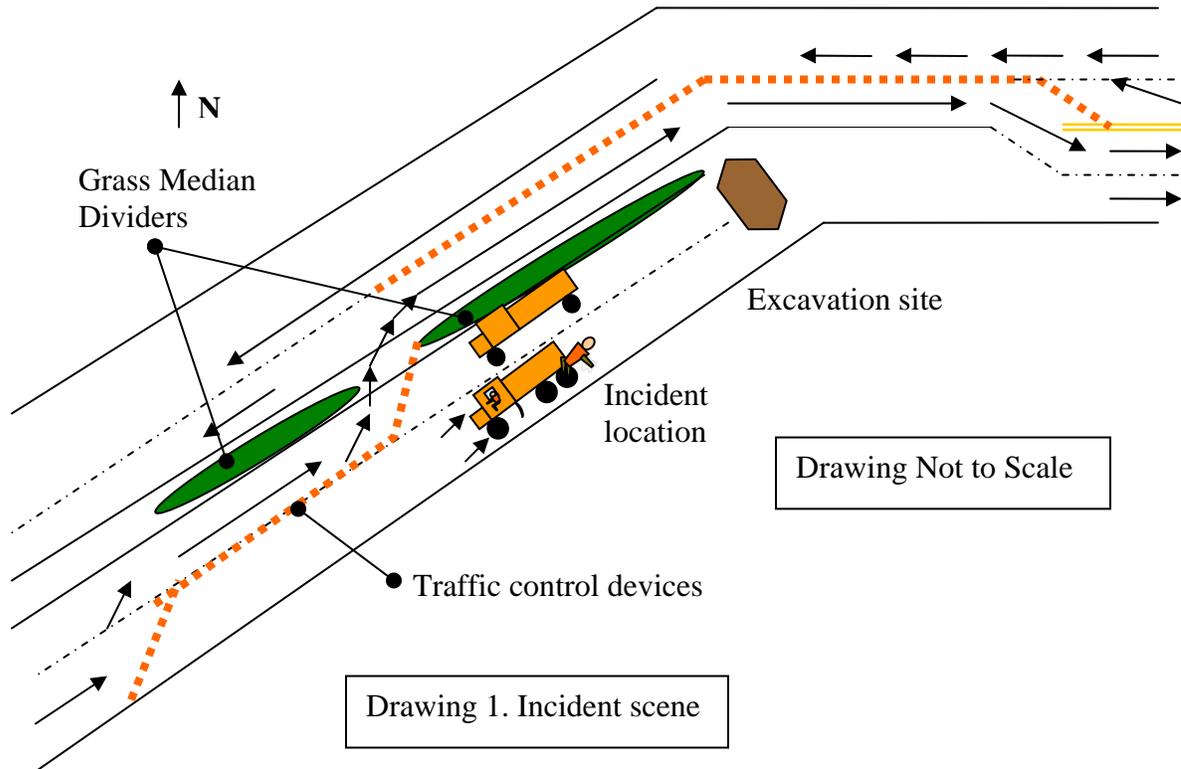


MIFACE INVESTIGATION REPORT: #08MI040

SUBJECT: Municipal Truck Driver Dies After Being Backed Over by Dump Truck

Summary



On May 22, 2008, a 55-year-old Hispanic municipal truck driver was critically injured when a three-ton dump truck, which was backing up, hit him in a street work zone. The decedent had returned from dumping his spoils as a second dump truck driver with a full load was leaving the site. The site supervisor radioed the drivers to switch dump trucks. The decedent gathered his personal belongings (lunch container, newspaper, etc.) and exited his truck. As the decedent walked behind his truck to switch trucks, he dropped his newspaper. The second driver entered the decedent's dump truck and looked for him using the dump truck mirrors. He saw the decedent in the passenger side rear view mirror. The decedent, noting he dropped his newspaper, walked back behind the truck and bent down to retrieve it. Simultaneously, the second driver began to back the decedent's truck to the excavation site. The excavation crew noticing the decedent was in the path of the backing dump truck ran toward the vehicle and yelled warnings to him and the driver. The decedent stood up and was struck by the backing truck. Emergency response was summoned and the decedent was transported to a local hospital. He died approximately two weeks later in the hospital from complications of the injuries sustained at the time of the incident.

RECOMMENDATIONS

- Employers should ensure that written backing protocols are in place and that designated individuals are assigned as spotters to direct backing construction vehicles on construction sites.
- Employers should ensure that workers who are on foot stay out of the work area where heavy equipment is operating and in clear view of operators.
- Employers should utilize the National Institute of Occupational Safety and Health (NIOSH) Safety and Health topic Highway Work Zone Safety topic page to provide employee training concerning blind spots for construction equipment.
- Safety department/personnel should be provided high visibility and the power to implement changes and evaluate compliance with safety plans and programs.
- Heavy equipment owners should consider equipping vehicles with devices to detect the presence of individuals or objects behind the vehicle.

INTRODUCTION

On May 22, 2008, a 55-year-old Hispanic municipal truck driver was critically injured when a dump truck, which was backing up, hit him in a street work zone. On June 9, 2008, MIOSHA Construction Safety and Health division personnel notified MIFACE that the above incident had occurred and that the individual had died from injuries sustained at the time of the May 22 incident on June 6, 2008. On August 14, 2008, the MIFACE researcher interviewed the safety director for the municipality for whom the decedent worked. After the interview, the safety director escorted the MIFACE researcher to the location of the incident and noted the work locations of the project. MIFACE reviewed the autopsy results, death certificate, police report and pictures, MIOSHA file and citations, and documents and pictures provided by the municipality's safety director. Figure 1 is courtesy of MapQuest. The pictures used in Figures 2, 3, 4, and 5 were supplied by the municipal safety director. Pictures used in Figures 6, 7, and 8 and the truck/person drawings in Drawing 1 are courtesy of the MIOSHA compliance officer.

The municipality employed approximately 1,100 workers. The decedent worked in the Sewer Division, which was a subdivision of the Operations and Maintenance Division, which was a subdivision of the Division of Public Service. Ninety-six individuals worked in the Operations and Maintenance (O&M) department. The decedent worked full time as a truck driver (maintenance worker 200) for the municipality in the sewer division. His job description required him to drive a commercial motor vehicle and thus maintain a valid Michigan Commercial Driver's license (CDL). A CDL license incorporates a written test, driving test, and a medical exam. A medical provider must provide medical clearance for an individual to drive a commercial motor vehicle. According to the safety director, the medical provider diagnosed the decedent with high blood pressure and determined that he was not medically fit to drive. The decedent applied for and was denied coverage under the Americans with Disabilities Act. The decedent then applied and received a waiver from the Michigan State Police to have a CDL license. The municipality provided the vehicle that the individual would be driving to take the CDL

driving test. Although the victim was of Hispanic descent, he was born in the US and attended four years of college. His primary language was English.

His normal work shift was variable eight-hour days with overtime. His shift began at 7:30 a.m. and usually ended at 5:30 p.m. He had been working for the city for a total of five years and had been hired into the O&M Division in 2004. He had driven trucks for the city for three years. The decedent was an hourly worker employed full time. He was a member of a union.

The city had a vehicle driver's training program. All drivers must drive with an experienced driver for three days and then on their own for two days. A supervisor follows the driver in training and observes him/her during the two days of solitary driving. The city also requires new drivers to take and pass a defensive driving course, using the vehicle he/she would be driving for the city. According to the safety director, the decedent had been involved in several previous driving incidents which had caused concern about his driving abilities, but due to the nature of the union agreement with the city, it made it difficult to address these issues as well as the medical issue by removing and reassigning him to another job.

The city employed a safety director who had 17 years experience in safety. He had been employed as the safety director for the past five years. The safety director reported to Human Resources director, who reported to the mayor's Chief of Staff. The safety director had worked for several Human Resource directors over the past several years.

At the beginning of his full time employment with the municipality, the decedent was provided (as are all city employees) with a copy of the City's workplace safety rulebook. These rules included specific guidance for "accident preventability" and backing of vehicles. A copy was not on-site at the time of the incident. After the incident, the rulebook was placed into the interior storage compartment of all dump truck vehicle cabs. The workplace safety rule book Rule 4.2, Guidelines for Accident Preventability included: "(b) Backing: When ever possible, position vehicle so that backing is not necessary. Whenever possible, get another person to help guide the maneuver. A driver is not relieved of the responsibility to back safely when a guide is involved in the maneuver. A guide cannot control the movement of the vehicle; therefore a driver must check all clearances (walking around the vehicle, position and check mirrors, etc.)"

In response to a report of a 2006 fatality in a nearby city from a garbage truck backing over an 8-year-old boy, additional training specific to backing vehicles was given by the safety director in September 2006. The training session addressed the safe operation of garbage trucks and other over-the-road heavy trucks. Training also included keeping distractions out of the cab of the truck, including iPods, cell phones, magazines, trash, food containers and bags, to avoid backing when ever possible, and hazards of working behind trucks. The training was not specific to dump trucks.

The municipality had a written health and safety program with specific safety rules and procedures in place for the specific task being performed by the victim. The city had a

joint health and safety committee, which met monthly. Safety meetings were scheduled with employees every 30 days. There was a written disciplinary procedure in place for safety and health policy violations. The city had an incentive program for days without injury. The minimum time for an incentive reward was 30 days; as the number of days without injury increased to three months, additional rewards were given to the city employees. A safety training program was in place that included both classroom and on-the-job training. Training records were maintained. Supervisors had also received safety training. The supervisor was responsible for implementing the safety procedures on site as well as directing work crew activities.

MIOSHA Construction Safety and Health Division issued the following alleged Serious Citation at the conclusion of its investigation:

SERIOUS:

GENERAL RULES, PART 1, RULE 114(1).

An employer shall develop, maintain, and coordinate with employees an accident prevention program, a copy of which shall be available at the worksite.

- A. Employees were working without the knowledge and training received from a construction site safety and health accident prevention program developed and administered by the employer.
- B. Employees were not provided with formal training on hazard recognition associated with walking behind heavy equipment used on a construction site.

INVESTIGATION

The blacktop roadway on which the incident occurred was a curved, median-divided, two-lane road with a posted speed limit of 35 mph. The roadway ran northeast-southwest and had a slight grade (Figure 1), and then intersected with a four-lane roadway with a double yellow line dividing two eastbound and two westbound lanes. Due to the excavation/sewer

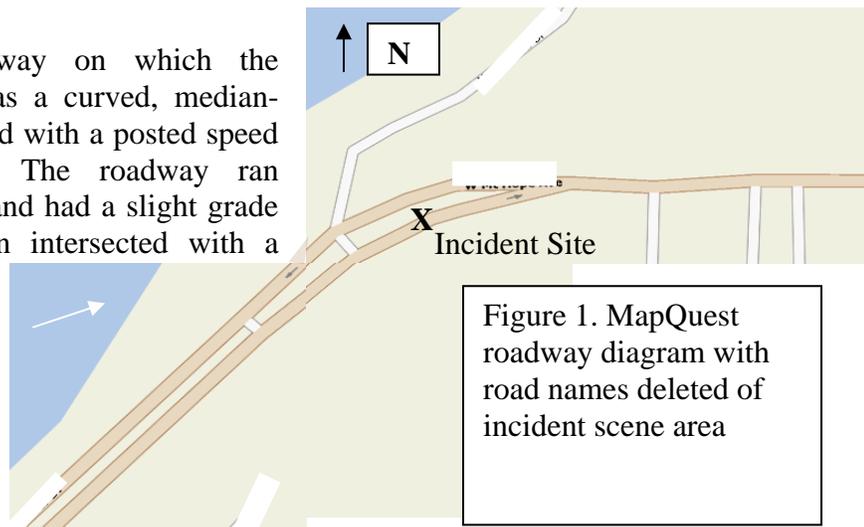


Figure 1. MapQuest roadway diagram with road names deleted of incident scene area

repair project, the southwest lanes had been divided into one westbound lane and one eastbound lane. One of the two northeast lanes had been closed approximately 200-300 feet west of the excavation and traffic diverted through a median access. (Drawing 1 and Figures 2 and 3). The following traffic control devices were on site: detour signs, traffic drums, barricades, advance warning signs, and flashing arrows.



Figure 2. Incident roadway looking northeast at lane taper



Figure 3. Looking west towards excavation site from south side of eastbound lanes of 4-lane roadway

The excavation site encompassed both of the northeast bound lanes (Figure 4). The work crew for the sewer repair included an equipment operator, two laborers, a supervisor, and two truck drivers working in tandem, one of whom was the decedent. As one dump truck was filled, the other was to wait west of the site and back to the excavation when the truck being filled pulled away.



Figure 4. Excavation site

The truck involved in the incident was a 2003 three-ton tandem axle Sterling dump truck (Figure 5). The truck had been inspected that morning and no defects were identified. After the injury the responding police and the safety director evaluated the truck for related defects; none were found. The city safety director and the responding police heard the truck's back up warning signal as the vehicle was tested. The responding police determined that the truck's mirrors were positioned so that with little head movement the driver



Figure 5. Sterling dump truck involved in incident

could observe both sides of the vehicle to the rear as well as out and away from the vehicle.

The crew had filled the decedent's truck, and the decedent left the work area to a remote dump site to empty the bed. The second driver arrived, and his single axle truck was filled. As the second driver was leaving, the decedent arrived with his empty truck.



Figure 6. Dump truck positions after decedent was struck

Because the decedent had difficulty following the roadway curve while backing the truck to the excavation, the site foreman suggested to the site supervisor that the two drivers exchange trucks, as the second driver was the more experienced driver (25 years of holding a CDL). The site supervisor agreed, and radioed both drivers and instructed them to switch trucks.

The decedent parked his truck approximately 250 feet from the excavation at the curb side of the road. The second driver pulled forward from the excavation and stopped his truck in the lane next to the traffic barriers approximately five feet behind the decedent's truck. The decedent was wearing a reflective vest, eye protection, work boots and a hard hat.



Figure 7. Final resting points of trucks

The second driver exited his truck, walked to the front and around to the driver's side of the decedent's truck. The decedent collected his belongings from the truck that included clothing and newspapers. The second driver assisted the decedent and then entered the cab as the decedent collected the remainder of his personal items. As the second driver watched the decedent movement using the driver's side mirror, the decedent walked behind the tandem axle truck

moving from the driver's side to the passenger side. The second driver noted the decedent's location on the passenger side of the truck by viewing him in the passenger side mirror. Apparently as he passed behind the truck, the decedent dropped part of his newspaper. In an attempt to retrieve the paper, the decedent walked behind the truck just as the driver of the decedent's truck placed it into reverse and began to back the truck to the excavation site. The decedent bent over to retrieve the newspaper with his backside facing the rear of the truck (facing east).

The decedent's coworkers at the excavation site, hearing the backup alarm of the tandem axle truck and noting the decedent's location behind the truck and out of view of the backing driver, began to yell warnings to the decedent. As they ran toward the backing truck, the decedent apparently heard his coworkers yelling, stood up and acknowledged his coworkers. He was then struck and knocked down by the truck and run over by the dual rear wheels (Figures 6 and 7).

The truck driver felt a bump and then stopped, exited the truck, and noted the workers from the excavation site running toward him. The truck had dragged the decedent approximately four to five feet. Coworkers called for emergency response. The decedent was alert and calm when the paramedics extracted him from under the truck/scrapper blade (Figure 8).



Figure 8. Resting positions of dump trucks and emergency responders attending to injured worker

The decedent was transported to a local hospital, where he died approximately two weeks later from the injuries sustained at the time of the incident.

CAUSE OF DEATH

The cause of death as listed on the death certificate was crush and complications from the injury. Blood toxicology was positive for hospital administered medications.

RECOMMENDATIONS/DISCUSSION

- Employers should ensure that written backing protocols are in place and that designated individuals are assigned as spotters to direct backing construction vehicles on construction sites.

If backing protocols had been established and there was a person assigned as a spotter, the dump truck would not have started backing toward the excavation until the spotter indicated an all clear and the incident may have been prevented. Backing protocols should be developed for each highway/street construction project when there is a need to address this work practice. These protocols should include (but not be limited to):

- ❖ An assigned spotter who has received appropriate training,
- ❖ A requirement that backing will not begin without an agreed upon signal from the spotter to the equipment operator that it is safe to start backing,
- ❖ Operators are required to come to a complete stop if contact with the spotter is lost and not resume backing until contact is reestablished
- ❖ Assigned spotter is positioned in an area with an unobstructed view of the vehicle's intended path.

The site supervisor should hold daily safety talks on this specific topic on the days when a backing activity will take place. Even with the use of a spotter, there is a need for a review of the task-specific plan.

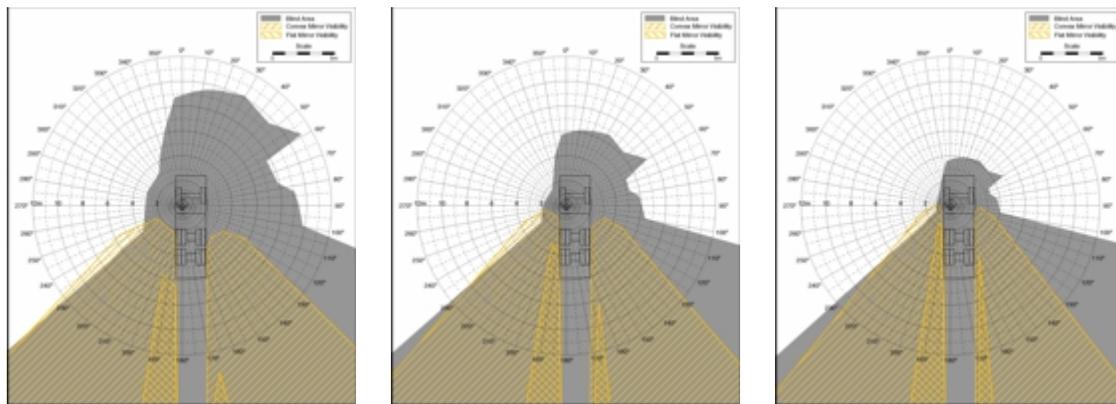
- Employers should ensure that workers who are on foot stay out of the work area where heavy equipment is operating and in clear view of operators.

As so tragically demonstrated in this incident, a worker on foot in the proximity of moving construction equipment in a construction zone can be a lethal combination. Although the municipality had stressed the importance of working around refuse trucks, specific training regarding the hazards of working around backing construction vehicles was not provided. Employers can ensure worker compliance with safe work practices through continued documented programs of specific training, supervision, safe work recognition and progressive disciplinary measures.

- Employers should utilize the National Institute of Occupational Safety and Health (NIOSH) Safety and Health topic Highway Work Zone Safety topic page to provide employee training concerning blind areas for construction equipment.

Areas around construction equipment that cannot be seen from the operator's position are considered blind areas or blind spots. Caterpillar Inc, under contract to NIOSH, developed detailed diagrams to assist in the visualization of the blind areas around various construction vehicles and equipment. For each construction vehicle tested, three different diagrams were developed to represent the ability of the vehicle operator to see an object at three different elevations: ground level, 900 millimeters (3 feet), and 1500 millimeters (mm). The diagram depicting the 900 mm plane represents the average height of a channelizing device, e.g. construction barrels that are commonly used in road construction. The diagram depicting the 1500 mm plane corresponds to the height of a 4-

foot 11-inch person. The NIOSH Highway Work Zone Safety website can be accessed at <http://www.cdc.gov/niosh/topics/highwayworkzones/>. Click on Construction Equipment Visibility to view a list of construction equipment and their corresponding blind area diagrams. Also on this website are the test procedures for developing the Blind Area Diagrams to assist safety personnel or instructors in developing their own Blind Area Diagrams. The following diagrams copied from the NIOSH website illustrate the blind spots of a Sterling 9500 three-axle dump truck.



Ground Level **900mm Level** **1500mm Level**
[800 x 914](#) | [1024 x 1170](#) [800 x 914](#) | [1024 x 1170](#) [800 x 914](#) | [1024 x 1170](#)

- Safety department/personnel should be provided high visibility and the power to implement changes and evaluate compliance with safety plans and programs.

Municipalities should ensure the safety department is positioned in the organization so that it has high visibility, and receives adequate funding. The safety department needs authority to implement, monitor, and provide feedback regarding a municipality’s work division compliance with safety programs.

- Heavy equipment owners should consider equipping vehicles with devices to detect the presence of individuals or objects behind the vehicle.

Working in close proximity to moving heavy equipment on construction sites is common for construction workers and other support personnel, such as suppliers, testing engineers, traffic controllers, etc. Daily exposure to the noise and warning devices of backing equipment can desensitize workers to the presence of such vehicles. Other warning devices, such as a strobe light, are available. Also available are detection systems employing electromagnetic, infrared, or ultrasonic signaling systems, and video cameras for use on vehicles to identify and alert operators to the presence of objects or individuals in the blind spots behind a vehicle.

RESOURCES

MIOSHA standards cited in this report may be found at and downloaded from the MIOSHA, Michigan Department of Energy, Labor & Economic Growth (DELEG) website at: www.michigan.gov/mioshastandards. MIOSHA standards are available for a fee by writing to: Michigan Department of Energy, Labor & Economic Growth, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan 48909-8143 or calling (517) 322-1845.

- MIOSHA Construction Safety and Health Division, General Rules, Part 1, Rule 114(1).
- National Institute of Occupational Safety and Health (NIOSH) Safety and Health topic Highway Work Zone Safety topic page.
<http://www.cdc.gov/niosh/topics/highwayworkzones/>
- Michigan FACE Investigation Report04MI107: Engineering Technician Dies When Backed Over by Cement Mixer. www.oem.msu.edu
- California FACE Case Report 07CA001: A Laborer Dies in a Street Work Zone after Being Backed Over by a Dump Truck.
www.cdc.gov/niosh/face/stateface/ca/07ca001.html
- Wisconsin FACE Case Report 00WI074: Construction Laborer Killed When Run Over by Dump Truck in Highway Work Zone – Wisconsin.
www.cdc.gov/niosh/face/stateface/wi/00WI074.html
- Federal Motor Carrier Safety Administration, Part 391: Qualifications of drivers and longer combination vehicle (LCV) driver instructors, Subpart E – Physical qualifications and examinations, 391.41 Physical qualifications for drivers.
<http://www.fmcsa.dot.gov/rules-regulations/administration/fmcsr/fmcsrruletext.asp?section=391.41>
- MapQuest. <http://www.mapquest.com/>

Key Words: Construction, Struck By, Backing Dump Truck, Truck Driver

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MIFACE

Investigation Report #08 MI 040

Evaluation

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

Please rate the report using a scale of:

Excellent	Good	Fair	Poor
1	2	3	4

What was your general impression of this MIFACE investigation report?

	Excellent 1	Good 2	Fair 3	Poor 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)

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Thank You!

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Comments:
