99 F-44
NIOSH
Fire Fighter Fatality Investigation and Prevention Program

Death in the line of duty...

A Summary of a NIOSH fire fighter fatality investigation *May 18, 2000*

Motor-Vehicle Incident Claims Life of Volunteer Fire Fighter Who Was Responding to Alarm - Ohio

SUMMARY

On September 13, 1999, a 29-year-old male volunteer fire fighter was killed as a result of injuries sustained in a motor-vehicle incident that occurred while he was responding to a kitchen fire at a local residence. Central Dispatch notified the fire department at 0656 hours of a kitchen fire, and at 0659 hours, the driver of Engine 81 notified Central Dispatch that he was leaving the station to respond to the alarm. The victim left his residence in his privately owned vehicle (POV). It is believed that he was heading directly to the fireground, and as he approached the fireground, he saw that no apparatus had arrived on scene. He was proceeding to the fire station to obtain the apparatus when his POV collided with a tandem dump truck that was turning onto the road he was traveling. The driver of the dump truck had stopped at a stop sign and when he looked for oncoming traffic, he saw the victim's vehicle approximately 450 feet away. As he started to turn left, the driver of the dump truck realized the victim's vehicle was quickly coming toward him. In an attempt to avoid a collision, the driver stopped the dump truck. Due to a tall corn field near the roadway, the victim may not have seen the truck until the collision. The victim's vehicle struck the dump truck's front axle, and the victim was killed instantly. At 0702 hours, the driver of Engine 81 informed Central Dispatch of a motor-vehicle incident at an intersection near the fire station which involved a tandem dump truck and the POV of a fellow fire fighter. After approximately 40 minutes of extrication, the victim was removed from the vehicle and was pronounced dead at the scene by the local coroner.

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

- ***develop standard operating procedures as they relate to responding to or returning from an alarm and monitor to ensure their use***
- ***provide defensive driver training to all emergency vehicle operators***
- ***ensure that all drivers are trained and certified in emergency vehicle operations***

Vehicles Involved in Incident

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:

http://www.cdc.gov/niosh/firehome.html

or call toll free **1-800-35-NIOSH**

Motor-Vehicle Incident Claims Life of Volunteer Fire Fighter Who Was Responding to Alarm - Ohio

INTRODUCTION

On September 13, 1999**,** a 29-year-old male volunteer fire fighter died from injuries sustained in a motor-vehicle incident that occurred while he was responding in his privately owned vehicle (POV) to a kitchen fire at a local residence. The victim's POV collided with a three-axle tandem dump truck, and he was killed instantly.

On October 7, 1999, the United States Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of the incident. On December 6-8, 1999, two Occupational Safety and Health Specialists from NIOSH, Division of Safety Research, investigated the incident. Interviews were conducted with the Chief and other members of the fire department and members of the Sheriff's Department, all of whom were directly involved with the investigation of the incident. The incident site was visited and photographed. Copies of witness statements, training records, standard operating procedures (SOPs), the death certificate, a map of the incident site, and photos were obtained. The volunteer department consists of one station and 33 uniformed fire fighters. The department serves a population of 1,800 in a geographic area of 21.5 square miles.

The incident occurred at the intersection of a state road approximately ½ mile from the fire station. The road was a standard two-lane asphalt road with a dashed center line in the eastbound lane (the direction of the victim's travel), a solid yellow line in the westbound lane and white fog lines separating the road edge from the shoulder. The posted speed limit is 55 mph. The intersection where the incident occurred was partially obscured by a corn field. The weather conditions at the time of the incident were as follows: a relative humidity of 97%, an ambient air temperature of 64° F, and a visibility of 4.0 miles. The road was wet from light rain at the time of the incident.

The victim's POV was a 1989 Cadillac DeVille. His POV was equipped with a single-mounted red deck light, which met the requirements in the Ohio Revised Code Section 4511.45. At the time of the incident the victim was wearing his seat belt (lap and shoulder). The dump truck was a 1974 GMC Brigadier. It had three axles and a gross vehicle weight rating (GVWR) of 54,500 lbs. At the time of the incident, the truck was carrying 18 tons of stone, causing it to be over its weight limit by 3,800 lbs. The truck was not equipped with a seatbelt (lap or shoulder).

The State requires that all fire fighters complete a 36-hour course titled Introduction to Fire Attack. The fire department offers various in-house training opportunities. The victim had received the following training: Hazardous Material, Class A Foam, Weather Spotter, Weather Training, Search and Rescue, and CPR. The victim had 5 years of fire fighting experience.

INVESTIGATION

On September 13, 1999, at 0655 hours, a local resident reported a kitchen fire to Central Dispatch, who notified the fire department at 0656 hours. At approximately 0657 hours, a fire fighter (the victim) was en route by his privately owned vehicle (POV) to the fire station to obtain an apparatus. From interviews conducted, it is believed that the victim was heading directly to the fireground. As he approached the scene, he saw that no apparatus had arrived, so he proceeded to the fire station to obtain the apparatus.

The victim was traveling eastbound on a two-lane state highway. A tandem dump truck was stopped at the stop sign of a road that intersected the one on which the victim was traveling. The driver of the dump truck started a left turn, heading westbound onto the road the victim was traveling. *Note: The intersection was partially obscured by a corn crop*

planted in the area bordering this intersection. The corn was approximately 6 feet in height (see Figure 1). The driver of the dump truck stated that when he was stopped at the stop sign, he saw the victim's vehicle with its headlights turned on approximately 450 feet away. As he proceeded into the intersection, he stopped the dump truck when he noticed the victim quickly approaching. The victim collided with the front axle of the dump truck. *Note: The driver of the dump truck recalled seeing the victim's red light only when the victim was in close proximity. It is believed that the victim activated his light and siren when he saw the dump truck at the intersection.* At 0659 hours, the driver of Engine 81, en route to the fire, noticed a large dump truck stopped in the middle of an intersection approximately 1/4 mile in front of him. Approaching the intersection, he advised Central Dispatch of a motor vehicle incident involving a large dump truck and a full-size automobile. The vehicle involved in the incident was that of a fellow fire fighter (the victim). He requested a mutual aid department be sent to the fire while he responded to the motor vehicle incident. At approximately 0704 hours, a fire fighter (Fire Fighter #1) en route to the original call of a kitchen fire, arrived by POV at the motor-vehicle incident site. At this time the driver of Engine 81 notified Central Dispatch to ask the local EMS and a back up department to respond to the motor-vehicle incident. Fire Fighter #1 was instructed by the driver of Engine 81 to go to the station approximately ½ mile away to get the Brush Truck which contained the jaws-of-life. The driver of Engine 81 approached the vehicle and found that the victim had no pulse and was unresponsive. At approximately 0707 hours, the local EMS and Fire Fighter #1 returning with the Brush Truck, arrived simultaneously at the incident site. The driver of Engine 81 and a member of the local EMS removed the jaws-of-life from the Brush Truck and began extrication. At approximately 0709 hours, two trucks from a neighboring fire department notified Central Dispatch that they were en route to the incident. During the extrication the driver of Engine 81 requested that one of the members from the backup department apply a hydraulic ram to the vehicle to straighten the frame to aid in the extrication of the victim. The extrication continued for approximately 40 minutes. Before the extrication was complete, the coroner arrived and pronounced the victim dead at the scene.

CAUSE OF DEATH

The death certificate lists the cause of death as multiple fractures (skull, spine, ribs, and feet) with internal bleeding due to blunt impact to the head and body.

RECOMMENDATIONS AND DISCUSSION

Recommendation #1: Fire departments should develop standard operating procedures as they relate to responding to or returning from an alarm and monitor to ensure their use.[1,2]

Discussion: Driver/operators of emergency vehicles are regulated by State laws, city ordinances, and departmental policies. All members of the department should study and be familiar with departmental policies and procedures as they relate to fire emergency vehicles. Department policies state that when responding to emergencies, all traffic laws must be observed. All drivers should also have a thorough knowledge of the rules governing speed for emergency vehicles in their own jurisdictions and the jurisdictions of their mutual-aid partners. Unless specifically exempt, emergency vehicle driver/operators are subject to any statute or ordinance that governs any vehicle operator. Statutes usually describe those vehicles that are in the emergency category; this classification usually covers all fire department vehicles when responding to an emergency.

Recommendation #2: Fire departments should provide defensive driver training to all emergency vehicle operators.[1]

Discussion: Sound defensive driving skills are one of the most important aspects of safe driving. To aid the department in its defensive driver training, every driver/operator should be familiar with the basic concepts of defensive driving, including

Anticipating Other Drivers' Actions

The driver/operator should know the rules that govern the general public when emergency vehicles are on the road. Most laws or ordinances provide that other vehicles must pull toward the right and remain at a standstill until the emergency vehicle has passed. This does not guarantee that people will follow this procedure. Some drivers may panic at the sound of an approaching siren; others may be unable to hear the siren due to radios, closed windows, or loss of hearing; while others may simply ignore warning signals.

Intersections are the most likely place for an incident to occur. When approaching an intersection, the driver/operator should slow the emergency vehicle to a speed that allows a complete stop in the intersection if necessary. The emergency vehicle should be brought to a complete stop if obstructions, such as buildings or trucks, block the driver/operator's view of the intersection. The emergency vehicle should only proceed if the driver can account for all lanes and ascertains that it is safe to proceed. In this incident the victim's visibility was obstructed due to the time of day that the incident occurred (0655 hours), the weather (minimal fog with a slight dew on the road surface), and the decreased visibility of the intersection due to the crops (corn) planted in the fields bordering this intersection.

Visual Lead Time

Visual lead time interacts directly with reaction time and stopping distances. As stated in the International Fire Service Training Association (IFSTA), Fire Department Pumping Apparatus; by "aiming high in steering" and "getting the big picture" it is possible to become more keenly aware of conditions that may require slowing or stopping. The driver/operator is responsible for 360-degree driving.

Braking and Reaction Time

Speed directly affects the distance required to stop a vehicle. A driver/operator should know the total stopping distance of the emergency vehicle/apparatus. The total stopping distance is the sum of the driver/operator reaction distance and the vehicle braking distance. The driver reaction distance is the distance a vehicle travels as the driver is transferring the foot from the accelerator to the brake pedal after perceiving the need for stopping. The braking distance is the distance the vehicle travels from the time the brakes are applied until it comes to a complete stop.

Combating Skids

Avoiding conditions that lead to skidding is as important as knowing how to correct skids once they occur. The most common causes for skids are traveling too fast for road conditions, failing to properly appreciate weight shifts of heavy emergency vehicles/apparatus, and failing to anticipate obstacles. Proper maintenance of tire air pressure and adequate tread standards for tires are crucial for skid prevention.

Evasive Tactics

During an evasive maneuver, drivers' hands should not leave the steering wheel. Drivers should not lean or sway back and forth in the seat, and they should

use their arms to steer the emergency vehicle/ apparatus. Drivers should look ahead of the stopped vehicle, concentrating on where they want to be, not where they do not want to be. In the event of a panic stop by a vehicle ahead, drivers should pass the vehicle on the left side because the driver's likely next move is to pull to the right, as is generally required by law.

Weight Transfer

The effects of weight transfer must be considered in the safe operation of emergency vehicles/apparatus. Weight transfer occurs as the result of physical laws that state that objects in motion tend to stay in motion; objects at rest tend to remain at rest. Whenever a vehicle undergoes a change in velocity or direction, weight transfer takes place relative to the severity of the change.

Recommendation #3: Fire Departments should ensure that all drivers are trained and certified in emergency vehicle operations.[1]

Discussion: All emergency vehicle drivers should be trained in the safe operation of emergency vehicles. This training should be completed by following a protocol of classroom (written tests and videos) and hands-on (vehicle operations/procedures) experience. Emergency vehicle operators need realize that most driving regulations pertain to dry, clear roads. Driver/operators should adjust their speed to compensate for conditions such as wet roads, darkness, fog, or any other condition that makes normal emergency vehicle operations more hazardous.

REFERENCES

1. International Fire Service Training Association [1998]. Fire department pumping apparatus. 7th ed. OK: Oklahoma State University, Fire Protection Publications.

2. National Fire Protection Association [1977]. NFPA 1451, Standard for a fire service vehicle operations training program. Quincy, MA: National Fire Protection Association.

INVESTIGATOR INFORMATION

This investigation was conducted by Kimberly L. Cortez and Thomas P. Mezzanotte, Safety and Occupational Health Specialists, NIOSH, Division of Safety Research, Surveillance and Field Investigations Branch.

Figure 1. *Incident Site: Intersection*

Figure 2. *Vehicles Involved*

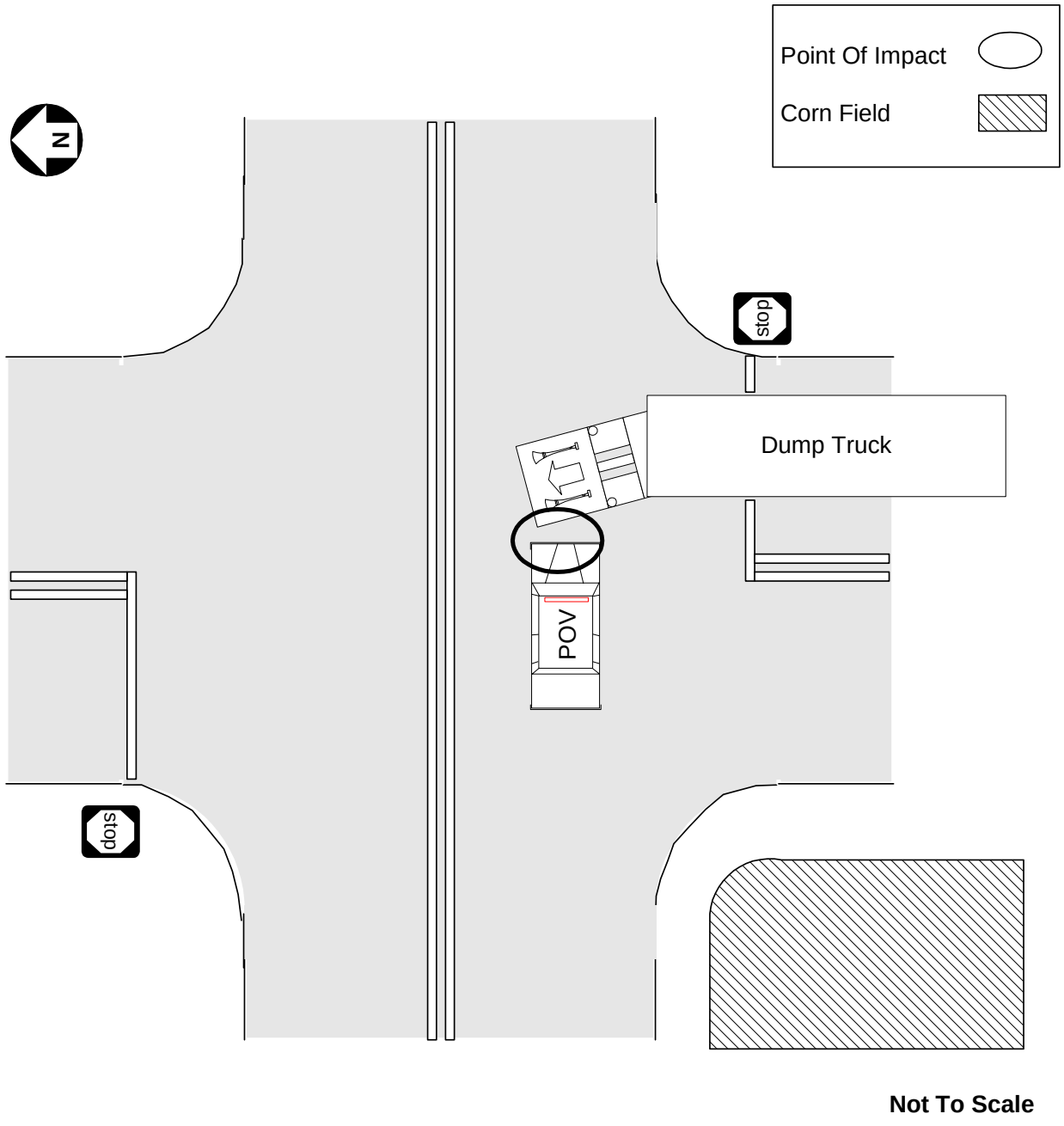

Figure 3. *Aerial View*