MIFACE INVESTIGATION REPORT: #07MI011

SUBJECT: Career Fire Fighter Dies After Ejection From His Fire Engine When It was Struck By a Vehicle

Summary

On February 7, 2007, a 47-year-old male career fire fighter died after he was ejected from his fire engine when it was struck by a sport utility vehicle (SUV). The decedent was driving the fire engine with its lights and sirens activated enroute to a structure fire. The fire station lieutenant was seated in the front passenger seat. Two additional fire fighters were seated in the back seats behind the fire engine's front compartment. As the fire engine proceeded through an intersection, a speeding SUV struck the passenger side of the fire engine near the windshield. The decedent was ejected along with the lieutenant through the passenger front windshield. The lieutenant landed in the street in front of the SUV approximately ten yards away from the fire engine. After the decedent was ejected, he rolled underneath the fire engine. The fire engine came to rest on top of the decedent's chest. The decedent expired as the fire engine was removed from his chest. Although the other two fire fighters were not ejected, they sustained serious injuries. These two fire fighters and the lieutenant were taken by ambulance to a local hospital. The driver of the SUV was pronounced dead at the scene.

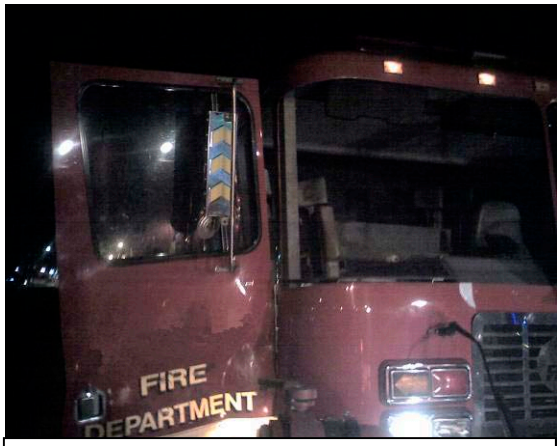

Figure 1. Fire engine after incident.

RECOMMENDATIONS

- The use of seat belts should be mandatory when driving or riding in a fire engine or any emergency vehicle that is in motion. MIOSHA General Industry Safety Standard Part 74, Fire Fighting requires seat belt use when the apparatus is in motion.
- Fire engines and other fire apparatus should be equipped with automatic seat belt systems or warning signals that require seat belt use for operation of the vehicles.
- In accordance with the National Fire Protection Association (NFPA) 1451, Standard for a Fire Service Vehicle Operations Training Program, driver training should be provided as often as necessary, but not less than twice a year.
- In accordance with the NFPA 1451, formally written Standard Operating Procedures (SOP) should be developed and implemented for safe driving, defensive driving techniques, and riding within and operating fire department vehicles during an emergency and non-emergency response.

- The SOP should have a procedure to evaluate the effectiveness of this training every three years in accordance with NFPA 1451.
- All fire apparatus driver/operators shall meet the requirements as outlined in NFPA 1002, Standard for Fire Apparatus Driver/Operator Professional Qualifications.
- In accordance with the NFPA 1451, all fire department vehicle drivers/operators should possess a valid vehicle operator's licensed as required by the State.
- The SOPs should be communicated, applied and enforced by all fire fighters to ensure "Everyone Goes Home" as promoted by the National Fallen Fire Fighter Foundation.
- All fire fighters should be encouraged to sign the "National Fire Service Seat Belt Pledge" to re-enforce the importance of wearing seat belts.

INTRODUCTION

On February 7, 2007, a 47-year-old male career fire fighter died after he was ejected from his fire engine when it was struck by a sport utility vehicle (SUV). On February 8, 2007, MIFACE was informed by the Michigan Occupational Safety and Health Administration (MIOSHA) personnel, who had received a report on their 24-hour-a-day hotline, that a work-related fatality had occurred on February 7, 2007. On July 6, 2007, the MIFACE researcher met with the Second Deputy Fire Commissioner to discuss the incident. The police reports, autopsy results and MIOSHA investigation results were used to assist in writing this report. Pictures used in this report were either fire department photographs taken at the time of the incident, or pictures taken by the MIFACE researcher at the time of the MIFACE investigation. The pictures were modified as needed to remove identifiers.

The city fire department was officially established in 1867. The fire department has five commissioners who establish and administer department policy based on federal, state and local regulations, as well as National Fire Protection Association (NFPA) and other applicable industry guidelines. The city's risk management department has quarterly meetings with the department commissioners to discuss trends in injuries and incidents. The department has a health and safety committee that consists of one commissioner and three union fire fighters. This committee reviews any complaints brought forward by the fire fighters or fire stations.

The city has forty-eight fire stations. Each fire station has an officer in charge that is responsible for implementing department policy. The city employs 1185 fire fighters (including fire engine operators). Fire fighters work 24-hour shifts with one or three 24-hour days off in between their shift. Work shifts begin and end at 7:30 am. Fire fighters are typically assigned to the same house and the same fire engine. All fire fighters belong to the fire fighters union.

Each fire station has one, two or three fire engines. Each fire engine has an operator, who drives and operates the apparatus. In addition to the operator, each fire engine has three fire fighters, one of which is the officer in charge. This individual rides in the passenger

seat of the fire engine, while the remaining two fire fighters ride in the back seats of the front compartment. A fire station may have four, eight or twelve fire fighters per shift dependent on the number of fire engines. When more than one officer in charge is present, the officers will determine amongst themselves who is in charge of the fire station.

Each fire station maintains a daily journal on all activities. The most senior fire fighter (officer in charge) conducts a daily safety inspection of the fire station including the fire engine. Each fire fighter is responsible for the daily inspection and care of his personal protective equipment, which includes a helmet, respirator facepiece, and turnout gear with boots.

The decedent was employed as a career fire fighter, specifically a fire engine operator, with the city for twelve years. He worked only as a fire engine operator during his tenure. His training included how to operate and drive the fire engine. The instruction included hands-on and textbook training. Engine operators learn to drive the fire engine on a closed course, then in traffic. The training stressed stopping distance, and turning and navigating through traffic. Administration does not have Standard Operating Procedures (SOPs) for defensive driving techniques. They do distribute information on proper driving techniques and other information by daily memorandums, bulletins, etc. According to the administration, additional training, including refresher training, is only conducted at the request of the individual fire station's officer in charge.

The decedent possessed a regular driver's license. According to State regulations, a certified driver's license (CDL) is not required as long as the driver has successfully completed the Michigan Fire Fighter's Training Council driver training course. The administration indicated the decedent's training was current.

The Department received one "Serious" citation as a result of the MIOSHA inspection of the fatality. The citation was issued under Firefighting Rule, Part 74, Rule 7421(2)(e). This rule requires employers to provide seat belts and enforce their use when a fire apparatus is in motion.

INVESTIGATION

The decedent was driving the fire engine with its lights and sirens activated enroute to a structure fire. The fire station lieutenant (officer in charge) was seated in the front passenger seat. Two additional fire fighters were seated in the back seats behind the fire engine's front compartment. The fire engine was traveling westbound on a four-lane road at 5:50 p.m. The roads were dry and the weather clear. The posted speed limit for the road is 30 miles per hour (mph). According to the fire engine occupants, the decedent slowed approximately to 20 mph as he approached the intersection with a traffic light (Figure 2). The traffic light was green for the fire engine. The intersection had a parking lane separated by a median on both sides. A building was located on the northeast corner that obstructed the north view of the intersecting side street.

Figure 2. Four-lane road fire engine was traveling enroute to an emergency

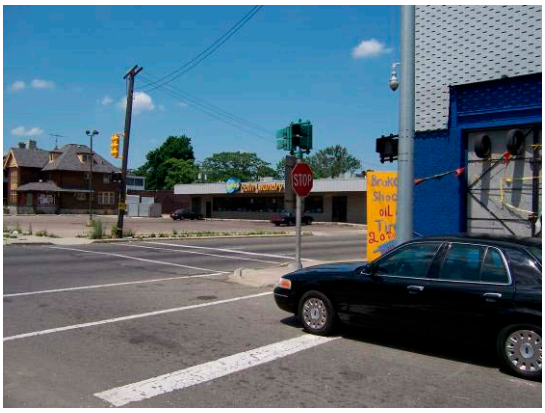

Figure 3. Intersecting side street SUV was traveling prior to striking fire engine

According to the Second Deputy Fire Commissioner, the police indicated the SUV was traveling at 87 mph based on its speedometer at the time of incident. It was traveling south on the intersecting side street (Figure 3). The SUV driver proceeded through the intersection against the red traffic light and struck the passenger side of the fire engine near the front windshield. The force of the impact pushed the fire engine across the intersection, then onto the grass and into a pole on the southwest corner of the intersection. The decedent along with the lieutenant was ejected through the passenger front windshield. The lieutenant landed approximately ten yards away in the street in front of the SUV. After the decedent was ejected, he rolled underneath the fire engine. The fire engine came to rest on top of the decedent's chest. The decedent expired as the fire engine was removed from his chest. Although the other two fire fighters were not ejected, they sustained serious injuries. These two fire fighters and the lieutenant were taken by ambulance to a local hospital. The driver of the SUV was pronounced dead at the scene.

The fire engine was equipped with seat belts for all four seats. The seat belts are a combination lap belt and shoulder harness. The seat belts fit over the occupant even when they are wearing a self-contained breathing apparatus (SCBA), because the SCBAs are designed to fit into the seat backs. According to the police reports, none of the fire fighters were wearing their seat belts at the time of incident. The city police officers responding to the incident indicated the seat belts were operating correctly immediately following the incident. A forensic team investigation conducted at the department's repair facility also reported the seat belts were in good condition and operating correctly.

CAUSE OF DEATH

The medical examiner listed the cause of death as multiple injuries. The toxicology report was negative for alcohol and screened drugs.

RECOMMENDATIONS/DISCUSSION

- The use of seat belts should be mandatory when driving or riding in a fire engine or any emergency vehicle that is in motion. MIOSHA General Industry Safety Standard Part 74, Fire Fighting requires seat belt use when the apparatus is in motion.

Although fire engines are large, they are susceptible to significant damage as demonstrated by this incident. All fire fighters and department personnel should be required to wear seat belts as required by sate laws and department policy when traveling inside any department vehicles. Use of the seat belts would also have minimized the injuries sustained by the other occupants.

- Fire engines and other fire apparatus should be equipped with automatic seat belt systems or warning signals that require seat belt use for operation of the vehicles.

The fire department administrators should evaluate the effectiveness of automatic seat belt systems. Fire engines can be equipped with systems that do not allow the engine to start unless all seat belts are locked in place. Warning signals might also be used to alert occupants to attach their seat belts. If warning or automatic systems for seat belts are installed, employees may disengage the systems if possible. Therefore, administrators and fire station officers in charge should conduct regular audits to ensure these systems are not bypassed by personnel. If the systems are bypassed, then disciplinary actions should be implemented to enforce proper practices and procedures.

- In accordance with the National Fire Protection Association (NFPA) 1451, Standard for a Fire Service Vehicle Operations Training Program, driver training should be provided as often as necessary, but not less than twice a year.

According to the administration, the decedent's training was current. However, records were not available to determine when the last time the decedent received the appropriate training. NFPA 1451, Standard for a Fire Service Vehicle Operations Training Program and NFPA 1002, Fire Apparatus Driver/Operator Professional Qualifications state that fire departments should establish and maintain a driver training education program. Each member should be provided driver training on each vehicle that he/she will operate not less than twice a year. Once a year, the training should include hands-on exercises using actual fire engines/apparatus'. Vehicle characteristics, capabilities and limitations should be incorporated into driver training programs. If any changes in driving procedures or technologies are introduced, training and education on these changes should be provided for all affected fire department members. In addition, fire department members should

receive instruction and training whenever new or unfamiliar vehicles are placed into service. The American National Standards Institute (ANSI) standard Z15.1, Safe Practices for Motor Vehicle Operations, contains minimum requirements for workplace traffic safety programs and is intended to give employers, whose employees drive on the job, tools to prevent motor vehicle crashes.

- In accordance with the NFPA 1451, formally written Standard Operating Procedures (SOP) should be developed and implemented for safe driving, defensive driving techniques, and riding within and operating fire department vehicles during an emergency and non-emergency response.

Policies and procedures that are vague or not formally written, tend to be ineffective. Individuals often develop poor and unsafe habits when allowed to perform tasks at their own discretion. Ineffective policies and procedures limit the ability of the administration, officers in charge and fire fighters to enforce correct procedures, which increase the risks for accidents. Therefore, SOPs should be developed and written to address proper, safe and defensive driving techniques (visual lead time, braking and reaction time, combating skids, evasive tactics, knowledge of weight transfer, and anticipating other drivers' actions) that emphasize the safe arrival of fire department vehicles and occupants at the emergency scene as the first priority.

- The SOP should have a procedure to evaluate the effectiveness of this training every three years, in accordance with NFPA standard 1451.

The administration should review reported incidents, near misses, etc. to identify areas of deficiencies in regards to driving and operating fire engines and apparatus'. The training program should be updated as needed to address these deficiencies. Updates should be shared with all fire fighters in a timely fashion.

- All fire apparatus driver/operators shall meet the requirements as outlined in NFPA 1002, Standard for Fire Apparatus Driver/Operator Professional Qualifications.

Although the decedent received training on operating and driving of the fire engine, the extent of the training was not clear. The administration should develop SOPs that specifically outline the type of training and education needed by each fire fighter specific to their job duties in accordance with NFPA 1002. Following training, fire department vehicle drivers should meet the qualifications described in NFPA 1500, Standard on Fire Department Safety and Health Program, and NFPA 1200, Standard for Fire Apparatus Driver/Operator Professional Qualifications. These qualifications include intersection practices, preventative maintenance inspections and demonstrating how to properly operate an apparatus under a variety of conditions. The State does provide a variety of approved fire fighter training courses at the Office of Fire Fighting Training. Several courses include training on the operation and driving of fire engines and other apparatus'.

The Office of Fire Fighting Training and available courses can be found by the Department of Labor and Economic Growth (MDLEG) website at http://www.michigan.gov/dleg. Click on Agencies and Commissions, then click on the Bureau of Fire Services, and then click on the Office of Fire Fighter Training link. The Director of the Office of Fire Fighter Training may also be contacted at 517-241-8847. Training should be documented and tracked by the administration to ensure all individuals have received proper and current training.

- In accordance with the NFPA 1451, all fire department vehicle drivers/operators should possess a valid vehicle operator's licensed as required by the State.

According to the Office of Fire Fighting Training, individual Fire Departments are responsible for administering the appropriate training course, which includes both textbook and hands on training. If the individual Fire Department indicates the fire fighter has successfully completed the course, then the Office of Fire Fighting Training approves their training. Once the fire fighter passes this course, he/she is exempt from needing a Certified Driver's License (CDL) to operate a fire engine or other fire apparatus. They only need to possess a regular driver's license. As part of the SOPs, administration should establish criteria fire fighters must achieve in order to be approved to drive/operate a fire department vehicle/apparatus.

- The SOPs should be communicated, applied and enforced by all fire fighters to ensure "Everyone Goes Home" as promoted by the National Fallen Fire fighter Foundation.

The National Fallen Fire Fighter Foundation is promoting the program "Everyone Goes Home." This program encourages fire departments, including administration, officers in charge and individual fire fighters, to empower each other to accept responsibility for safety. Fire fighters must set examples for their fellow fire fighters to follow policies and proper procedures to ensure "Everyone Goes Home". Information on this program is available at the Foundation's website http://www.firehero.org/.

- All fire fighters should be encouraged to sign the "National Fire Service Seat Belt Pledge" to re-enforce the importance of wearing seat belts.

The National Fallen Fire fighter Foundation has established the following pledge:

"I pledge to wear my seat belt whenever I am riding in a Fire Department vehicle. I further pledge to insure that all my brother and sister fire fighters riding with me wear their seatbelts. I am making this pledge willingly; to honor Brian Hunton, my brother fire fighter, because wearing seat belts is the right thing to do."

This pledge was created to honor fire fighter Christopher Brian Hunton, age 27, of the Amarillo (Texas) Fire Department. In 2005, he fell out of his fire truck responding to an

alarm. He died two days later from his injuries. Brian was not wearing his seat belt. The pledge can be found at http://www.firehero.org/.

REFERENCES

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

The MIOSHA Consultation Education & Training (CET) Division services are provided throughout the state by an in-house staff of professional occupational safety consultants, occupational safety specialists and industrial hygienists. The staff in the CET Division is non-enforcement personnel. MIOSHA CET Division can be contacted by writing to: Consultation Education and Training, 7150 Harris Drive, P.O. Box 30643, Lansing, Michigan 48909-8143 or calling (517) 322-1809. The MIOSHA CET Division website can be accessed through the MDLEG website at http://michigan.gov/dleg. Click on the MIOSHA link located in the box on the left side of the web page, then click on the Consultation, Education, and Training link.

- MIOSHA General Industry Safety Standard, Part 74, Fire Fighting.
- NIOSH HAZARD ID 14 – Fire fighter Deaths from Tanker Truck Rollovers. December 2001. http://www.cdc.gov/niosh/hid14.html.
- National Fire Protection Association 1451, Standard for a Fire Service Vehicle Operations Training Program, 2002 edition.
- National Fire Protection Association 1002, Standard for Fire Apparatus Driver/Operator Professional Qualifications, 2003 edition.
- National Fire Protection Association 1401, Recommended Practice for Fire Service Training Reports and Records, 2001 edition.
- National Fire Protection Association 1500, Standard for Fire Department Occupational Safety and Health Program, 2007 edition.
- The American National Standards Institute (ANSI) Z15.1, Safe Practices for Motor Vehicle Operations. February 15, 2006.

Key Words: Fire fighter, seat belt, MVA

MIFACE
Investigation Report #07 MI 011
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	**Good**	**Fair**	**Poor**
1	2	3	4

Was the report…	**Excellent**	**Good**	**Fair**	**Poor**
Objective?	1	2	3	4
Clearly written?	1	2	3	4
Useful?	1	2	3	4

Were the recommendations …	**Excellent**	**Good**	**Fair**	**Poor**
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)

- ❑ Distribute to employees
- ❑ Post on bulletin board
- ❑ Use in employee training
- ❑ File for future reference
- ❑ Will not use it
- ❑ Other (specify) _____

Thank You!

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Comments:

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