MIFACE INVESTIGATION REPORT: #09MI085

Subject: Truck Driver Struck by Semi-Tractor When Walking in Parking Lot

Summary

In the fall of 2009, a 52-year-old male truck driver, wearing a Class II reflective vest died when he was struck by a double-axle gravel train (2002 Peterbuilt tractor, empty dump trailer and pup) as he was walking to his parked truck located in the second row of trucks parked along the west fence in the rear of the parking lot. The parking lot was dark and inadequately lit because two corner pole lights located at each corner end at the rear of the parking lot were not functional. There was one white mercury vapor lamp functional; the light was located behind the open parking space to be used for the gravel train. The parking area was located west of the maintenance shop and had two wide driveways located at its north and south to provide access to the lot. There were two truck rows with a large open area between them. The driver of the Peterbilt was a truck mechanic who had a suspended driver's license and did not have a commercial driver's license (CDL). He was driving the recently repaired gravel train from the maintenance shop, utilizing the north driveway, to park the vehicle two spaces to the north of the decedent's parked vehicle. The semi-tractor's amber/running lights were on but the tractor's headlights were turned off. The mechanic drove past the open parking space, turned the truck around in the wide open area, and headed back to the open parking space. As he began to make his turn into the open space, the driver's side of the tractor struck the decedent (See Figure 1). Emergency response was called and the decedent was declared dead at the scene.

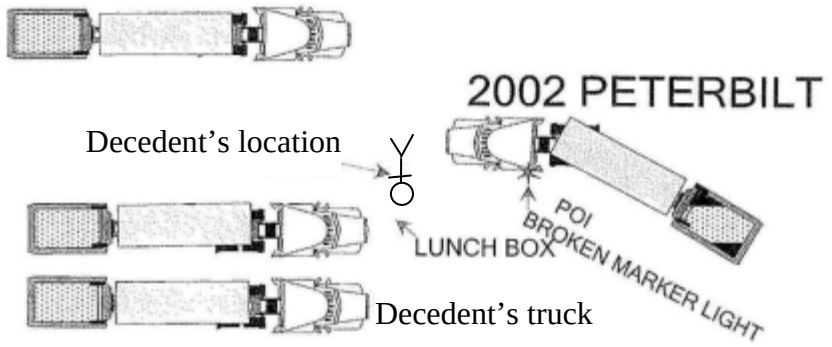

Figure 1. Sheriff report drawing of incident scene. Company and decedent identifiers removed.

RECOMMENDATIONS

- Employers should mandate the use of vehicle headlights in parking lots when the vehicles are moving during dusk through dawn hours.
- Employers should institute a training/awareness program to educate shift work workers, especially those working 12-hour shifts at night, about sleep/fatigue management and the potential safety and health issues, such as "sleep debt".
- Employers should develop an interior/exterior facility inspection checklist to identify and remedy safety and health concerns, such as non-functional pole lights.

- Employers should establish both vehicle traffic flow and pedestrian walkways within a parking lot.
- Employers who utilize commercial vehicles should identify and include in their Michigan Department of State Driver Database subscription service any employee who operates the vehicle for any reason, including maintenance personnel.
- Employers should establish and utilize a health and safety committee as an integral part of their safety and health management system.

INTRODUCTION

MIFACE investigators were informed of this work-related fatality by the Michigan Occupational Safety and Health Administration (MIOSHA) personnel, who had received a report on their 24-hour-a-day hotline. The MIFACE researcher interviewed the Safety Director for the decedent's employer at the company headquarters in December 2009. The employer escorted the MIFACE researcher to the incident scene and permitted pictures to be taken. During the course of writing this report, MIFACE reviewed the MIOSHA compliance file, police report and pictures, the death certificate and the medical examiner's report. Pictures used in this report are courtesy of the responding police department and pictures taken by the MIFACE investigator at the time of the site visit.

The family-owned business delivered and moved site construction materials for clients. The firm employed 50 plus individuals. The decedent worked full time and was one of 15 truck drivers employed by the firm. He routinely worked 10 hour shifts and arrived at work on the day of the incident at approximately 4:00 a.m. Truck driver arrival is staggered between 4:00 and 6:00 a.m. The decedent had seven years of truck driving experience, including experience driving gravel trains. He had worked at this firm for approximately five months. The Safety Director indicated that the decedent was deaf in his left ear, the ear turned toward the truck. It was unknown if the decedent was wearing a hearing aid; a hearing aid was not mentioned in the medical examiner or police reports.

All new employees receive a general orientation with the Human Resources Department to learn firm policies; the orientation includes the firm's safety policies. Specific safety orientation for tractor/trailer drivers includes driver training by an outside firm with certified instructors. The training also encompasses vehicle inspection, areas where losses have occurred, and training tapes from tractor manufacturers. Mechanics are not sent through the specialized truck training.

Gravel trains are assigned to one individual. The drivers are given one of two rows to park their gravel trains in the parking lot – they are not assigned specific parking spaces. The firm permits higher seniority drivers to park the gravel trains in the first row, allowing the drivers to pull into and out of the space. Drivers assigned to the back row must, at some time, back their vehicle to leave the parking area.

The Safety Director conducts daily site visits to locations where drivers are delivering material. The firm enforces mandatory safety rules. If drivers violate these rules, they are terminated. The safety rules include: wearing a hard hat and Class II safety vest, no cell phone use, using ladders when getting into and out of trailers. The firm has a safety committee that is used to address special firm-wide safety issues. For example, the safety committee addressed the issue of trailers and ladder access and installation. Each spring, there is a safety kick-off meeting. Drivers have quarterly safety meetings, and mechanics have monthly safety meetings. The truck drivers use flashlights to perform pre- and post-trip inspections when there is low lighting.

The firm obtained and verified information via a subscription service with the Michigan Secretary of State's office to confirm a truck driver's commercial driver's license (CDL) as required under federal law. The firm had not included the mechanic-on-duty in its subscription request to the Secretary of State's office for these records. The firm was unaware that the mechanic had a license restriction. The firm's policy would restrict anyone from driving in the yard if the individual was restricted from driving in public. If an individual was on the subscription list and worked in a shop position, the individual must sign a letter indicating they understood that they were not permitted to move vehicles in the parking lot/yard.

MIOSHA General Industry Safety and Health Division did not issue any violation citations to the firm at the conclusion of its investigation. The Division issued the following Safety and Health Recommendations:

"An inspection/investigation of your worksite revealed the following conditions which may constitute a threat to the safety or health of your employees. It is Recommended that your firm:

1. Repair and maintain the lighting at the rear of the parking lot in good working order at all times.
2. Ensure that truck drivers use their head lights when driving in the parking lot at night so that pedestrian are readily seen
3. Do not move truck from repair bay into the parking lot during periods of darkness to avoid employees on foot walking through the lot."

INVESTIGATION

The parking area was a secured lot by a chain link fence around the property and was restricted to employee access (Figure 2). The surface was dirt and gravel and was muddy at the time of the incident. The parking lot was dark because two corner pole lights located at each corner end at the rear of the parking lot were not functional. There was one white mercury vapor lamp

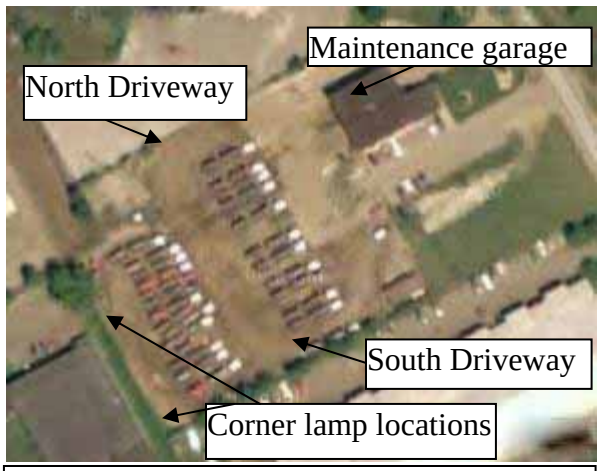

Figure 2. Overhead view of firm's property courtesy of Google Maps.

functional; the light was located behind the open parking space to be used for the gravel train. The parking area was located west of the maintenance shop and had two wide driveways located at its north and south to provide access to the lot. There were two truck rows with a large open area between them (Figures 2, 3 and 4). The lights on the maintenance building were working, as well as one light at the front of the lot. The parking area did not have marked parking spaces or pedestrian walkways.

Figure 3. Open area used for turning Peterbilt between two truck rows

The decedent arrived at 4:00 a.m. the morning of the incident. According to the police report, the mechanic driving the incident vehicle had been on duty since 4:30 p.m. the previous day. The police department learned from the mechanic that he awoke the previous day at about 11:30 a.m., and his last 15-20 minute break was at 12:30 a.m. on day of incident.

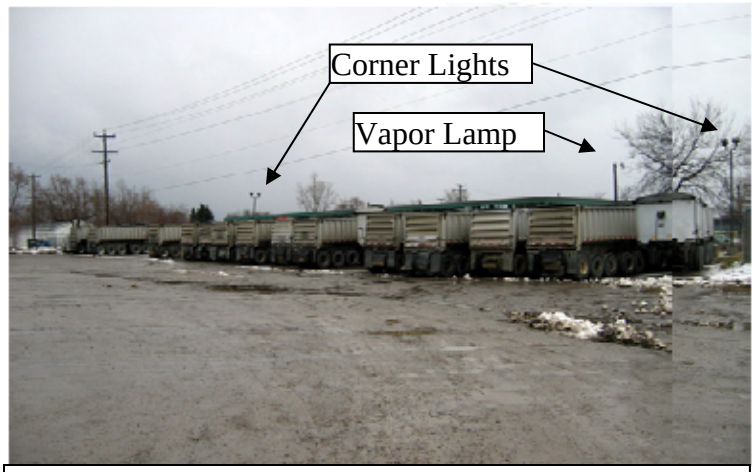

Figure 4. Row of trucks parked at rear of parking lot with vapor lamp and corner lights.

The vehicle involved in the incident was an empty 2002 Peterbilt tractor trailer pulling a dump trailer and a pup. The mechanic had completed repairs to the truck the morning of the incident and was in the process of moving it from the mechanics bay to the back of the unlit, gravel parking lot when the incident occurred. The mechanic had many years of experience driving the tractor trailer units but he did not have a CDL.

The mechanic backed the tractor trailer and dump units out of the center mechanic's bay, drove through an adjacent bay, down the north driveway of the parking area (Figure 5) and out into the rear parking lot, driving past where he

Figure 5. View from Maintenance garage at north driveway

was planning to park the vehicle. He made a U-turn in the center area to loop around to the desired parking space so he could pull forward into the parking space located between two parked trucks. The amber running lights were on but the headlights were turned off. The truck's four-way flashers were also not on. Interviews indicated that employees requested that truck headlights not be on when moving trucks into the lot as a matter of courtesy to those walking. The "no headlights in parking lot" request by employees was not in compliance with company policy. The Safety Director indicated that he was unaware of this request and actions by those individuals moving the trucks.

At approximately 5:00 a.m., the decedent was walking north to south from the maintenance garage to get to his vehicle that had been backed into a parking space located two truck spaces south from the space into which the mechanic was planning to park the repaired gravel train. The decedent was wearing a Class II safety vest, blue jeans and grey sweatshirt. The Safety Director indicated to the MIFACE researcher that the decedent had deafness in his left ear. There was no mention of the decedent wearing a hearing aid in the medical examiner report. The police report indicated it was unknown if the decedent was wearing a hearing aid at the time of the incident.

The mechanic indicated he hit something just before pulling into the open parking space. He stated he heard a "crunch" and then stopped the vehicle. He got out of the truck and noticed a lunch box on the ground between the front driver's side tire and the driver's door. The mechanic did not see or hear anyone. He picked up the scattered items on the ground and put them back in the lunch box. He got back into the truck and backed up approximately 13 feet in an attempt to reload the parking brake. He then noticed the decedent lying on the ground, face first with his head facing to the south. The mechanic ran back to the shop and called for emergency response. Other individuals in the shop ran to the incident scene and checked for a pulse. They did not find a pulse so did not attempt to provide aid. When emergency response arrived, the decedent was declared dead.

Figure 6. Deputy visibility, vapor light and amber marker lights only

The responding police indicated that the grill on the Peterbilt tractor appeared to be marked near the front driver's side. A broken amber marker light was noted on the driver's side front fender. The light's debris was on the ground on the driver's side of the vehicle, near the first trailer's tires. A tire mark was noted coming from the decedent to the front of the vehicle. The mechanic indicated he was not speeding; the police department confirmed speed was not a factor in the incident. A vehicle inspection by the County Weigh Master showed that the Peterbilt tractor was in good working order.

The firm investigated the reason for the two corner lights not working. On the day of the crash, it was discovered that an underground cable was corroded. The cable was fixed two days later. The sheriff's department tested the mechanic for alcohol at the incident scene and the firm tested him for drugs post accident: no alcohol or drugs were noted.

Sheriff Department Night Visibility Study

The county sheriff's department conducted a night visibility test several days after the incident. On the day of the study, the two corner lights had been repaired and the parking lot where the incident occurred was well lit. The two corner lights were turned off to conduct part of the study. The Safety Director supplied a sheriff deputy re-enacting the decedent's position with the same type of vest worn by the decedent. The truck involved in the incident was brought to the area and parked with its amber marker lights on. The sheriff deputy stood in front of the truck in the approximate location the decedent would have been walking. Another sheriff deputy climbed into cab of truck and took several photographs with the flash off.

Figure 7. Deputy visibility, vapor light, headlights and amber marker lights

The night visibility study demonstrated that the decedent would have been slightly visible in front of the vehicle with the yard lights and headlights off and the amber marker lights on (Figure 6). When the yard lights were off, but both the headlights and marker lights on, the deputy was visible in front of the vehicle (Figure 7). When all lights were on (corner yard lights, headlights and running lights), the police officer was again visible in front of the vehicle. The police findings were: a) the deputy would have been visible with the headlights and yard lights on; b) that he was difficult to see with the yard lights and headlights off; c) the vehicle was moving at the time of the crash; and d) it would have been difficult for the truck driver to see the decedent with the yard lights off and only the marker lights on.

The police department identified two possible factors in the incident: 1) fatigue (mechanic had been up for over 17 hours when the incident occurred) and 2) lighting (unlit parking lot and no headlights). Additionally, the police department noted that the mechanic's driver's license was valid but his driving status was ineligible; his license had been suspended for four months.

CAUSE OF DEATH

The cause of death as listed on the death certificate was multiple blunt force injuries. The toxicology report on the decedent indicated no alcohol or drugs in his system.

RECOMMENDATIONS/DISCUSSION

- Employers should mandate drivers turn on the vehicle's low-beam headlights while moving through parking areas at night and during dusk through dawn hours.

Driver visibility is reduced at night and during dusk/dawn, limiting what can be seen in front and to the side of the vehicle. Ninety percent of a driver's reaction depends on vision, and vision is severely limited at night. Depth perception, color recognition, peripheral vision, and the ability to discern distance and movement are compromised in darkness. The mechanic had been working in a brightly lit area and drove the vehicle to a relatively unlit area. His eyes had to adapt to the difference in lighting from the maintenance area to the dark parking lot, potentially decreasing his ability to discern objects. The use of low-beam headlights would illuminate a small portion of the area in front of the vehicle to provide increased visibility. Additionally, headlight use also makes it easier for others to see the vehicle.

- Employers should institute a training/awareness program to educate shift work workers, especially those working 12-hour shifts at night, about sleep/fatigue management and the potential safety and health issues, such as "sleep debt".

The mechanic had been awake for longer than 17 hours. Research has found that night shift workers are most sleepy around 4:00 to 5:00 a.m., which was the time of the incident.

Night shift workers are awake when their body rhythm (circadian rhythm) tells them to be asleep and asleep during the day when their circadian rhythm tells them to stay awake. Often, the end result of this disturbance of their natural body rhythm is that night workers do not get enough quality sleep during the day and they incur a sleep deficit or "sleep debt." Sleep debt can be described as an accumulated sleep deficit. The factors that determine whether sleep is sufficient are quantity, quality, and timing (day vs. night). Sleep debt can impair math skills, thought processes and memory, reaction time, and contribute to a poor attention span, which can place workers at an increased risk of making workplace errors and create serious hazards for those workers and other workers working around and/or with them. In addition, shift workers may be at a higher risk for a number of health problems, gastrointestinal and cardiovascular diseases, hypertension, weight gain, and diabetes. Sleep debt also can weaken the immune system and heighten susceptibility to viruses such as the common cold.

Although individual needs may vary, adults typically need between 7 to 9 hours of sleep per night. Shift workers in general tend to get an hour less of sleep per day than day workers. Employers can play a role in easing sleep deprivation in the workplace and reap the benefits of improved safety and reduced costs. Employers may wish to allow employees to take more frequent breaks, use high-intensity lighting and a buddy system. Additionally, employers should develop and implement an educational outreach program for workers to alert them to the safety and health implications of a sleep deficit and how to promote restful sleep. Topics which could

be addressed are: why sleep is important, what is considered normal sleep, benefits of sleep, factors affecting the quality of sleep, effects of shift work, how sleep affects performance and productivity, and how to increase alertness.

- Employers should develop an interior/exterior facility inspection checklist to identify and remedy safety and health concerns, such as non-functional pole lights.

The Safety Director was unaware that the lighting was not functional in the parking lot. No night shift or truck driver had alerted him to this safety issue. To help ensure safety and health issues are addressed in a timely manner, a facility inspection checklist should be developed and include an area for corrective actions. Corrective action plans should list any problems or concerns noted during the inspection, what action is being taken to correct the problem, the person responsible for corrective action, a targeted completion date, and the date the action is completed. The facility walk-around can be completed on a monthly or quarterly basis (or more frequently as necessary) by the Safety Director, or if formed, a member(s) of the Safety Committee.

- Employers should establish both vehicle traffic flow and pedestrian walkways within a parking lot.

The decedent was walking in the travel path of the vehicle. The firm should identify, based on traffic flow and pedestrian activity, the travel routes of both the vehicle drivers and the pedestrians to ensure both arrive without incident or close call at their destination in the parking lot. The firm should establish pedestrian walkways to access their vehicles and should provide a visual cue to incoming/departing trucks that the walkway is being approached. Having pedestrians follow a designated path allows vehicles to be more aware of where pedestrians are likely to travel.

- Employers who utilize commercial vehicles should identify and include in their Michigan Department of State Driver Database subscription service any employee who operates the vehicle for any reason, including maintenance personnel.

Employers who utilize commercial vehicles are permitted to obtain and verify driving record information relating either to the holder of a commercial driver's license or to the holder of a chauffeur's license via a subscription service to the Michigan Department of State Driver Database. The driving record includes items such as convictions for traffic violations, civil infraction determinations, failure to answer court judgments, crashes, and license withdrawal actions or restrictions on driving privileges. The Safety Director indicated that the firm had not included the mechanic in the subscription service. Had the firm known that the mechanic's license was suspended, the firm's policy would not permit the mechanic to drive a vehicle, even within the parking lot. Employers who are within scope of the permissible purposes list to access

this database should include any company person who may drive the vehicle for any purpose, to ensure that company safety policies regarding driving record is met.

- Employers should establish and utilize a health and safety committee as an integral part of their safety and health management system.

Although the firm had a health and safety committee, its expertise was only used on special projects and not as an integral part of the firm's health and safety management program. A health and safety committee, comprised of both management and hourly employees provides a forum for management and employees to regularly discuss health and safety issues in the workplace and is an important way for employees to help manage their own health and safety and assist the employer in providing a safer, healthier workplace.

MIOSHA has published the Safety and Health Management System Evaluation Form utilized by the compliance officers and consultative staff to evaluate a firm's safety and health management system. The form can be found on the MIOSHA website at: http://www.michigan.gov/lara/0,1607,7-154-11407_30453---,00.html. The elements of a safety and health management system include management commitment and planning, employee involvement, safety and health training, worksite analysis and hazard prevention and control. Employee involvement includes employee participation in: safety and health decision making, training, and in site walk-arounds to identify and correct hazards. The MIOSHA Safety and Health Toolbox contains materials that focus on the major components of a health and safety system and can be accessed via http://www.michigan.gov/lara/0,1607,7-154-11407_15317-124535--,00.html found at the homepage of MIOSHA Consultation, Education and Training (CET) Division (http://www.michigan.gov/lara/0,1607,7-154-11407_15317---,00.html). MIOSHA CET can also be contacted by telephone: (517) 322-1809.

Key Words: Struck by, semi truck, parking lot, pedestrian, worker on foot, vehicle traffic flow

REFERENCES

MIOSHA standards and educational materials may be found at and downloaded from the MIOSHA, Michigan Department of Licensing and Regulatory Affairs (MDLARA) website at: http://www.michigan.gov/lara/0,1607,7-154-11407---,00.html. MIOSHA standards are available for a fee by writing to: Michigan Department of Licensing and Regulatory Affairs (MDLARA), MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan 48909-8143 or calling (517) 322-1845.

- Overtime and Extended Work Shifts: Recent Findings on Illnesses, Injuries, and Health Behaviors. NIOSH, April 2004. http://www.cdc.gov/niosh/docs/2004-143/pdfs/2004-143.pdf
- Work Schedules: Shift Work and Long Work Hours. Workplace Safety and Health Topics, NIOSH. http://www.cdc.gov/niosh/topics/workschedules/
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