



NIOSH
Fire Fighter Fatality Investigation
and Prevention Program

Death in the line of duty...

A summary of a NIOSH fire fighter fatality investigation

September 23, 2005

One Part-time Fire Fighter Dies and Another Is Seriously Injured When Two Fire Engines Collide at an Intersection While Responding to a Fire - Illinois

SUMMARY

On April 27, 2004 a 34-year-old male part-time fire fighter died after the engine in which he was riding (Unit 1) crashed into an engine from another department (Unit 2) as they passed through an intersection. Both engines/departments were responding to the same call for a structure fire. The force of the impact caused the front of Unit 1 to collapse inward and cause crushing injuries to the unrestrained driver whose legs were pinned between the seat and the dashboard. He was extricated and transported to the hospital for treatment. The rear passenger of Unit 1 received minor injuries and was transported to a local hospital where he was treated and released. The victim, who was riding unrestrained in the officer's seat, was ejected from the vehicle. He was transported to a local hospital where he was pronounced dead on arrival.

NIOSH investigators concluded that to minimize the risk of similar occurrences, fire departments should:

- ***provide training to driver/operators as often as necessary to meet the requirements of NFPA 1451, 1500, and 1002. This training should incorporate specifics on intersection practices.***
- ***develop and enforce standard operating procedures (SOPs) for seat belt usage, intersection practices, and response to mutual/automatic aid incidents.***

INTRODUCTION

On April 27, 2004, a 34-year-old male, part-time fire fighter (the victim) died after being ejected from the engine in which he was riding (Unit 1) after crashing into an engine from another department (Unit 2). On May 3, 2004, the U.S. Fire Administration (USFA) notified the National Institute for Occupational Safety and Health (NIOSH) of this fatality. On September 26, 2004, NIOSH received a written request from a representative of the local International Association of Fire Fighters (IAFF) to

investigate this incident. On November 30 and December 1, 2004, two safety and occupational health specialists from the NIOSH Fire Fighter Fatality Investigation and Prevention Program investigated the incident. The NIOSH team met with an attorney for the village where the incident occurred, the driver and the fire fighter riding in Unit 1 and their attorney, the Safety Officer for the victim's department who was standing in for the Chief, and the Chief and several fire fighter/union representatives of the career department involved in the incident (Unit 2). The three career fire fighters (Unit 2) declined interviews. The State Occupational Safety & Health Administration (OSHA) compliance officer who investigated this incident was contacted by phone and a copy of her report was reviewed. The detective of the police department that investigated the crash was contacted by phone, as was the Chief of the victim's department. NIOSH investigators reviewed the state police traffic collision report, training records for the victim and the driver, standard operating procedures (SOPs), photos, and the medical examiner and autopsy reports.

Department/Training: The victim's department has 30 uniformed personnel operating out of one station. It serves a population of approximately 5,000 covering about one square mile. Fire fighters are part-time, paid-on-premises, including responding to calls. The victim had been a part-time fire fighter with this department for almost 3 years. He was a full-time, career paramedic at another department. The victim had completed State fire fighter Level I and II, EMT, Paramedic, and HazMat training. The driver of Unit 1 had completed State fire fighter Level II, HazMat awareness, and HazMat first responder. In May 2003 the driver of Unit 1 received his certification for driving Class B, non-CDL vehicles. This certification required two weeks of classroom and practical training. Records obtained by NIOSH indicated that the department offered driver training in April and September 2003 and in March 2004. The records indicated that the driver of Unit 1 had not participated in these classes. The victim's department did not have a written training program at the time of the incident.

Standard Operating Procedures (SOP): At the time of the incident, the victim's department had an *Employee Handbook* containing departmental policies and procedures as well as requirements of employment and responsibilities of fire fighters. Included was a seat belt policy stating that all members must wear seat belts per state statute. The SOP concerning driver/engineer responsibilities stated that drivers are not allowed to move an apparatus until all persons on vehicle are seated and secured with seat belts. At the time of the incident, the victim's department did not have a procedure concerning mutual or automatic aid response, or for intersection practices.

Weather/road: The incident occurred at the intersection of two concrete roadways bordered on both sides by raised concrete curbs. The east-west roadway (R1) has two lanes; the north-south roadway (R2) has three northbound and three southbound lanes. ([Diagram](#)). R2 has dedicated left-turn-only lanes on both the north- and southbound sides. Traffic at the time of the crash was reported as being of medium density. The crash occurred during daylight hours; the weather was clear and the roads were dry.

Traffic control: Traffic was controlled by multiple overhead and pole-mounted traffic control lights.^a The traffic control devices at the intersection are connected to an emergency traffic light control system.^b According to the police and the State Department of Labor (DOL) reports, shortly after the incident,

the emergency traffic light system was checked on the scene by a technician and found to be functioning properly in all modes. The data log for the control device indicated that it had been activated at 1741 hours on the day of the crash. The log further indicated that the device had been activated in an east/west direction and that the traffic lights in that direction were green at the time of the crash.

Apparatus: Unit 1 was a 2001 engine/pumper with a 1000-gallon water tank and a gross vehicle weight rating of 45,000 lbs. Unit 2 was a 1999 engine equipped with an emitter that generates a signal to a sensor on the traffic light as the apparatus approaches. Unit 1 did not have such an emitter. Maintenance records indicated that Unit 1 had been serviced twice since the date of purchase: in July 2003, at 3606 miles, and in March 2004, at 7633 miles.

^a Per the traffic crash reconstruction report of the state police.

^b This device senses signals generated from emergency vehicles equipped with sending units and changes the appropriate traffic lights to green in the direction the vehicle is traveling to assist them in crossing the intersection safely. Traffic lights in all other directions will be red.

INVESTIGATION

On April 27, 2004, at approximately 1735 hours, a call came in for a garage fire in a local township. Three fire departments, including the two involved in the crash, responded via automatic-aid response.^c The victim and two fire fighters responded in Unit 1. Three career fire fighters from another department responded in Unit 2. According to the state police report, at approximately 1742 hours, Unit 2 was heading east on R1 when it entered the intersection where the crash occurred. Unit 2 had a sending unit for the emergency traffic light control system and the traffic light was green as it entered the intersection. As Unit 2 crossed the northbound lane of the intersection, it was struck by an engine from the victim's department (Unit 1) just behind the enclosed cab ([Photo 1](#)). *Note: No speed estimates were available.* Upon impact, the victim (who was unrestrained) was thrown forward striking his head on the interior of the cab. Unit 1 then rotated clockwise approximately 180 degrees and rolled onto its left side. According to the police report, during this rotation, the victim was ejected through the windshield and landed on the northeast side of the intersection. As the front of the cab of Unit 1 collapsed inward ([Photo 2](#)), the legs of the driver (who was also unrestrained) were pinned between the seat and the dashboard causing crushing injuries. The driver of Unit 1 had to be extricated and hospitalized. The rear passenger of Unit 1, who was restrained, received minor injuries. He was taken to a local hospital where he was treated and released. After being struck, Unit 2 rotated clockwise about 320 degrees before coming to rest on the east side of the intersection facing northeast. The three fire fighters in Unit 2, who were wearing restraints at the time of the incident, had minor injuries. They immediately exited their apparatus to help the fire fighters in Unit 1. Later they were taken to a hospital where they were treated

and released. The victim was transported to a local hospital where he was pronounced dead on arrival.

^c A plan developed between two or more fire departments for immediate joint response on first alarms.¹

Cause of Death

The county medical examiner listed the cause of death as craniocerebral injuries with aspiration of blood within the lungs.

RECOMMENDATIONS/DISCUSSIONS

Recommendation #1: Fire departments should provide training to driver/operators as often as necessary to meet the requirements of NFPA 1451, 1500, and 1002. This training should incorporate specifics on intersection practices.

Discussion: In NFPA 1451, *Standard for a Fire Service Vehicle Operations Training Program*,¹ Chapter 5.3.1 states that fire department personnel must be trained in, and exercise applicable principles of, defensive driving techniques under both emergency and non-emergency conditions. Chapter 6.2.7.1 states that *procedures for emergency response must emphasize that the safe arrival of fire apparatus at the emergency scene is the first priority*. To reduce the risk of crashes and injury or death, Chapter 6.2.8 states that fire apparatus must come to a complete stop in a number of situations including red traffic lights, stop signs, negative right-of-way intersections, blind intersections, and when the driver cannot account for all lanes of traffic in an intersection.

The Volunteer Firemen's Insurance Services (VFIS)² recommends the following specific practices for controlled intersections such as existed in this incident (those controlled by a stop sign, yield sign, or yellow or red traffic lights):

- Scan the intersection for possible hazards, e.g., right turns on red and vehicles traveling fast. Do not rely on warning devices to clear traffic.
- Begin to slow down well before reaching the intersection and continue to scan in all directions.
- Change the siren cadence at least 200 feet from the intersection.
- Scan the intersection for possible passing options avoiding the use of the opposing traffic lane if possible.
- If the driver cannot account for traffic in all lanes in an intersection, he/she should bring the vehicle to a complete stop.
- Establish eye contact with other vehicle drivers.

Driver qualifications: NFPA 1500 *Standard on Fire Department Safety and Health Program*³ and NFPA 1002 *Standard for Fire Apparatus Driver/Operator Professional Qualifications*⁴ describe the requisite knowledge and skills individuals need to be a driver/operator. NFPA 1451, A.7.1.3¹ recommends the installation and use of intersection control devices to allow emergency vehicles to control traffic lights. If two apparatus have intersection control devices, the last to approach will get a red light. Accordingly, if they do not get a green light, drivers must assume that the system is working properly. They should approach the intersection cautiously coming to a complete stop.⁵

Frequency of training: NFPA 1451¹ states that departments should establish and maintain a driver training education program and each member should be provided driver training not less than twice a year. NFPA 1451¹ states that during the training each driver should operate the vehicle and perform tasks that he/she is expected to encounter during normal operations to ensure the vehicle is safely operated in compliance with all applicable State and local laws.

The victim's department has developed and enacted a comprehensive driver training program since this incident.

Recommendation #2. Fire departments should develop and enforce standard operating procedures (SOP) for seat belt usage, intersection practices, and response to mutual/automatic aid incidents.

Discussion: SOPs are directives or plans that establish how the organization will react in various situations to increase the effectiveness and ensure the safety of the fire fighting team. Standard vehicle operation procedures should include but not be limited to defensive driving techniques, seat belt use, and intersection practices. SOPs should be comprehensive and encompass training and procedures for incidents involving mutual and automatic aid. SOPs should be written, periodically reviewed, and enforced.

Seat belts: Fire departments should enforce SOPs on the use of seat belts. The SOPs should apply to all persons riding in emergency vehicles and should state that all persons on board must be seated and secured in an approved riding position whenever the vehicle is in motion.¹ In its publication *Safe Operation of Fire Tankers*,⁶ the USFA cites a Department of Transportation (DOT) study of seatbelt use which revealed the following statistics: 1) 75 percent of the people ejected from vehicles suffer fatal injuries; 2) 80 percent of fatalities in rollover incidents involve occupants being ejected from the vehicle; and 3) in a rollover incident, occupants are 22 times more likely to be thrown from the vehicle if they are not wearing their seatbelts. In addition to increasing the chance of surviving a crash, an operator who is properly secured by a seatbelt has a better chance of maintaining control of the vehicle in an emergency situation. The department in this incident has a mandatory seat belt usage policy which states that drivers and occupants must wear their seatbelts and drivers must follow state laws concerning motor vehicle

safety. Illinois has a seat belt law. Only one of the occupants in Unit 1 was wearing a seat belt.

Intersection practices: The SOPs should include defensive driving practices, particularly as they relate to intersections (see [Recommendation #1](#)).

Automatic/mutual aid response:⁷ Coordination of efforts is facilitated if response planning and training take place among mutual- and automatic-aid departments. Procedures and protocols that are jointly developed, and which have the support of the majority of participating departments, will greatly enhance overall safety and efficiency regarding emergency response. Once these procedures are agreed upon, training protocols must be developed and joint-training sessions conducted to relay appropriate information to all affected department members. To integrate the various personnel into a functional team, the departments should train together before an incident occurs.

NFPA 1710⁸ and 1720⁹ both address response to automatic/mutual aid incidents. NFPA 1720, Chapter 4.7.2, for example, states “Procedures and training of personnel for all fire departments in mutual aid, automatic aid, and fire protection agreement plans shall be comprehensive to produce an effective fire force and to ensure uniform operations.” NFPA 1620, *Recommended Practice for Pre-incident Planning*¹⁰ provides guidance to assist departments in establishing pre-incident plans. Pre-incident planning includes agreements formed by a coalition of all involved parties including mutual-and automatic-aid fire departments, EMS, and law enforcement personnel, to help ensure a coordinated response to emergency situations.

In this incident, three fire departments responded to the same alarm per an automatic aid agreement. The victim’s department did not have an SOP regarding automatic aid response.

REFERENCES

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5. IFSTA [1999]. Pumping apparatus driver/operator handbook, p. 70. Stillwater, OK: Fire

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6. USFA/FEMA [2003]. Safe operation of fire tankers. Emmitsburg, MD: U.S. Fire Administration
7. NFPA [2004]. NFPA 1201, Chapter 3.3.1.1: Standard for providing emergency services to the public. Quincy, MA: National Fire Protection Association.
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9. NFPA [2004]. NFPA 1720: Standard for the organization and deployment of fire suppression operations, emergency medical operations, and special operations to the public by volunteer departments. Quincy, MA: National Fire Protection Association.
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INVESTIGATOR INFORMATION

This investigation was conducted by Linda Frederick and Virginia Lutz, Safety and Occupational Health Specialists, Fire Fighter Fatality Investigation and Prevention Program, Division of Safety Research, Surveillance and Field Investigations Branch, NIOSH. The report was written by Linda Frederick.

DIAGRAM AND Photographs

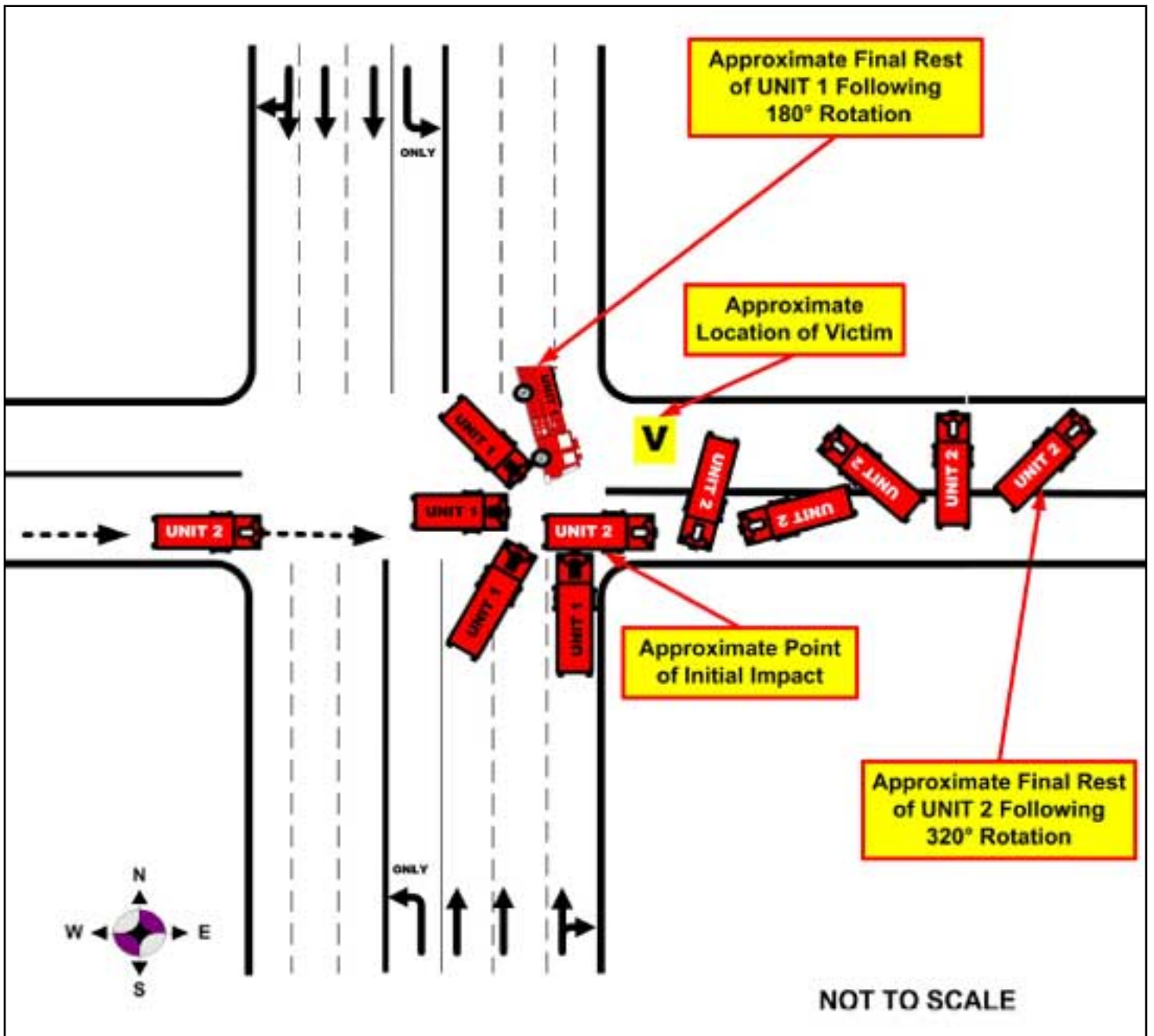


Diagram. Aerial view of intersection where crash occurred



Photo 1. View of Unit 2 which was struck on the passenger side



Photo 2. Crushed front end of Unit 1



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