



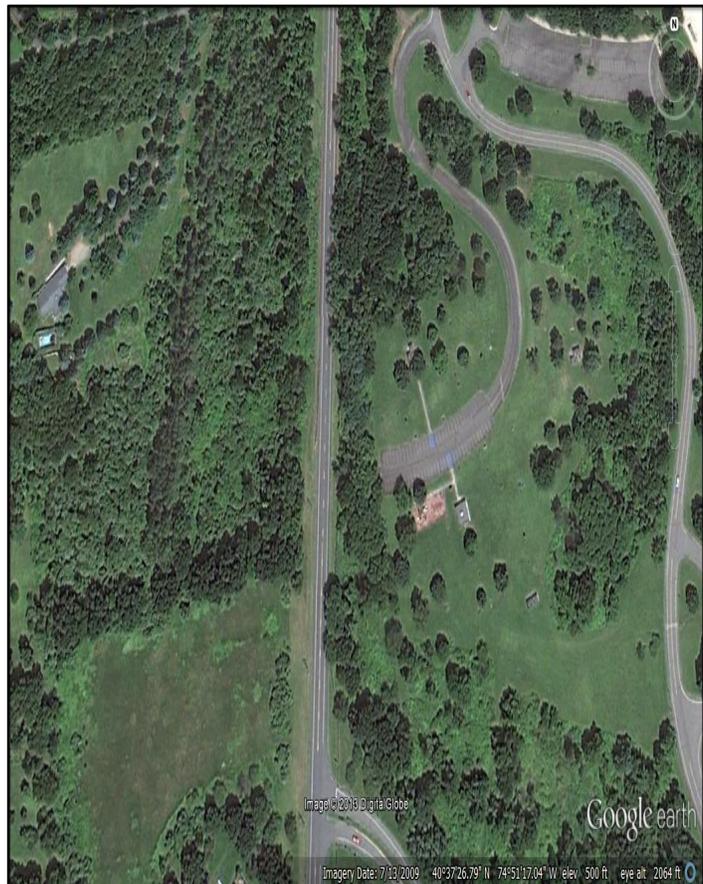
## **Forest Fire Service Fire Fighter Monitoring Prescribed Burn from Roadway is Struck and Killed When Smoke Obscures Visibility Following a Wind Shift —New Jersey**

### **Executive Summary**

During a prescribed burn on March 28, 2013, a 35-year-old male state forest fire service hourly fire fighter (the victim) lost his life after being struck by a motorist. The victim, working alone but in close proximity to his other crew members, was monitoring a prescribed burn from an adjacent roadway while in his state forest fire service vehicle. For an unknown reason, the victim, exited this vehicle and walked onto the roadway. Even though signs had been placed to warn motorists approaching from different directions of an ongoing prescribed burn, the victim was struck by a passing motorist because smoke from the prescribed burn had obscured visibility. Lifesaving measures were immediately started and the victim was transported to a local hospital where he was pronounced dead.

### **Contributing Factors**

- *Victim working in unprotected travel lane*
- *Inconspicuousness of the victim*
- *Smoke-obscured roadway*
- *Shifting winds in the burn area*



**Aerial view of section of roadway where incident occurred.**

*(Adapted from Google Earth® satellite image.)*

### **Key Recommendations**

- *Forest fire services should ensure that personnel receive proper training and have sufficient equipment and that appropriate procedures are in place for operating on or near roadways*

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- *Forest fire services should ensure that safety circulars or standard operating procedures providing guidance on identifying and the importance of remaining in a safe location while working in or near moving traffic are implemented and enforced*
- *Forest fire services should establish pre-incident plans and agreements regarding traffic control incident management with local fire departments, EMS, law enforcement, local or state departments of highways, and other public and private sector responders*
- *Local, state, and federal department of highways should evaluate different types of media to ensure that motorists have ample warning of roadway hazards while operating a motor vehicle, especially when approaching and driving through a traffic incident management area, so that they avoid striking emergency responders, other vehicles, and/or traffic control devices.*

The National Institute for Occupational Safety and Health (NIOSH), an institute within the Centers for Disease Control and Prevention (CDC), is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. In 1998, Congress appropriated funds to NIOSH to conduct a fire fighter initiative that resulted in the NIOSH “Fire Fighter Fatality Investigation and Prevention Program” which examines line-of-duty-deaths or on duty deaths of fire fighters to assist fire departments, fire fighters, the fire service and others to prevent similar fire fighter deaths in the future. The agency does not enforce compliance with State or Federal occupational safety and health standards and does not determine fault or assign blame. Participation of fire departments and individuals in NIOSH investigations is voluntary. Under its program, NIOSH investigators interview persons with knowledge of the incident who agree to be interviewed and review available records to develop a description of the conditions and circumstances leading to the death(s). Interviewees are not asked to sign sworn statements and interviews are not recorded. The agency’s reports do not name the victim, the fire department or those interviewed. The NIOSH report’s summary of the conditions and circumstances surrounding the fatality is intended to provide context to the agency’s recommendations and is not intended to be definitive for purposes of determining any claim or benefit.

For further information, visit the program Web site at [www.cdc.gov/niosh/fire](http://www.cdc.gov/niosh/fire) or call toll free 1-800-CDC-INFO (1-800-232-4636).

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### **Introduction**

During a prescribed burn on March 28, 2013, a 35-year-old male state forest fire service hourly fire fighter lost his life after being struck by a passing motorist on a public roadway. On April 1, 2013, the U.S. Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On April 21–26, 2013, a safety and occupational health specialist from the NIOSH Fire Fighter Fatality Investigation and Prevention Program traveled to New Jersey to investigate this incident. The NIOSH investigator met with and interviewed state forest fire service management personnel, the prescribed burn incident commander (IC), state forest fire service members involved with the prescribed burn, a state deputy attorney general assigned to the incident, a detective with the county prosecutor's office tasked with investigating the incident, the occupational health and safety program manager for the New Jersey Department of Environmental Protection (DEP), and his part-time assistant safety manager. The NIOSH investigator also met with the compliance officer and representatives of the New Jersey Public Employees Occupational Safety and Health Program (PEOSH) and reviewed their photographs, investigative findings, and safety and health standards for fire department personnel. PEOSH will be issuing a report at a later date.

The NIOSH investigator visited, documented, and photographed the incident scene, personal protective equipment similar to what was worn by the victim, the engine operated by the victim, and traffic control devices that were in place at the time of the incident. The NIOSH investigator reviewed training records for the victim and incident commander, the prescribed burn plan and program procedures, and circulars for the state forest fire service. The NIOSH investigator also reviewed the death certificate.

### **Fire Department**

At the time of this incident, the state forest fire service had approximately 65 paid full-time field personnel. In addition, the DEP had approximately 1,500 part-time, paid hourly on-call, fire fighters employed on a regular basis to perform operations such as responding to wildland emergencies or prescribed burn projects, within three regions throughout the state. These regions were broken down into 29 sections with 7–12 districts per section and serving the entire state, covering 7,100 square miles with a population of over 8,000,000.

The state forest fire service is responsible for protecting life and property, as well as the state's natural resources, from wildfires and has authority to:

- Determine forest fire hazards.
- Remove or cause to be removed brush, undergrowth, or other materials that contribute to forest fire hazards.
- Maintain or cause to be maintained fire breaks.
- Plow lands, set prescribed fires and back fires, order a highway or road closed to traffic by the authority responsible for it during wildland fire emergencies, and adopt regulations for burning

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forests or any forest material. For planned events, such as a prescribed burn operation, permission to close a highway or road must be acquired in advance from the authority responsible for that highway or road.

- Summon any person between the ages of 18–50, who may be within the jurisdiction of the state, to assist in extinguishing fires.
- Require the use of materials, equipment, or property needed for extinguishing wildfires when required to abate an emergency.

Prior to the NIOSH investigation, the state forest fire service had established circulars covering numerous administrative and operational functions. Circulars related to this incident include:

- Incident traffic safety
- Risk management
- SAFENET incident reporting system
- Radio communications plan
- Incident command system
- Vehicle emergency lighting
- Vehicle identification standard
- Training procedures and requirements

The incident traffic safety circular provided to the NIOSH investigator discussed information related to traffic incident management at roadway emergencies that included:

- Law enforcement and highway agency notification procedures for lane and road closures
- State of New Jersey *Highway Incident Traffic Safety Guidelines for Emergency Responders*<sup>1</sup>
- Chapter 6I, “Control of Traffic Through Incident Management Areas,” from the *Manual on Uniform Traffic Control Devices (MUTCD)*<sup>2</sup>
- Chapter 6G, “Type of Temporary Traffic Control Zone Activities,” from the *MUTCD*<sup>2</sup>
- United States Department of Agriculture, Forest Service program *Incident Sign Installation Guide*.<sup>3</sup>

The incident traffic safety circular is very detailed, outlining step-by-step procedures and requirements and according to the state DEP is intended to protect state forest fire service personnel any time they would be working along a highway, regardless of the reason.

This state forest fire service had no centralized dispatch center and was not responsible for interior structural firefighting.

### **Prescribed Burn Plan**

In November 2009, the section forest fire warden, who was also the IC, had prepared a prescribed burn plan for a local recreational reservoir. The plan was approved by the state forest service in November

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2011 and was valid until November 2014. This meant the same area could be burned as often as necessary without updating the original burn plan. On the day of the incident, 50 acres were scheduled to be burned. The 2011 prescribed burn plan included:

- Types of fuels to be burned
- Location of the burn
- Management goals and objectives
- Burn objectives
- Weather and wind conditions
- Burn methods
- Smoke management
- Potential impacts (e.g., wildlife, residents, and roadways)
- Medical plan
- Logistics and resources
- Execution
  - Personnel
  - Resources
  - Ignition plan
  - Holding plan
  - Contingency plan
  - Prescription monitoring
  - Mop up and patrol
  - Rehabilitation plan
- Prescribed burn briefing outline
  - Burn organization
  - Burn objectives
  - Description of burn area
  - Expected weather
  - Communications
  - Firing sequence
  - Contingency plan
  - Safety

Prior to any burning, the division fire warden or designee must ensure that conditions for that day fall within the scope of the prescribed burn plan and the available state forest fire service requirements. If not, the burn cannot proceed. Additionally, the IC for the day of the burn holds a briefing, detailing burn plan specifics, as listed above, to all personnel. This briefing is an ideal time to discuss potential safety concerns, especially those of working on or alongside roadways.

### **Training and Experience**

The victim had been with the state forest fire service for the past 6 years, holding the rank of district forest fire warden for the past 4½ years. The victim was also an active member of a local volunteer fire

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department spanning the last 10–15 years. As a district fire warden, he was required to be qualified as a firing boss—National Wildfire Coordinating Group Single Resource Boss and Incident Commander Type IV—and attend in-service training.<sup>4,5</sup> The victim’s training record from the state forest fire service did not contain any courses related to traffic incident management; however, this does not mean that the victim had not received this type of training on his own or through his volunteer fire department. No additional training records were available.

Even though the state forest fire service incident traffic safety circular provided detailed information from many resources, the state forest fire service does not have a specific training program for safely implementing a traffic incident management area (TIMA). The state forest fire service has been in contact with the New Jersey Department of Transportation to develop a training program that is applicable to its operations and authorities.

### **Equipment and Personnel**

The state forest fire service vehicle operated by the victim was a 2006 diesel-powered heavy-duty pick-up truck chassis with an automatic transmission and dual rear wheels. It was classified as a Type 6 engine carrying 300 gallons of water and a 250-gallon-per-minute pump. When purchasing new apparatus, the state forest fire service research and development shop would take possession of the chassis and then fabricate and install the rear body, including pump, cabinets, plumbing, ROPS, emergency lighting and markings, and brush guards. According to the state forest fire service circulars provided to NIOSH, the vehicle was appropriately identified with emergency lighting (above minimum requirements), decals and logos, reflective striping, and lettering (see Photo 1 and Photo 2). According to circulars provided to NIOSH during the investigation, amber warning lights or bar lights were not required for this type of state forest service vehicle. At the time of this incident, the vehicle the victim was using was scheduled for replacement with a new one, but it was still under construction and unavailable as the replacement at the time of the incident. The NIOSH investigator photographed the new vehicle, which was being made ready for service during the NIOSH investigation, and determined additional high-visibility retro-reflective striping and chevrons had been added to make the vehicle more conspicuous (see Photo 3 and Photo 4). The new vehicle went into service after the NIOSH investigation.

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**Photo 1. Engine operated by the victim prior to being struck.  
(NIOSH photo.)**

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**Photo 2. Rear of engine operated by the victim prior to being struck.  
(NIOSH photo.)**

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**Photo 3. Vehicle purchased to replace engine used during the incident. The replacement unit was being made ready for service during the NIOSH investigation.**  
*(NIOSH photo.)*

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**Photo 4. Another view of the new engine. Note the high-visibility chevrons added on the rear of the engine for increased conspicuity.**

*(NIOSH photo.)*

## **Timeline**

The times within the timeline are provided to set out, to the extent possible, the sequence of events according to witness interviews and other available information. No recorded radio transmissions were available during this incident. This timeline is not intended, nor should it be used, as a formal record of events.

- **0700 Hours**

The forest fire warden (incident commander), state forest fire service fire fighters and the victim arrive at the prescribed burn location.

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- **0830 hours**  
Incident commander briefs personnel on the prescribed burn.
- **0900 Hours (approximately)**  
A “crew boss,” victim and three other state forest fire service fire fighters are assigned to burn out the area between the adjacent roadway and the main park drive way. The crew boss briefs them on tactics and safety, including traffic.
- **1000 Hours**  
Ignition of grass and leaf litter is initiated.
- **1100 Hours**  
Crew boss reports ignition is started inside the fence line along the adjacent roadway. He initiates another quick briefing before this part of the operations is started.
- **1125 Hours (approximately)**  
Crew reports a wind shift (not a radio transmission) that is now blowing smoke onto the adjacent roadway.
- **1130 Hours**  
Victim is struck by a passing motorist.

### **Personal Protective Equipment**

State forest fire service personnel reported to the NIOSH investigator that, at the time of the incident, the victim was wearing his state forest fire service approved protective gear. The state forest fire service provides a yellow NOMEX® long-sleeve shirt (see Photo 5), wildland helmet, gloves, and fire shelter. Cotton blue jeans and boots are approved gear, however, these items are not provided by the state forest fire service. The victim was not wearing a high-visibility retro-reflective vest (see Photo 6). High-visibility retro-reflective vests are stored on forest fire service vehicles. The *MUTCD* Chapter 6I allows for fire fighters who are involved in suppression to not wear a vest due to the melting, burning of the garment. Most traffic vests are now flame resistant but not all. Agencies should evaluate the potential of working in or near moving traffic and the conspicuity of workers as they write specifications for traffic vests and the SOPs for wearing them.

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**Photo 5. Example of wildland long-sleeve shirt worn by the victim.**  
(NIOSH photo.)



**Photo 6. Example of high-visibility retro-reflective vest available to the victim.**  
(NIOSH photo.)

## **Weather and Road Conditions**

On the day of the incident, the temperature was approximately 50°F and overcast with no rain. The fatal incident occurred on a two-lane, paved, rural roadway that ran adjacent to the state park where the prescribed burn was taking place. The lanes ran north and south and were separated by painted, broken and solid, yellow lines with periodic recessed roadway reflectors just off the centerline. A solid, white fog line on the outer edges of the paved roadway separated the roadway from the shoulder. The state forest fire service had deployed a portable, fluorescent pink sign reading “Prescribed Burning Ahead” approximately 2/10 of a mile south of the incident site on the northbound shoulder (see Photo

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7). An additional sign reading “Smoke Limited Visibility Ahead” was posted approximately 7/10 of a mile north of the incident site on the southbound shoulder (see Photo 8). The posted speed limit was 50 miles per hour. The motorist was traveling slower than the posted speed limit because of the smoke-limited visibility conditions.



**Photo 7. Scene photo from the incident, as seen approaching from the south.**  
*(Photo courtesy of law enforcement.)*

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**Photo 8. Scene photo from the incident, as seen approaching from the north.  
(Photo courtesy of law enforcement.)**

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**Investigation**

During a prescribed burn on March 28, 2013, a 35-year-old male state forest fire service hourly fire fighter lost his life after being struck by a passing motorist. On the day of the incident, the incident IC had performed his pre-burn preparations to ensure that the conditions to burn this day were appropriate, and he conducted a briefing with all personnel working the prescribed burn. This burn was scheduled to last for 1 day, starting at sunrise and ending by sunset. The burn location was next to a reservoir within a state park, and the IC advised the NIOSH investigator that the humidity was normally higher in this area. The area around the reservoir was known for rapid wind changes and swirling winds. All personnel commented to the NIOSH investigator that the smoke had good dispersion but would move and set in at different times and places.

According to the victim's crew boss, the victim was assigned to an engine on the day of the incident. Prior to being struck, his duties were to maintain a presence on the adjacent roadway that ran parallel on the west side of the burn area, with the engine and to protect the fence from fire, if necessary. On this day, he was operating the engine by himself. Although not a procedural requirement, an engine would normally be staffed with two personnel to allow the passenger to walk along a burn line with a hoseline while the operator drove. Additional personnel in close proximity could have been assigned to assist him if requested. During this incident, his two additional crew members were tasked with igniting a fire line within the fence line, approximately 30-50 feet from the victim's position on the adjacent roadway. The fire crew boss stated to the NIOSH investigator that the victim had exited his vehicle three times to briefly spray down the plastic-coated, chain-link fence that separated the roadway from the park, using the engine's booster reel. At some point, the victim parked the engine in the northbound lane and exited; all emergency lights were on. The engine was parked straddling the fog line and extended approximately 46 inches into the northbound lane (see Photo 9). Those working the burn line closest to the roadway remember the victim operating the engine and then stopping on the roadway. Since no hoseline was pulled prior to him being struck, some believe he was trying to get a better view of the burn area. It is unknown whether the smoke was obscuring the roadway prior to him exiting his engine.

The victim was struck while in the southbound lane just off the passing yellow centerline of the roadway; approximately 6 feet from the engine (see Photo 9 and Diagram). Three vehicles were traveling north in the direction of the parked engine (within close proximity of each other). The first vehicle swerved urgently into the southbound lane to miss striking the victim's vehicle. The second vehicle, which had slowed, also swerved into the southbound travel lane, inadvertently striking the victim who was standing in the roadway. The third vehicle side-swiped the engine before coming to a rest. The motorists stated that smoke was visually obstructing the roadway when the victim was struck.

The IC was immediately notified of the incident by personnel near the incident, and personnel from the park service and state forest fire service involved with the burn quickly responded to the roadway. Resuscitative efforts were started before the victim was transported by ambulance to a local hospital. The victim was later pronounced dead at the hospital. Individuals interviewed by NIOSH stated that

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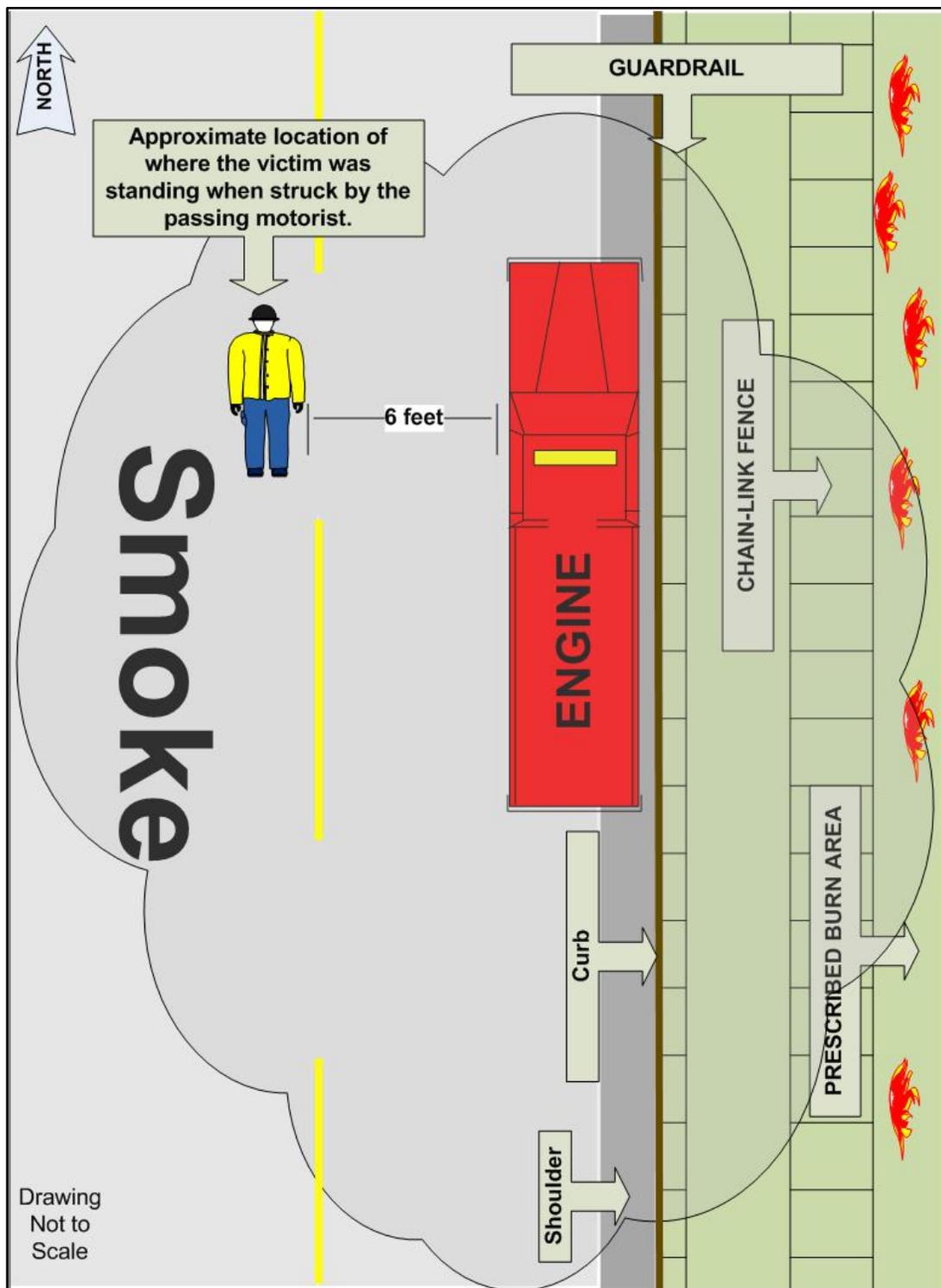
once they got to the victim the smoke had dissipated and was intermittent while waiting for the ambulance.



Victim believed to be standing here when struck.

**Photo 9. Position of engine when the victim was struck (see also Diagram). Note: The hoselines were deployed after the incident to control the prescribed burn. (Photo courtesy of law enforcement.)**

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**Diagram. Incident scene at the time the victim was struck.**

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### **Contributing Factors**

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. NIOSH investigators identified the following items as key contributing factors in this incident that led to the fatality:

- Victim working in unprotected travel lane
- Inconspicuousness of the victim
- Smoke obscured roadway
- Shifting winds in the burn area

### **Cause of Death**

On the death certificate the coroner listed the victim's cause of death as blunt force trauma.

### **Recommendations**

***Recommendation #1: Forest fire services should ensure that personnel receive proper training and have sufficient equipment and that appropriate procedures are in place for operating on or near roadways.***

Discussion: All personnel who have the potential of being assigned to traffic control duties or exposed to vehicular traffic should be trained in: the use of advanced warning devices, safe-positioning of an apparatus, the use of high-visibility personal protective equipment and its limitations during fire suppression and hazardous material type incidents, available/necessary resources including personnel, vehicles and equipment, general safety practices, and establishment of the traffic incident management area (TIMA). Training should be provided to all personnel before responding to a roadway incident or working alongside a roadway. The state forest service incident traffic safety circular provided several resources for this state forest fire service.<sup>1-3</sup>

The *Manual on Uniform Traffic Control Devices (MUTCD)* is a resource for establishing temporary traffic control. *MUTCD* Chapter 6I, "Control of Traffic Through Incident Management Areas," defines a traffic incident management area as "an area of highway where temporary traffic controls are installed, as authorized by a public authority or the official having jurisdiction of the roadway, in response to a road user incident, natural disaster, hazardous material spill, or other unplanned incident."<sup>2</sup> A traffic incident management area is a type of temporary traffic control (TTC) zone and extends from the first warning device (such as a sign, light, or cone) to the last TTC device or to a point where vehicles return to the original lane alignment and are clear of the incident."<sup>2</sup> Also, according to the *MUTCD*, traffic incidents can be divided into three general classes of duration, each of which has unique traffic control characteristics and needs. These classes are:

- A. Major—expected duration of more than 2 hours
- B. Intermediate—expected duration of 30 minutes to 2 hours

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C. Minor—expected duration under 30 minutes

*MUTCD* guidance states that all TTC devices needed to establish the area should be available for ready deployment. The TIMA should include the proper traffic diversions, tapered lane closures, and upstream warning devices to alert traffic approaching the queue to use an appropriate alternative route. Attention should be paid to the upstream end of the traffic queue such that warning is given to road users approaching the back of the queue. If manual traffic control is needed, it should be provided by qualified flaggers or uniformed law enforcement officers.<sup>2</sup>

Warning devices and transition areas are a means by which individuals can convey information to motorists approaching an incident scene, referred to as the “advance warning area.” Warning devices in the advance warning area may vary from a single sign or high-intensity rotating, flashing, oscillating, or strobe lights on a vehicle to a series of signs in advance of the incident scene. Warning devices or even apparatus should be placed to take advantage of topography and weather conditions so that protection is provided to personnel working on or near a roadway. The National Fire Protection Association (NFPA) 1500 *Standard on Fire Department Occupational Safety and Health Programs* section 8.7.5 states that one or more of the following warning devices should be used to warn oncoming traffic of the incident operations and the hazards to members operating at the incident: (1) fluorescent and retro-reflective warning devices such as traffic cones, (2) Federal Highway Administration approved 48-inch by 48-inch retro-reflective signs stating “Emergency Scene Ahead” (with directional arrow overlay), (3) illuminated warning devices such as highway flares, and (4) other devices appropriate to warn oncoming traffic of the emergency operations.<sup>6</sup> Additionally, cones should be predominantly orange and should be made of a material that can be struck without causing damage to the impacting vehicle. Cones should be a minimum of 18 inches in height for daytime and low-speed roadways. Cones should be a minimum of 28 inches in height with retro-reflective markings when used on freeways and other high-speed highways or at night on all highways or when more conspicuous guidance is needed.<sup>6</sup> NFPA 1500 section 8.7.6 states that warning devices should be placed and used with proper considerations given to visual obstruction, such as hills, curves, or blind spots, or unusual localized weather conditions, such as fog or rain.<sup>6</sup> Weather conditions, curves, and hills that limit visibility of the incident scene require that the advance warning devices be placed at an even greater distance. For this incident, additional measures could have been taken since the prescribed burn was previously planned to last all day with the potential of decreased visibility due to smoke.

The *MUTCD* states: “Where special emphasis is needed, signs may be placed on both the left and right sides of the roadway. Signs mounted on portable supports may be placed within the roadway itself. Signs may also be mounted on or above barricades.”<sup>2</sup> The primary purpose of portable changeable message signs is to advise the road user of unexpected situations such as changes in speed, visibility, or traffic pattern.

The roadway on which the incident occurred had a 50-mph posted speed limit. The state forest fire service had placed two portable signs: one for motorists approaching from the north and one for motorists approaching from the south. No additional TTC devices were available to establish a TIMA

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and warn approaching motorists of potential vehicles or individuals working in or alongside the roadway. Only one of these signs warned motorists of potential visibility problems from smoke. These signs did not indicate, or warn motorists, that there may be emergency personnel and/or vehicles on the roadway. Additionally, side streets feeding between the posted signs had no warnings. Finally, the MUTCD TTC guidelines include the need for a warning to traffic for a temporary incident, but not as in the case of a mobile traffic control zone. Since a prescribed burn situation near a roadway produces unique safety hazards for passing motorists, including the potential for changing smoke and visibility conditions as well as the presence of emergency personnel or moving emergency vehicles, a combination of MUTCD TTC zone signage and state forest fire service signage might be considered to provide additional warning to motorists of potential hazards ahead.

At the time of the incident, the engine driven by the victim did not have chevrons on the back and the use of chevrons had never been required. The *State Forest Service Incident Traffic Safety* circular provided information that wasn't utilized for this incident, and the NIOSH investigator could not determine whether the scope of the circular included prescribed burns. All state forest services should review their circulars, procedures, and/or guidelines to ensure that all potential instances where an individual is working in a roadway or alongside a roadway are properly protected. A model SOP for establishing advance warning and transition areas at roadway-related incidents can be found on the Emergency Responder Safety Institute Website ([http://www.respondersafety.com/Articles/Model\\_SOG\\_Available\\_for\\_Download\\_on\\_Deploying\\_Cones\\_and\\_flares\\_at\\_Roadway\\_Incidents.aspx](http://www.respondersafety.com/Articles/Model_SOG_Available_for_Download_on_Deploying_Cones_and_flares_at_Roadway_Incidents.aspx)).<sup>7</sup>

The NFPA is currently drafting standard NFPA 1091 *Standard on Professional Qualifications for Traffic Control Incident Management*. This document will provide emergency responders with information related to safe operations at a roadway incident. A draft copy of NFPA 1091 can be found at <http://www.nfpa.org/AboutTheCodes/AboutTheCodes.asp?docnum=1091&tab=nextedition>. *Note: For more information related to training, personal protective equipment, and policies/procedures for traffic management, see the "Additional Information" section at the end of this report.*

***Recommendation #2: Forest fire services should ensure that safety circulars or standard operating procedures providing guidance on identifying and the importance of remaining in a safe location while working in or near moving traffic are implemented and enforced.***

Discussion: Forest fire service personnel should operate defensively with an awareness of the high risk associated with working in or near moving traffic, because individuals cannot rely on approaching motorists to see them, slow down, and/or move over. Motorists may not follow traffic signs and regulations for various reasons, including poor visibility, not understanding what the sign means, distraction, being under the influence of alcohol or drugs, and/or because of a medical condition that affects their judgment or abilities. This line-of-duty death provides a reminder that one can never depend solely on signs to protect them when they are working near moving traffic. The forest fire service should ensure that multiple prevention strategies are in place and situational awareness is maintained at all times by personnel. NFPA 1500 states that every effort should be taken to protect members from conflict with motor vehicle traffic.<sup>2</sup> Personnel should be trained on how to identify

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hazardous situations and preplan an escape strategy should they encounter a dangerous traffic situation, such as a vehicle entering the temporary traffic control zone.<sup>8</sup> The placing of advanced warning devices to aid oncoming traffic to recognize a TIMA may not provide personnel with complete protection from traffic hazards. Personnel should remain in an area of safety created by the proper positioning of apparatus and warning devices. A vehicle with emergency lights flashing provides additional warning and additional protection to the incident scene but may not be sufficient warning for the approaching motorists, especially when roadway conditions are obscured by fog or smoke.

During this incident, the victim was struck while standing in the southbound travel lane. At the time he was struck, roadway conditions were obscured by smoke from the adjacent prescribed burn he was monitoring. Establishment of a more complete TIMA in this incident might have included temporarily suspending personnel operations on the roadway due to smoke conditions. Also, extreme caution should be taken if a vehicle must be parked within a travel lane where occupants exiting the vehicle could be exposed to oncoming traffic. Departmental safety circulars or standard operating procedures that detail safety measures along roadways should be routinely evaluated, implemented, and enforced.

***Recommendation #3: Forest fire services should establish pre-incident plans and agreements regarding traffic control incident management with local fire departments, EMS, law enforcement, local or state departments of highways, and other public and private sector responders.***

Discussion: Pre-incident planning is fundamental to effective traffic control incident management. The white paper *Protecting Emergency Responders on the Highways*<sup>9</sup> states that a preplan should (1) account for possible use of detours, (2) anticipate the likelihood of vehicles transporting hazardous materials or of extraordinary weight or size, (3) accommodate the need to keep commerce flowing, (4) minimize the possibility of secondary incidents, and (5) account for possible impact on neighboring jurisdictions. All agencies that are responsible to keep roadways safe and open should be fully involved in the process, formatting, and development of pre-incident plans and ensure that the final plan is easily understood and implemented within their agency.

According to the U.S. Fire Administration document, *Traffic Incident Management Systems*,<sup>10</sup> specific concepts that should be addressed in pre-incident planning for roadway operations include the following:

- All agencies that may respond to roadway incidents should be fully involved in the development of the plan and ensure that the final plan is easily understood and implemented within their agency.
- Each agency involved must provide initial and refresher training and ensure that individual and organizational roles are understood.
- Each agency should make sure that personnel are at least minimally briefed on the roles and procedures of other plan participants to avoid on-scene confusion and conflict.

Local authorities, including law enforcement, departments of transportation, fire departments, municipal leadership, businesses, forestry services, and other interested parties, should work together

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to develop local traffic control incident management plans that address the needs of the local community in the event of traffic disruptions. These traffic control incident management plans should address a wide range of events that could affect normal roadway traffic, such as traffic incidents, hazardous material spills, fires, natural disasters, inclement weather, parades, and other planned events. States and municipalities, including the transportation department, in conjunction with state forest services, fire departments, emergency medical responders, law enforcement, and parks and recreation, should develop these plans to include automatic response protocols detailing the responsibilities of each at planned and unplanned incidents. Governing entities should ensure that adequate funding is available to staff and equip response protocols once jointly established and agreed upon by all parties involved. Preplanning such incidents allow forest fire services and other interested parties to identify needs, locate necessary resources and materials, and develop mutual-aid-response agreements. Additionally, these pre-plans should be readily available to all parties involved.

Prior to this incident, no pre-incident plans or agreements had been established.

***Recommendation #4: Local, state, and federal department of highways should evaluate different types of media to ensure that motorists have ample warning of roadway hazards while operating a motor vehicle, especially when approaching and driving through a traffic incident management area, so that they avoid striking emergency responders, other vehicles, and/or traffic control devices.***

Discussion: Motorists need to maintain a constant awareness of their surroundings while operating a motor vehicle. They need to pay attention to such things as signs, emergency scenes, traffic patterns, work zones, and various roadway hazards (e.g., slowed/stopped vehicles, weather, and smoke). Motorists could benefit from additional highway-related information disseminated by other sources. Various means of disseminating incident-related information to affected motorists are listed below:

- Commercial radio broadcasts
- Highway advisory radio
- Variable message signs
- In-vehicle or personal data assistant information or route guidance systems
- Commercial and public television traffic reports
- Changeable message boards

Traffic reports on radio and television stations have been a traditional means by which motorists receive traffic information, including incident-related warnings. Radio and television stations receive the traffic information they use in their reports from a variety of sources, which may include public transportation agencies, or by monitoring emergency (police and fire) radio frequencies.

Public agencies, radio, and television stations can communicate important incident-related information to motorists. This information may help motorists be more prepared for what's ahead and perhaps avoid an area all together. Motorist information should be disseminated as soon as possible or ahead of time, especially when advanced planning is required for prescribed burns. Motorist information should be disseminated until traffic flow is returned to normal conditions.

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### **Investigator Information**

This incident was investigated by Stacy C. Wertman, Safety and Occupational Health Specialist with the Fire Fighter Fatality Investigation and Prevention Program, Surveillance and Field Investigations Branch, Division of Safety Research, NIOSH located in Morgantown, WV. An expert technical review was provided by Steve Austin with the Cumberland Valley Volunteer Firemen’s Association and Emergency Responder Safety Institute. A technical review was also provided by the National Fire Protection Association, Public Fire Protection Division.

### **Additional Information**

Federal Highway Administration *Traffic Incident Management Handbook*  
[http://ops.fhwa.dot.gov/eto\\_tim\\_pse/publications/timhandbook/](http://ops.fhwa.dot.gov/eto_tim_pse/publications/timhandbook/)

Emergency Responder Safety Institute <http://www.respondersafety.com/>

Manual on Uniform Traffic Control Devices <http://mutcd.fhwa.dot.gov/>

National Traffic Incident Management Coalition  
<http://ntimc.transportation.org/Pages/default.aspx>

U.S. Department of Transportation, Federal Highway Administration, “Traffic Incident Management” [http://ops.fhwa.dot.gov/eto\\_tim\\_pse/about/tim.htm](http://ops.fhwa.dot.gov/eto_tim_pse/about/tim.htm)

International Association of Fire Fighters *Best Practices for Emergency Vehicle and Roadway Operations Safety in the Emergency Services* <http://www.iaff.org/hs/EVSP/guides.html>

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