



Career Fire Fighter Fatally Injured In Fall From Apparatus - Texas

SUMMARY

On April 23, 2005, a 27-year-old male career fire fighter (the victim) sustained a fatal head injury when he fell from an enclosed-cab quint^a. The incident occurred shortly after leaving the station while the truck was en-route to a reported structure fire. It is believed the victim reached to close a rear passenger door that had opened during a turn to the right, when he fell out of the quint and landed on the pavement. The victim was treated at the scene and transported to a local hospital by ambulance. He died two days later from his injuries.

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



*Victim seating area and door
Photo courtesy of the State Fire Marshal*

- *consistently enforce and repeatedly train members on standard operating procedures/ guidelines (SOPs/SOGs) that require all persons responding in emergency vehicles to be secured by seat belts or safety restraints at all times the vehicle is in motion*
- *ensure that all seating areas, including seat belts and doors, are inspected during routine maintenance checks and that safety concerns are documented and addressed*

Additionally manufacturers should:

- *ensure that fire apparatus design incorporates all applicable safety standards and that passenger doors are constructed to remain securely latched under conditions of normal and expected use*

INTRODUCTION

On April 23, 2005, a 27-year-old male career fire fighter (the victim) fell from a moving enclosed-

The **Fire Fighter Fatality Investigation and Prevention Program** is conducted by the National Institute for Occupational Safety and Health (NIOSH). The purpose of the program is to determine factors that cause or contribute to fire fighter deaths suffered in the line of duty. Identification of causal and contributing factors enable researchers and safety specialists to develop strategies for preventing future similar incidents. The program does not seek to determine fault or place blame on fire departments or individual fire fighters. To request additional copies of this report (specify the case number shown in the shield above), other fatality investigation reports, or further information, visit the Program Website at www.cdc.gov/niosh/fire/ or call toll free **1-800-35-NIOSH**

^a A quint is a fire apparatus equipped with a fire pump, water tank, ground ladders, and hose bed in addition to the aerial device.¹



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cab quint and subsequently died from his injuries on April 25, 2005. On April 27, 2005, the U.S. Fire Administration (USFA) notified the National Institute for Occupational Safety and Health (NIOSH) of this fatality. On June 14, 2005, a safety and occupational health specialist from the NIOSH Fire Fighter Fatality Investigation and Prevention Program investigated the incident. The NIOSH investigator met with a representative from the State Fire Marshal's office, the Chief of the department, District Chief, department Safety Officer, and crew members who were on the responding apparatus. The police report, autopsy report, training records of the victim, standard operating procedures (SOPs), dispatch sheets, and apparatus maintenance records were reviewed. The NIOSH investigator also met with police officers who investigated the incident.

Department The career department has approximately 220 fire fighters and serves an area of about 92 square miles. The department has ten fire stations that serve a population of approximately 185,000. The Safety and Health Division oversees a safety committee; administers a fitness and wellness program; specifies, maintains, and issues compliant protective equipment; and is responsible for implementing the department's respiratory protection program.

The department has a Maintenance Division that is staffed by a Master Mechanic who oversees repair and maintenance of all fire apparatus. Fire department apparatus are exempt from State inspection requirements; however, it is standard department procedure for fire fighters to perform weekly and monthly apparatus/equipment maintenance reports, in addition to daily maintenance checks.

Training and Experience The 27-year-old victim had successfully completed numerous training courses including National Fire Protection Association (NFPA) Fire Fighter Levels 1 and 2, Apparatus/Engine Operator, Hazmat, Search & Rescue, and he was a certified Emergency Medical Technician. He had two years of experience as a fire fighter.

Equipment The victim was riding in a 1998 quint with a 75 foot aerial ladder, 1500 gallon-per-minute pump, and 490 gallon water tank (Photo 1). The quint was being used as a reserve unit while the assigned truck was in the shop for maintenance. The fire department purchased the quint new in 1998. It was a custom cab with two front seats, two rear-facing crew seats, and one forward facing folding rear jump seat. The forward-facing rear seat was equipped with a three-point safety belt and the rear-facing seats had two-point lap belts.

According to the State Fire Marshal's report of the incident, the lap belt on the seat in which the victim was riding was retracted and not buckled. At the time of their investigation, the safety belt appeared to be in functional condition with no defects or other impediments to use. The quint was equipped with a safety belt monitoring system with an audible and visual alarm that would indicate if a safety belt was not fastened in an occupied crew seat. The monitoring system was not functioning and at least one seat sensor had been disabled.²

Road / Weather Conditions The incident occurred at approximately 2203 hours at an intersection of two city streets (Diagram). The asphalt road surface was clear and dry, and was illuminated by street lights. The apparatus made a right turn at the intersection, crossing a roadway depression



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that is designed to direct rainwater runoff toward the roadway perimeter. At the time the incident occurred civilian traffic was light. The temperature was approximately 48° F with a wind blowing from the southeast at approximately 16 miles per hour (mph).

INVESTIGATION

On April 23, 2005, at 2200 hours, a career fire department was dispatched to a report of a residential structure fire. The assigned truck was out of service for maintenance so the department's crew responded in a reserve quint. The quint left the station with a driver and officer in the front seats and two fire fighters seated in the rear-facing seats in the cab. The victim was seated behind the driver.

Upon leaving the station, the driver made a left turn at the end of the apron and traveled approximately 100 yards where he made a right turn and headed eastbound into a four lane city street (see Diagram). The fire fighter who was seated adjacent to the victim reported that the victim was in a semi-standing position and was possibly attempting to retrieve his air pack strap when the truck began the right turn. As the apparatus entered into the turn and dipped slightly due to the roadway depression, the rear passenger door came open. It appeared to the adjacent fire fighter that the victim reached to pull the door closed and lost his balance. The victim fell out of the truck and landed in the street striking his head on the pavement. In the side-view mirror, the driver saw the cab door open and heard the fire fighter who was seated behind the officer shout for him to stop the truck. He immediately stopped and all personnel on board rushed to the victim to begin emergency care.

The victim was alive but unresponsive and had sustained a serious head wound. Emergency

medical services personnel arrived on the scene within minutes and began advanced life support measures. The victim was transported to a local hospital where he died from his injuries two days following the incident.

CAUSE OF DEATH

The autopsy listed the cause of death as blunt force head injuries.

RECOMMENDATIONS / DISCUSSIONS

Recommendation #1: Fire departments should consistently enforce and repeatedly train members on standard operating procedures/guidelines (SOPs/SOGs) that require all persons responding in emergency vehicles to be secured by seat belts or safety restraints at all times the vehicle is in motion.

Discussion: NFPA 1500 Section 6.2.5 states that “drivers shall not move fire apparatus until all persons on the vehicle are seated and secured with seat belts,” and 6.3.2 states that, “seat belts shall not be released or loosened for any purpose while the vehicle is in motion.”³

There are several references to the use of seat belts within the department’s SOGs. The Apparatus Safety SOG states that “All personnel will be secured with seat belts before the apparatus responds. The officer and fire fighters shall don turnout coat, pants, and boots prior to getting on the apparatus. If the crew is already on the apparatus when they are dispatched to an emergency, personnel shall not remove seat belts or stand while the apparatus is moving. The proper PPE shall be donned upon arrival at the scene. Unless the SCBA can be donned and worn while the seat belt is being used, donning the SCBA should be postponed until the apparatus arrives on scene.”⁴

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Fire departments should ensure that specific seat belt or safety restraint guidelines not only are established and written, but are repeatedly trained upon and consistently enforced. Fire department line personnel should clearly understand what is required of them regarding the use of seat belts. Officers must enforce all established safety rules, including prohibiting the movement of a fire apparatus until all persons in the vehicle are seated and secured by a seat belt. NFPA 1451, Standard for a fire service vehicle operations training program,- contains the minimum requirements for a fire service vehicle operations training program. Section 8.3.6 states that “while the vehicle is in motion, the donning or doffing of equipment and personal protective clothing that requires removal of any restraining belt or device shall be prohibited.”⁵

Recommendation #2: Fire departments should ensure that all seating areas, including seat belts and doors, are inspected during routine maintenance checks and that safety concerns are documented and addressed.

Discussion: Every fire department should have SOPs/SOGs for a systematic apparatus maintenance program that includes evaluating each vehicle to determine if it is safe for emergency response.⁶ Guidelines should include programmed inspections which are conducted at regular intervals, as well as procedures for removing an apparatus from service until it is repaired and deemed safe for operation if a safety defect has been reported. The maintenance program should include daily, weekly, and periodic maintenance service checks. The daily maintenance check should follow the manufacturer’s handbook and should include items such as oil level, coolant level, batteries, visible and audible warning signals, fuel levels, and tires for wear, cuts and proper inflation.

Additionally, maintenance checks should include a visual inspection and operational testing of all safety equipment such as seat belts, doors, and existing safety monitoring systems. According to the State Fire Marshal’s report, the safety belt monitoring system on the apparatus was not functioning and at least one seat sensor had been disabled at the time of this incident. Even though safety monitoring systems on apparatus are not required, if installed, they should be maintained in operable condition to enhance personnel safety and avoid a false perception of safety.²

The quint in this incident had a history of the passenger doors not latching securely and coming open while the apparatus was moving. Maintenance records reveal that department personnel reported the issue to the manufacturer, and records show that the quint was taken out of service because of the door latch failure on numerous occasions dating back to 1998 when it was purchased new. However, many attempts to conclusively resolve the issue were unsuccessful.

Recommendation #3: Manufacturers should ensure that fire apparatus design incorporates all applicable safety standards and that passenger doors are constructed to remain securely latched under conditions of normal and expected use.

Discussion: The safety of responding emergency personnel should be paramount. Prudent safety procedure directs us to “engineer out” an existing hazard where possible. If an engineered resolution cannot be achieved, administrative controls should be put in place to prevent injury or death. In this incident, the department’s attempts to have the door hazard mitigated were unsuccessful; however, strict adherence to, and enforcement of, their seat belt policy would have been a successful control.

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The National Highway Traffic Safety Administration, Office of Vehicle Safety Compliance,⁷ recommends that “apparatus manufacturers should ensure that all passenger compartment doors are designed with components capable of meeting the performance requirements in the new global technical regulation (gtr) for doors systems (see <http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29registry/ECE-TRANS-180a1e.pdf>). The gtr was developed and adopted by the United States and other international communities on November 18, 2004.⁸ Since that time, the United States Department of Transportation issued a subsequent notice of proposed rulemaking to adopt the gtr into the US door standard (see http://dmses.dot.gov/docimages/pdf90/308246_web.pdf)”.⁹

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INVESTIGATOR INFORMATION

This incident was investigated by Virginia Lutz, Safety and Occupational Health Specialist, NIOSH, Division of Safety Research, Surveillance and Field Investigation Branch.



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*Photo 1. Type of quint involved in the incident
Photo courtesy of the State Fire Marshal*



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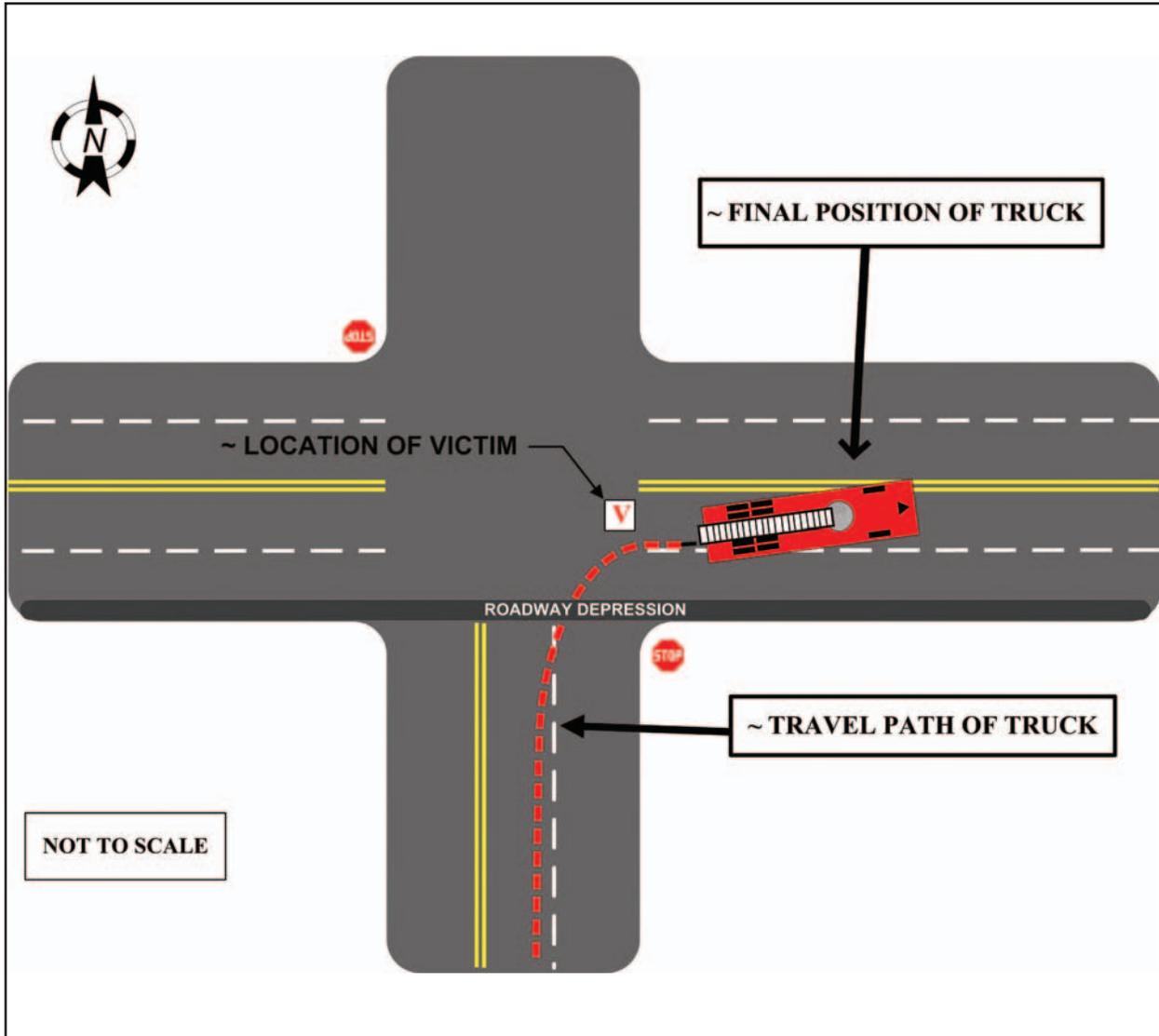


Diagram. Incident Scene

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