



A Captain and a Fire Fighter Die From Injuries in a Tanker Rollover - Indiana

SUMMARY

On October 28, 1999 a 57-year-old Captain (Victim #1), and a 23-year-old fire fighter/driver (Victim #2) from a volunteer fire department died, after the tanker they were responding in veered off the road, and then turned over and rolled several times in a corn field. The incident occurred while they were responding in Tanker 3 to a mutual aid call which had been dispatched as a grass fire, and which threatened nearby structures. The tanker was traveling west on a two-lane state road (Photo #1). As it approached the curve, the driver (Victim #2) lost control of the tanker. It drifted towards the shoulder of the road, as the driver tried to correct the direction of travel. Just past the curve it veered off the road and into a corn field. The tanker rolled on the passenger side (Victim #1's side), and continued to roll several times (Photo #2). Victim #2 was ejected out the driver's side window. Victim #1 was entrapped in the crushed upside-down cab and had to be extricated. He was transported to a local hospital and remained conscious and able to communicate, but died 7 days after the incident. Victim #2 was transported by ambulance to a local

hospital then flown by life flight helicopter to a trauma center. He remained hospitalized and was conscious, but was unable to communicate and died 86 days after the incident.

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

- **ensure that operators of emergency vehicles operate them in a safe condition to avoid a skid**
- **ensure that all fire fighters riding in emergency fire apparatus are wearing and are belted securely by seat belts**
- **develop and follow standard operating procedures (SOPs) for safe operation of emergency vehicles.**

Although there is no evidence that they contributed to this fatal event, Recommendations #4, #5, and #6 are being provided as a reminder of good safety policy.



Incident Scene

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. 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:

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- *develop and document an inspection, maintenance, and repair schedule for fire apparatus*
- *establish and maintain proper scene control and management*
- *ensure that all fire fighters have attended and successfully completed the minimal fire fighter training requirements required by their state and/or department.*

INTRODUCTION

On October 28, 1999, a 57-year-old Captain (Victim #1) and a 23-year-old fire fighter/driver (Victim #2) died from injuries they received in a tanker rollover that occurred while responding to a mutual aid call for assistance on a grass fire, which was threatening structures. On November 4, 1999, the U.S. Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On February 9, 2000, two Safety and Occupational Health Specialists from NIOSH, Division of Safety Research, investigated the incident. They obtained a copy of the witnesses' statements, police report, training records, photos, standard operating procedures (SOPs), and death certificates. Interviews were conducted with patrolmen from the county sheriff's department, the Fire Chief of the department involved in this incident, and officers and fire fighters from other departments which responded to the incident. The volunteer fire department involved in the incident serves a population of 3,600 in a geographic area of 30 square miles and is comprised of 23 volunteer fire fighters. The tanker in this incident was a 1994 GMC, and had a 1,800-gallon elliptical water tank manufactured by U.S. Tank, that was equipped with baffles. The gross vehicle weight was 32,499 lbs., this included the weight of the fully loaded water tank, which was full at the time of the incident. The department's members perform a monthly visual inspection of all

the equipment and apparatus. Approximately 2 weeks prior this incident, a visual inspection had been performed by the department's members on the tanker. There were no written monthly inspection or annual maintenance records kept for the tanker.

The annual maintenance of the tanker was performed by a local garage. In the State where this incident occurred, there were no requirements for a special class or type of driver's licence, or a required state vehicle inspection for this type of fire apparatus. The department requires all fire fighters to complete the State of Indiana requirements for fire fighters, which consist of a mandatory 24 hours of training. Victim #1 had completed the requirements from the State of Indiana to be a fire fighter. Victim #2 had not completed the requirements to be a fire fighter. The department in this incident requires drivers to be at least 21 years of age, and to demonstrate their driving skills to a fire department officer before being qualified to drive an apparatus. Both Victim #1 and Victim #2 had met the department's driver training requirements. Victim #1 had 17 years of volunteer fire fighting experience, 5 of those years with the department involved in this incident. Victim #2 had 2 years of volunteer fire fighting and driving experience with the department.

INVESTIGATION

On October 28, 1999, central dispatch received a call about a grass fire that was threatening structures. At 1354 hours Tanker 3 responded as mutual aid with a Captain (Victim #1) riding in the officer seat, and a fire fighter/driver (Victim #2). The tanker was traveling west on a two-lane state road, approximately 2 miles from the fire station (Photo #1). The posted speed limit was 55 miles per hour (mph) with a posted caution speed of 40 mph at the curve. The weather conditions were clear, sunny and approximately 79° F. As the tanker approached the curve, the driver (Victim #2) lost control of the tanker and it skidded off the road, and rolled into a



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corn field. *Note: The sheriff's department estimated that the tanker rolled several times. The speed of the tanker could not be determined. However the speed was estimated by the investigating county sheriff patrolman to be approximately 55mph, which was above the posted caution speed of 40 mph for the curve.* The incident was witnessed by a civilian motorist, who was stopped at a crossroad. The witness saw the tanker, traveling westbound with flashing lights on, drift to the outside (northern) edge of the road until the right front tire hit the graveled shoulder of the road. The driver (Victim #2) then tried to correct the tanker's direction of travel, but the tanker continued to drift north off the road past the curve, and the tanker rolled over on the passenger (Victim #1's) side into a corn field (Photo #2). Victim #2 was ejected, and it is believed he exited the tanker through the driver's side window. *Note: The driver's side window was believed to be in the down position at the time of the incident.* The witness called 911 to report the incident. Central dispatched the call at 1412 hours to the county sheriff's department, as a motor vehicle incident with property damage and no injuries. Once on the scene a patrolman from the county sheriff's office did a quick survey of the scene and observed the fire department tanker upside down in a corn field approximately 34 feet from the hard-graveled shoulder of the road. The patrolman also observed an unconscious fire fighter (Victim #2) lying on his back with no visual injuries. Victim #2 was approximately 9 feet from the hard shoulder of the road in a ditch along the road, approximately 35 feet from the tanker. A civilian bystander, who was a nurse and already on the scene, told the patrolman that there was a fire fighter trapped in the tanker. The patrolman asked the civilian nurse to remain with the ejected fire fighter (Victim #2). The patrolman then went over to check on the fire fighter (Victim #1) in the tanker. The patrolman made verbal contact with Victim #1, trapped in the tanker. Victim #1 was conscious and

able to respond to questions. He was lying across the tanker's front seat, face down on the driver's side, with his right arm pinned behind the seat. The patrolman asked Victim #1 about his condition, and he replied he was pinned in the cab and his right arm was in an awkward position. The patrolman located a second bystander on the scene, who was also a nurse, and requested that he remain at the tanker with Victim #1 and keep in verbal communication with him. The patrolman radioed central dispatch that the incident involved two injuries, one critical (Victim #2), and one entrapped (Victim #1). The patrolman made the request to central dispatch, for heavy extraction equipment, and additional police units to provide scene and traffic control, and for a heavy duty wrecker. Central dispatched 2 ambulances, a mutual aid volunteer department to provide extrication, and additional police units, at 1413 hours. The mutual aid volunteer department responded with Engine 2, with one fire fighter/driver, a Chief, and an Assistant Chief. Also responding was Rescue Truck 10 with a fire fighter/EMT. A career fire department, which has a station in the vicinity of the incident, was monitoring the radio traffic and called central dispatch to offer assistance with their heavy rescue truck. Central dispatch radioed the patrolman on the scene to see if the extra assistance could be used, and the patrolman confirmed that the additional assistance was needed. The career fire department responded with a Battalion Commander and two fire fighters in Rescue Truck 3, and two fire fighters and a Captain on Engine 4. The Chief of the volunteer department involved in the incident was responding to the mutual aid grass fire in his privately owned vehicle (POV) when he heard that his department was involved in the motor vehicle incident, and consequently decided to respond to the motor vehicle incident. The first ambulance on the scene began patient assessment on the ejected fire fighter (Victim #2), loaded him into the ambulance and tried to stabilize him before transporting to the local hospital. Once at the local



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hospital, it was decided to life flight Victim #2 to a trauma center in a neighboring state. Once on the scene, the Chief from the department involved in the incident made contact with the patrolman and was given an update of the situation. The Chief then went over to the tanker and began verbal communication with Victim #1. Rescue 3 arrived on the scene and conducted a size up and began to unload equipment off the Rescue truck. Truck 10 arrived on scene, and the Chief from Truck 10 assumed the role of the Incident Commander (IC). The Assistant Chief did a quick assessment of the scene. *Note: There were a large number of fire fighters and emergency personnel who had responded in privately owned vehicles (POV's) from the surrounding communities. They were near to the tanker, trying to watch and offer assistance, which at times caused crowding and confusion.* A second ambulance arrived on the scene and one of the Emergency Medical Technicians (EMTs) took on the role of communicating with Victim #1 (Photo #3). The Assistant Chief from Truck 10 removed air bags from the rescue truck, and members from both departments used air bags to slowly raise the driver's side of the tanker approximately 2 to 4 inches. They also used cribbing, spreaders, and cutters from the jaws of life to extricate the victim. The EMT who kept in communication with Victim#1 during the extrication process, entered the cab to do a patient assessment, and to help direct the fire fighters and assist with the removal of Victim #1. The extraction took approximately 45 minutes. Victim #1 was removed from the tanker by the fire fighters and emergency personnel and loaded into the second ambulance. In the ambulance, paramedics and EMTs stabilized Victim #1 prior to transporting him to the local hospital. Victim #1 remained hospitalized and died 7 days after the incident. Victim #2 remained hospitalized and was conscious, but unable to communicate after the incident, and died 86 days after the incident.

CAUSE OF DEATH

According to the death certificates, the cause of death of Victim #1 was cardiac arrhythmia, 7 days after the motor vehicle incident. Victim #2 died due to sepsis, 86 days after the motor vehicle incident. *Note: Sepsis is a serious infection caused by bacteria that has entered a wound or body tissue and that leads to the spread of the bacteria in blood.*

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Fire departments should ensure that operators of emergency vehicles operate them in a safe condition to avoid a skid.¹

Discussion: At all times the vehicle's operator should be in control of the vehicle and take into consideration the speed of the vehicle while responding to an emergency incident. Operating and controlling the vehicle at a speed from which the vehicle could be safely slowed or stopped could decrease the potential for a skid and loss of control. The most common causes for skids are driving too fast for road conditions, failing to properly appreciate weight shifts of heavy emergency vehicles/apparatus, and failing to anticipate obstacles. If the vehicle goes into a skid, the proper response is to release the brakes, allowing the wheels to rotate freely. The steering wheel should be turned so that the front wheels face in the direction of the skid, and to let up on the accelerator gradually. If using a standard transmission, the clutch should not be released until the vehicle is under control. Another key factor for skid prevention is proper maintenance of tire air pressure and adequate tread for tires. The tanker in this incident was estimated to be going the posted speed limit of 55 mph. However, the tanker may have been traveling at an excessive speed given the weight shifting of the 1,800 gallons of baffled water and the posted caution speed of 40 mph for the curve.

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Operators should always maintain a safe speed to avoid losing control of the vehicle. Apparatus drivers/operators must also be aware of the weight carried on the fire apparatus, which can contribute to skidding or possible rollover due to excessive weight or unequal weight distribution. These hazardous conditions can result from excessive speed in turns, harsh or abrupt steering action, or driving on slopes too steep for a particular apparatus.

Recommendation #2. Fire departments should ensure that all fire fighters riding in emergency fire apparatus are wearing and are belted securely by seat belts.^{2,3}

Discussion: Fire fighters make many life-and-death decisions during a tour of duty, and one of the most important is snapping on a seat belt after climbing aboard an emergency apparatus that has been called to respond. The fire department involved in this incident had no written or enforced policy on the use of seat belts at the time of the incident. Victim #2 was not wearing a seat belt and was ejected from the tanker. The Chief of the department involved in this incident was told by Victim #1 that he had his seat belt on. After further evaluation, it is undetermined whether Victim #1 was wearing a seat belt. However, it is believed that Victim #1 was not wearing a seat belt due his position in the cab of the tanker after the rollover, in which he was lying across the tanker's front seat, face down on the driver's side with his right arm pinned behind the seat. Additionally, none of the responders remembered removing Victim #1's seat belt, and photos taken after the incident of the interior of the tanker's cab show the passenger seat belt to be fully intact and in the original retractable position.

Recommendation #3: Fire Departments should develop and follow Standard Operating Procedures (SOPs) for safe operation of emergency vehicles.^{1,4,5}

Discussion: Drivers/operators of emergency vehicles are regulated by State laws, city ordinances, and departmental policies. All members of the department should know and be familiar with departmental policies and procedures as they relate to fire emergency vehicles. All drivers should have a thorough knowledge of the rules governing speed for emergency vehicles in their own jurisdictions and the jurisdictions of their mutual aid partners. Fire departments should develop SOPs for the safe operation of emergency vehicles, which include all department policies, ordinances, procedures, and any laws that pertain to that State and/or department. The SOPs should be made available to all vehicle operators and should be implemented into training. Developing and following SOPs for safely driving fire department vehicles during non-emergency travel and emergency response include, but are not limited to, specific criteria for maintaining appropriate vehicle speed, crossing intersections, traversing railroad grade crossings, use of seat belts and using emergency warning devices. Such procedures for emergency response emphasize that the safe arrival of fire department vehicles at emergency scenes is the first priority.

Although there is no evidence that they contributed to this fatal event, Recommendations #4, #5, and #6 are being provided as a reminder of good safety policy.

Recommendation #4: Fire departments should develop and document an inspection, maintenance and repair schedule for fire apparatus.⁵

Discussion: The apparatus driver/operator or persons responsible for the maintenance and readiness of the apparatus should establish a system of record keeping for reference and review of the need for preventive maintenance. Fire department vehicles need to be inspected at least weekly, within 24 hours after any use or repair, and prior to being placed in service or

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used for emergency purposes, to identify and correct unsafe conditions. This inspection should include tires, brakes, warning lights, wipers, and mirrors. The apparatus should be started and the operation of pumps and other equipment should be verified. Fluid levels should also be checked. The department in this incident performed monthly apparatus inspections, however, did not retain any type of documentation to reflect the results. Maintenance of the apparatus was not revealed as a contributing factor to the incident. This recommendation is provided for the purpose of bringing focus to the importance of maintenance being regularly scheduled and documented. The proper care, inspection, and maintenance of fire apparatus are crucial to its safe arrival and subsequent use by a fire fighter.

Recommendation #5: Fire departments should establish and maintain proper scene control and management.⁶

Discussion: Proper scene control and management reduces congestion and confusion by reducing the number of personnel within the perimeter of the emergency scene. Crowd control is essential to proper scene management. This function is usually the responsibility of the law enforcement agency on the scene. However, this duty could be performed by fire fighters or other rescue personnel. It is the responsibility of the Incident Commander (IC) to ensure that the scene is secured and properly managed. Emergency scenes tend to involve emotional situations that should be handled with care. This is particularly true when friends or relatives of the victims are at the scene. In this incident, there was a large number of fire fighters and emergency personnel who had responded in privately owned vehicles (POVs) from the surrounding communities. They were watching and offering assistance, which at times caused overcrowding and confusion. Cordoning off the area will keep bystanders, nonessential fire fighters and emergency personnel a

safe distance from the scene and out of the way of the emergency personnel performing the necessary actions and duties. Cordoning can be done with rope or fireline tape affixed to signs, utility poles, or any other objects readily available. Once the area has been cordoned off, the boundary should be monitored to ensure people do not cross the line.

Recommendation #6. Fire departments should ensure that all fire fighters have attended and successfully completed the minimal fire fighter training requirements required by their state and or department.^{3,6,7}

Discussion: Fire fighting requires skill in preventing, combating, and extinguishing fires; answering emergencies calls; and operating and maintaining fire department equipment and apparatus. A fire fighter must be an individual who can perform many functions. To function effectively, a fire fighter must have certain knowledge and skills. The State of Indiana, where this incident occurred, requires a minimum twenty-four (24) hours of training for all full-time and volunteer fire fighters. Victim # 2 did not meet those minimum state training requirements to be a fire fighter. However, he had completed the fire department's requirements to be a driver.

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INVESTIGATOR INFORMATION

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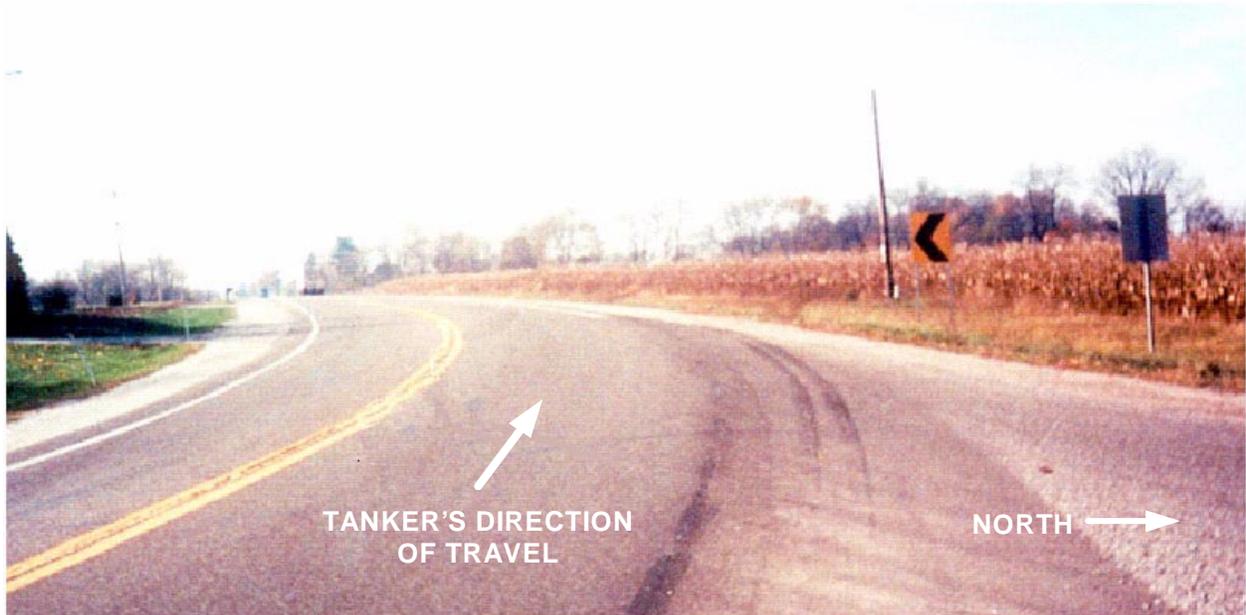


Photo 1. View of Curve Traveling West Where Tanker Veered Off Road and Rolled Over



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Photo 2. Tanker Involved in This Incident



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Photo 3. Incident Scene

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