Photo courtesy Midwest City (Okla.) Fire Department

Roadside assistance

With more and more firefighters at incident scenes being struck by motorists, NIOSH looks at the problems and offers suggestions to reduce the risks.

When firefighters and paramedics respond to an incident along a highway, they often don't realize that they may be in as much danger from passing traffic as when they enter a burning building.

Motorists accustomed to a clear, unobstructed roadway may not recognize and avoid closed lanes, emergency workers on or near the roadway, and a variety of fixed object hazards. In addition, weather conditions can impair motorists' ability to see and avoid firefighters and apparatus.

Between 1995 and 1999, 17 firefighters were struck and killed by motorists, according to the National Fire Protection Association. This is an 89% increase in this type of line-of-duty death from 1990 to 1994, when nine firefighters were killed. Early estimates for 2000 show five deaths and 20 injuries. (See sidebar.)

In 1999, the National Institute for Occupational Safety and Health investigated two cases where a firefighter was struck and killed by a motorist while providing emergency services along the roadside.

In Oklahoma, one firefighter died and a second was severely injured, and in South Carolina, a firefighter was killed after being struck by a tractor-trailer truck. These cases illustrate some of the hazards firefighters face while working along roadways. Reports 99F-27 and 99F-38 are available at <www.cdc.gov/niosh/firehome.html>.

Preparatory procedures

To minimize the risks of traffic hazards to firefighters, NIOSH offers several recommendations for fire departments to consider before they have to handle a roadside emergency.

Develop, implement and enforce SOPs regarding emergency operations for roadway incidents. SOPs can help establish proper traffic control measures when operating at the scene of motor-vehicle incidents. They should include:

- Positioning apparatus,
- Closing and/or clearing traffic lanes,
- Establishing a secure work area,
- Wearing appropriate protective clothing at all times, and
- Releasing the incident scene back to normal operation.

Part VI of the Manual on Uniform Traffic Control Devices contains national standards for traffic control at incident management operations. More information on this important resource for developing SOPs is available at <http://mutcd.fhwa.dot.gov/>.

Implement an incident management system to provide an approach for the fire department to successfully command, control and manage incidents of all sizes and types. Of course, IMS isn't exclusive to responses along roadways, but the interactive components of an IMS provide the necessary basis for clear communication and effective operations. Those components are:

- Common terminology,
- Modular organization,
- Integrated communication,
- Unified command structure,
- Consolidated action plans,

By Mark McFall
NIOSH Division of Safety Research
Morgantown, W.Va.

One firefighter was killed and another was injured when a car hit them on Aug. 5, 1999. They were attending to a driver who had struck their rig at the scene of a motor-vehicle accident.

- Manageable span of control,
- Designated incident facilities and
- Comprehensive resource management.

The major operational positions are:

- **Command**, for developing the strategic goals to control an incident;
- **Operations**, for implementing tactical assignments;
- **Planning**, for developing the incident action plan;
- **Logistics**, for securing facilities, services, equipment and materials; and
- **Finance/administration**, for documenting the cost of materials and personnel.

Develop preplans for areas where there's a high rate of motor-vehicle crashes. When emergency planning identifies where more motor vehicles crash, fire departments can work with local and state highway departments to identify solutions in advance. SOPs can be tailored to particular sites, such as blind curves or corners, hills or slopes, and high-traffic areas.

Vehicle location

When a fire department arrives at a highway emergency incident, there are several things the responders can do on their arrival to adjust the traffic flow to their advantage.

Position fire apparatus uphill and upwind to take advantage of topography and weather to protect firefighters from traffic. To act as a shield, apparatus should be placed between the flow of traffic and the firefighters working on the incident. To provide oncoming motorists with ample warning as they approach the incident scene, fire apparatus should also be positioned to provide the greatest visibility.

Conditions at the incident scene will dictate how fire apparatus should be positioned. Placement can be affected by weather; time of day; scene lighting; traffic speed and volume; and hills, curves and other obstructions. Smoke generated by fires can dramatically decrease visibility.

Park or stage unneeded vehicles off the street whenever possible. Moving vehicles off the street may eliminate the need for traffic control measures, thereby reducing exposure of personnel to hazards posed by passing traffic.

If police haven't arrived, control oncoming vehicles before addressing the emergency. When firefighters arrive on the scene of a highway emergency before the police, they should follow the MUTCD's traffic control management recommendations, which include the use of warning signals such as flares, signs, cones and flags. A directional warning bar is also recommended to supplement the use of apparatus emergency operating lights.

Firefighters conducting traffic control should maximize their visibility to motorists. Devices such as a flashing stop/slow paddle have been used at temporary work zones on roads and found to be effective. The paddle has strobe lamps mounted on the sign that can be activated at the push of a button. Such devices increase the flagger's ability to get drivers' attention and smooth the slowing of traffic.

Personnel protection

Even with careful preplanning and attention to apparatus placement and traffic control, accidents can happen. To further minimize the risks, responders should pay attention to what they're doing, as well as where and how they're doing it.

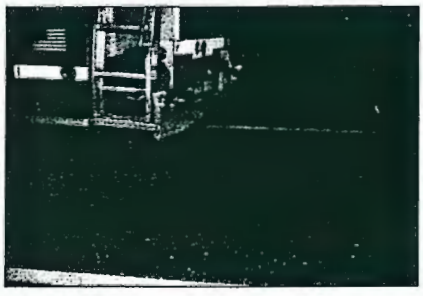
When it's impossible to protect the incident scene from immediate danger, firefighters should position them-

Early estimates show 5 dead, 20 injured in 2000

- **Jan. 27, Cincinnati.** Five firefighters injured when vehicle hits ambulance.
- **Feb. 14, South Lebanon, Ohio.** Fire chief injured by neighboring department's SUV at an MVA.
- **Feb. 18, Fairview, Utah.** Firefighter injured by SUV while on the scene of an MVA.
- **March 7, Norfolk, Va.** One firefighter injured when engine is hit by out-of-control dump truck on I-264.
- **April 21, St. Louis County, Mo.** Two paramedics injured when their ambulance and a police car were struck by a car at the scene of an MVA.
- **April 27, Atlanta.** Three firefighters injured on I-20 when automobile hits engine at the scene of a car fire.
- **May 26, Chicago.** Firefighter pulling hose across road at structure fire struck and injured by car.
- **July 13, Friendswood, Texas.** Fire captain injured by hit-and-run driver while investigating smoke in a field.
- **Aug. 21, Gary, Ind.** Firefighter struck and injured while assisting with backing engine into station.
- **Sept. 4, Yuma, Ariz.** Firefighter struck, killed by ARFF apparatus on training drill.
- **Sept. 4, Ludlow, Mass.** Firefighter struck and injured while hooking up hydrant at a structure fire.
- **Sept. 17, Maryland-Pennsylvania Line.** Firefighter killed while crossing I-83 at the scene of an MVA.
- **Oct. 24, Clearfield County, Pa.** Three firefighters injured when their parked rescue truck was hit by a tractor-trailer driver who fell asleep.
- **Nov. 2, Jonesboro, Ark.** Firefighter struck and killed while crossing road at scene of a disabled engine.
- **Nov. 7, Tiffin, Ohio.** EMT struck and killed while assisting a pedestrian along a highway.
- **Dec. 23, Chicago.** Fire lieutenant killed while working an MVA on a highway.

On Dec. 23, this car struck and killed Lt. Scott Gillen on a Chicago expressway.

Gillen had responded to an MVA and was standing behind Ladder 27.



Gillen was pinned against the apparatus. He was airlifted to the hospital, where he died.

— Compiled by Lt. Jack Sullivan (Ret.), Lionville (Pa.) Fire Company

selves and any victims in a secure area. Firefighters should work as far away from traffic as feasible and avoid working where the apparatus could be struck and pushed by another vehicle.

Cooperation between police and fire department personnel at highway incidents is essential to ensure that a secure area of at least one closed lane can be established. If the closure of one lane doesn't provide a safe barrier, then additional or all lanes may have to be closed.

Firefighters operating at an emergency scene should wear high-visibility apparel. The need to wear protective clothing such as a reflectorized, brightly colored vest while working on the scene of a motor vehicle incident is a given. Firefighters can wear either the strong yellow-green or orange to provide a suitable contrast with the background.

A new voluntary consensus standard, ANSI/ISEA 107-1999, American National Standard for High-Visibility Safety Apparel, provides guidance for use of high-visibility safety apparel to protect workers exposed to the hazards of low visibility. More information is available at <http://safetyplan.tamu.edu/index.htm>.

Additional resources

The **Cumberland Valley (Pa.) Volunteer Fireman's Association** White Paper, "Protecting Emergency Responders on the Highways," is available by calling 717-236-5995 or downloading from <www.usfa.fema.gov/alerts/cvvfa.htm>.

The **Hampton Roads (Va.) Highway Incident Management Plan** includes a 17-minute video and a six-page document. The video is available from John Dufresne, Virginia Department of Transportation, at <dufresne_jc@vdot.state.va.us>, and the document is available from Eric Reddeck at <creddeck@fire.city.chesapeake.va.us>.

The **Plano (Texas) Fire Department** has made available information regarding emergency operations in or near vehicle traffic, including a sample SOP, an overview of training and research, and findings on night-time PPE visibility. Download these Microsoft Word and PowerPoint files from the Information Center at <www.firechief.com>.

Firefighters should be trained in SOPs for operating in or near moving traffic. This training should include:

- Hazards associated with working in or near moving traffic.
- Safe positioning of apparatus.
- Establishing and working within a temporary work zone.
- Lane closure and detour techniques.
- Safe exiting of emergency apparatus.
- Effective use of scene lighting.

Firefighters who have traffic management responsibilities should be trained in traffic control techniques, as well as device usage and placement.

Working along any type of roadway always presents the potential for a motorist striking an emergency service provider, but standard operating procedures and the Incident Command System can make a difference. Providing the appropriate training for emergency personnel will familiarize them with the hazards of emergency incidents near moving traffic. FC

Mark McFall is a safety and occupational health specialist with the National Institute for Occupational Safety and Health, Division of Safety Research, Morgantown, W.Va., and is a member of the NIOSH Fire Fighter Fatality Investigation and Prevention Program team. A West Virginia–certified Fire Fighter I, McFall has a master's of science in safety management and has completed the National Fire Academy's fire/arson investigation course.