Typically, the truck drivers were responsible for their own truck's maintenance, defined by the company as; oil changes, grease jobs, etc. Repair, such as disassembly, was the responsibility of one of the company's mechanics.

There was no formal company written safety program or company, site, and task specific safety training. The employer did indicate that on-the-job warnings were used when the employer felt it was necessary. In fact, it was reported that the victim's father had warned the victim numerous times to chock, block or support elevated dump beds. The employer had not previously been cited by OSHA.

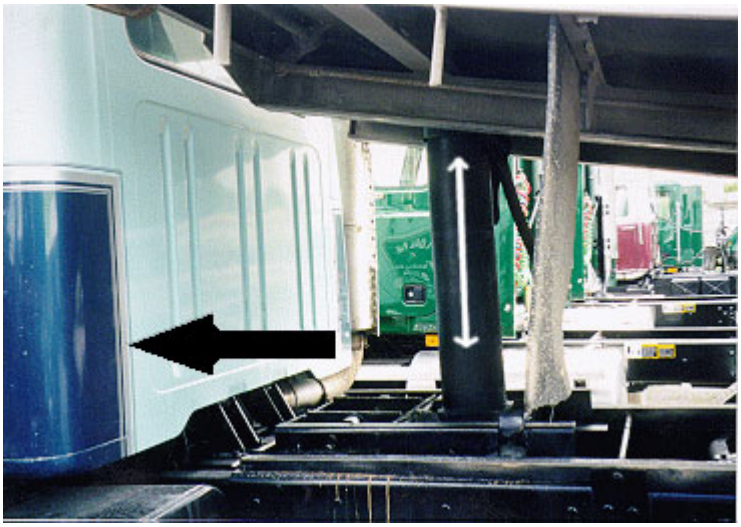
The victim's job at the time of the incident was driving and hauling. During the winter months, he assisted the mechanics. The victim had been working for the employer five years when the incident occurred. The victim was a graduate of an accredited Auto-Diesel College. The college offered 48-weeks of 65% hands-on training including two 62.5 clock hour modules dealing with Heavy Truck Preventative Maintenance and Inspection and Hydraulic Principles and Practices, respectively.

INVESTIGATION

At approximately 7:00 a.m., on the victim began his hauling operations. He was driving a 1989 GMC Brigadier tri-axle dump truck. The company was the second owner and had owned the vehicle for the past five years. The company did not have an owner's manual for the truck.

Typically, the dump bed system consisted of a hydraulic fluid reservoir, a pneumatically controlled PTO driven hydraulic pump, a single action telescoping hydraulic hoist cylinder, various hydraulic lines, and a 20-ton capacity steel dump body. It is estimated that the empty dump body alone weighed between four and six thousand pounds. The body could be raised from the cab using a lever which operated the pneumatic valve allowing the hydraulic pump to deliver fluid to the telescoping hoist which in turn raised the dump body. The body could be lowered via the same control valve which simply allowed the

fluid to drain from the hydraulic cylinder back into the fluid reservoir. Hydraulic hoist cylinder and fatal injury site were located directly behind the truck's cab. **See figure below.**



Hydraulic hoist cylinder located directly behind the truck's cab.

Dump body systems are usually equipped with a pull-off cable. A pull-off cable is a section of wire rope which runs along the truck's frame from the pneumatically controlled hydraulic valve to the rear portion of the dump bed. **See figures below.**

Pneumatically controlled hydraulic valve

Pull-off cable running along the truck's frame

Pull-off cables are designed to override the lever control in the cab and shut off the fluid delivery to the hoist cylinder during raising operations thereby limiting the angle of the raised bed to approximately 45 degrees from the horizontal. This prevents overextending the hydraulic cylinder. Overextending the cylinder can place great stress on the piston within. Often the pistons will become deformed which can

lead to binding, thereby causing the dump bed to stick during empty bed operations such as lowering after unloading. In addition, raising loaded dump beds beyond 45 degrees can lead to possible vehicle up ending. This vehicle no longer had the pull-off cable intact. The employer was unaware that it had been equipped with one.

The vehicle was typically equipped with a safety body prop which is used to support the body in the elevated position when empty. **See figures below.**

View of the body in an elevated position

Close-up of the safety body prop when body is in an elevated position

The safety body prop was present, but not used, during this fatal incident. It was reported that on prior occasions the empty elevated dump body stuck in the elevated position. Earlier that day, the victim needed assistance from an end-loader in order to lower the empty dump body which had stuck in the raised position. The end loader bucket was lowered in the back of the dump body to force it down.

Just prior to the incident, the victim had finished hauling for the day. He returned to the shop at approximately 6:30 p.m. Reportedly, all of the shop bays were occupied at the time, so he pulled his truck around back and parked it. Evidence suggests that he began an inspection process in order to determine why the dump body system was malfunctioning. He elevated the dump body and then attempted to lower the body using the standard method of doing so via the control within the cab. The dump body stuck in an elevated position as it had on previous occasions. When the body would not return to its lowered position, he left the control valve in the down position and exited the cab. The victim did not engage the truck's safety body prop. The victim also did not use other means of chocking the body, such as heavy timber. With the dump body being supported by the unwanted binding of the hydraulic hoist alone, the victim then climbed up on top of the truck frame placing himself directly behind the cab of the truck. He may have thought that the control valve within the cab was not in the down position and therefore the hoist would remain in that position. His position was such that he was

directly behind the cab, standing or sitting on the truck frame with the elevated dump body above his head. The victim was in the beginning stages of attempting to free the stuck dump body by attaching one end of a binder chain on the dump body and the other end to the truck frame. The dump body suddenly lowered pinning him between the dump body and the truck frame. At approximately 7:00 a.m. the next morning, the company's owner (victim's father) found the victim pinned between the dump body and truck frame. The victim had experienced compression asphyxiation as a result of being crushed by the dump body. The victim's father called 911 and then attempted to jack the dump body off of the victim. The local EMS used a system of jacks and chocks to elevate the dump body enough to permit the extrication of the victim. The local EMS then transported the victim to a local hospital where he was pronounced dead. The coroner estimated the time from injury to death to be minutes.

CAUSE OF DEATH

The medical examiner's report listed the immediate cause of death as compression asphyxiation.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that before making inspections, adjustments, or repairs, strong, heavy, positive supports are used to hold the dump body from inadvertently lowering.

Discussion: In this incident, the victim was working on a truck whose dump bed was elevated and then placed himself under the elevated dump bed without protection. OSHA Regulation 29 CFR 1926.600(a)(3)(i) requires that dump bodies and similar equipment shall be fully lowered or blocked when being repaired or when not in use.[1] Correctly chocking or blocking the raised bed would have prevented this incident by preventing and/or arresting the energy source before contacting the victim.

Recommendation #2: Employers should develop, implement, and enforce a written safety program which includes, but is not limited to, task specific safety procedures and worker training in hazard identification, avoidance, and control.

Discussion: The evaluation of tasks to be performed at the work site form the basis for the development, implementation, and enforcement of a safety program as well as task-specific safety procedures. The key elements of the program should include the communication of task-specific safe work practices and, at a minimum, training in hazard identification and the avoidance and abatement of these hazards. In this incident, the victim was fatally injured when he accessed an unsafe piece of equipment (dump bed system with a malfunctioning hoist) using an unsafe method to accomplish a task (not utilizing engineering controls and safe work practices). Training in the hazards associated with the work environment, and in particular, those hazards associated with working around both functioning and malfunctioning dump body systems and task-specific safety procedures for working on both functioning and malfunctioning dump body systems via a comprehensive safety program, would have given the victim the knowledge necessary to recognize and avoid a hazardous situation. For example, detailed explanations on the how and why dump bodies will suddenly lower and the precautions necessary to avoid this hazard should be part of the company training program.

Recommendation #3: Employers should develop and implement a preventative maintenance program which includes, but is not limited to, pre-shift inspections of all of the vehicle's operational systems and safety devices and the correction of identified defects prior to placing vehicle in service.

Discussion: In this incident, the dump bed system displayed a history of malfunctioning and binding. In addition, the vehicle was operated for a prolonged period of time without a pull-off cable, which ultimately may have caused the hydraulic hoist to malfunction. A comprehensive preventative maintenance program which included pre-shift inspections of all vehicle operational systems and safety devices and an ongoing company policy of pulling defective vehicles from service and repairing before further use may have prevented this incident. OSHA Regulation 29 CFR 1926.601(b)(10) requires that all vehicles in use shall be checked at the beginning of each shift to assure that parts, equipment, and accessories are in safe operating condition and free from apparent damage that could cause failure while in use, including operating controls and safety devices.[1]

Recommendation #4: Manufacturers should provide end users with a comprehensive dump bed system owner's manual, including, but not limited to, the proper inspection and maintenance of the system and the safe work practices concerning system inspection and maintenance.

Discussion: Dump trucks are produced by dump bed manufacturers who acquire the truck as a bare framed vehicle. The dump body itself is then manufactured on site. The remaining components such as the hydraulic hoist, hydraulic pump, controls and lines are purchased from various manufacturers, and the dump bed system is then assembled. The dump bed manufacturers and distributors contacted during this investigation (including the manufacturer of victim's truck) indicated that, at the present time, they do not provide an owner's manual with their product. Furthermore, the hydraulic hoist manufacturer's manual concerning operation and maintenance is also not provided to the end user unless requested. Proper maintenance schedules are included in the above manual to insure smooth and safe operation as well as important safety recommendations. For example, one hoist manufacturer's manual states, "Before making adjustments or repairs to the cylinder when mounted in a unit, use strong, heavy, positive supports to hold the body from accidentally lowering."[2] Information transfer is a key element in preventative maintenance as well as controlling the potential hazards associated with the person/machine interface. Having proper information concerning both hoist preventative maintenance and dump bed system safety may have prevented this incident.

Recommendation #5: Manufacturers should consider re-engineering current body prop systems so they provide a full range of protection during all phases of inspection and preventative maintenance operations.

Discussion: Strong, heavy, positive supports are provided by dump bed manufacturers in the form of body props. Body props are non-adjustable and will support the dump body at one position only, which is close to maximum elevated dump angle. Therefore, the need to inspect and/or work on the dump bed at an angle other than the one provided by the body prop places the burden of design and implementation of alternative protection on the employer and the person doing the work. **See figures below.**

The above methods and materials represent various after-market attempts to provide protection.

It should be noted that those distributors and repair shops contacted during the investigation indicated that the body props are often not used and commonly found rusted in the position of storage. This may in part be due to the fact that many necessary procedures are out of the body prop's scope of application. For example, one hoist manufacturer recommends that the plunger end pin mountings located in the upper portion of the dump bed body be greased regularly. [2] These mountings would be close to 15 feet above the ground when using the body prop as provided. **See figures below.**

Distance of the end pin mountings when body prop is used

Close-up of the hydraulic hoist cylinder

As was stated earlier this may have been in part why the victim placed himself under the elevated dump bed without protection. Manufacturers should consider adjustable body props and/or positioning an additional prop located closer to the cab thereby allowing a greater range of integral protection. Having had the ability to conveniently prop the bed at any point during the inspection process may have prevented the fatal energy from contacting the victim.

REFERENCES

1. Office of the Federal Register: Federal Register, Vol. 59, No. 196, 29 CFR 1910.600
2. Custom Hoists, Inc.: Installation, Operation and Maintenance Manual, Form 116-98.

FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The WVU Center for Rural Emergency Medicine, through a contract with the West Virginia Department of Health and Human Resources, conducts investigations on the causes of work-related fatalities within the state. The goal of this program is to prevent future fatal work-place injuries. West Virginia FACE intends to achieve this goal by identifying and studying the risk factors that contribute to work-place fatalities, by recommending intervention strategies, and by disseminating prevention information to employers, employees, trade associations, unions, equipment manufacturers, students, teachers, and others with an interest in work-place safety.

Please use information listed on the Contact Sheet on the NIOSH FACE website to contact In-house FACE program personnel regarding In-house FACE reports and to gain assistance when State-FACE program personnel cannot be reached.