

**A STANDARD OPERATING GUIDELINE REGARDING SAFETY
PROCEDURES FOR NORTH THOMPSONVILLE FIREFIGHTERS WHILE
OPERATING ON THE INTERSTATE HIGHWAY OR NEAR MOVING
TRAFFIC**

STRATEGIC MANAGEMENT OF CHANGE

BY: Earl F. Provencher, Jr.
North Thompsonville Fire Department
Enfield, CT

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ABSTRACT

The North Thompsonville Fire Department recognizes the dangers associated with fire fighting and supports the need for improving safety at incidents. One area that demonstrates need for a specific procedure and safety guideline is operating on the interstate highway. The problem is that the North Thompsonville Fire Department does not have a Standard Operating Guideline (SOG) for safety procedures while operating on the interstate highway.

The purpose of this applied research project (ARP) is to improve fire fighter safety by developing a Standard Operating Guideline for safety at incidents on the interstate highway. This applied research project used an action research methodology consisting of searches and reviews of pertinent literature sources, the authors personal experience and a questionnaire to each of the North Thompsonville Fire Department Fire Officers. This methodology allowed for a SOG to be developed and for the following questions to be answered:

1. Are secondary incidents or near misses at interstate highway operations a serious problem for fire departments?
2. What procedures do agencies other than fire departments, that operate on the interstate highway use to enhance worker safety which can also be adopted by the North Thompsonville Fire Department?
3. When responding to an incident on the interstate highway, what are the responsibilities of the incident commander and fire department members relative to highway safety?
4. Should complete closure of the interstate highway occur when operating at an incident?

The research indicates that the occurrence of secondary incidents is a problem for fire departments on interstate highway operations. Each year hundreds of firefighters are severely injured while operating on the interstate. The State of Connecticut uses a cone pattern for warning

motorists of workers on the interstate. The U.S. Department of Transportation as with the State of Connecticut recommends a sign and cone pattern along with a flag person. The research concluded that the incident commander has the responsibility insuring that appropriate safeguards are taken for the protection of firefighters, for the victims of an accident or fire, other personnel operating at a scene and by standers. Additionally, firefighters have a responsibility to insure that they comply with departmental operating guidelines, which developed with the safety of the responders as the paramount concern. The closing of an interstate highway is not always practical. Further complications will develop if the volume of traffic operating on an interstate is stopped and/or diverted to local streets.

The fire service must continue to realize that prior to working in an hazardous environment, specifically on an interstate highway, we must train the responders to protect themselves from secondary incidents. Additionally, standard operating procedures must be developed, maintained and enforced to protect the responders. The results of this research provided sufficient information for the development of a standard operating guideline that can be implemented to enhance safety when operating on the interstate highway.

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INTRODUCTION

The North Thompsonville Fire Department recognizes the dangers associated with fire fighting and supports the need for improving safety at incidents. One area that demonstrates need for a specific procedure is operating on the interstate highway. The average daily traffic count on Interstate 91 in Enfield, Connecticut is 76,500 vehicles (E. Lagosh, personal communication June, 2001). The problem is that the North Thompsonville Fire Department does not have a Standard Operating guideline (SOG) for operations on the interstate highway. According to the National Fire Protection Association (NFPA) in 1999 there were eleven firefighters that died in motor vehicle related accidents. Of those eleven fatalities, nine were due to the fire fighter being hit by a motor vehicle (Fahey and LeBlanc 2000). Additionally, there were 45,550 firefighters injured on the fire ground in 1999. Of the 45,550 injuries 3,644 or 8% of the fire ground injuries were caused by the firefighter being struck by an object (Badger 2000). It was not clear from the research whether the nine firefighters killed were on an interstate or a rural roadway. Nevertheless, with the number of vehicles on the interstate, the speed that these vehicles travel, and the number of firefighter injuries and deaths on the highways, all indicate that a specific SOG aimed at enhancing safety is warranted.

The purpose of this applied research project (ARP) is to improve fire fighter safety by developing a Standard Operating Guideline for safety procedures at incidents on the interstate highway. This applied research project used an action research methodology consisting of searches and reviews of pertinent literature sources, the authors personal experience and a questionnaire to each of the North Thompsonville Fire Department Fire Officers. This methodology allowed for an SOG to be developed and for the following questions to be answered:

1. Are secondary incidents or near misses at interstate highway operations a serious problem for fire departments?
2. What procedures do agencies other than fire departments, that operate on the interstate highway use to enhance worker safety which can also be adopted by the North Thompsonville Fire Department?
3. When responding to an incident on the interstate highway, what are the responsibilities of the incident commander and fire department members relative to highway safety?
4. Should complete closure of the interstate highway occur when operating at an incident?

To complete this research, a literature review was conducted from fire service publications, journals, textbooks, North Thompsonville Fire Department Standard Operating Guidelines as well as Internet sites.

BACKGROUND AND SIGNIFICANCE

The North Thompsonville Fire Department has not suffered a firefighter death or injury at incident scenes on the highway because of secondary highway incidents. There have been however, secondary incidents, which have been witnessed by personnel from this fire department as well as injuries to civilians. On July 19, 1998 while this department was operating at a motor vehicle fire on Interstate 91, in Enfield Connecticut, a Connecticut State Police cruiser was severely damaged by a driver that neglected to brake for the emergency vehicles parked in the breakdown lane of the highway. Fortunately, this police cruiser was unoccupied at the time, but the severity of the damage made a lasting impression on the responders.

Having a Standard operating guideline in place will help start an incident in a successful direction and will allow the responders to concentrate on the task at hand. In the absence of

Standard Operating Procedures it's difficult for an incident commander to complete a thorough size up and develop a strategic plan, because he or she is busy assigning first in companies or, worse trying to reposition first in companies that have taken inappropriate positions (Kleane & Sanders 2001). This author is referring to operations at a structure fire, however the content of the message is the same for a highway incident.

Implementing SOG's with specific safety procedures for crews operating on the interstate will lessen the confusion of an incident and the occurrence of a firefighter being injured or killed is reduced or eliminated. Those firefighter's or Incident Commanders that do not have to be developing and action plan for the safety of the responders, because standard procedures or guidelines are in place, can concentrate on the emergency incident.

This applied research project relates to the several aspects of the National Fire Academies (NFA) Strategic Management of Change Program, including change management and organizational change of the department operating procedures and policies. By developing a standard operating guideline for operations on the interstate highway, it is changing the way the department operates to provide a more efficient and safe operation. As with all standard-operating guidelines and as outlined in the change management module a review and update must be conducted on a regular basis.

LITERATURE REVIEW

A literature review was performed to identify answers to the following questions. First, are near misses or secondary incidents while operating on the interstate highway a serious problem for responders? Next, what safety procedures are being used by agencies other than fire departments that work on the highway and can be adopted by the North Thompsonville Fire Department? What

are the responsibilities of the Incident Commander, and other fire department personnel relative to safety while operating on the highway? Lastly, should the interstate be completely closed to flowing traffic during operations by the fire department?

The research was initiated at the United States Fire Administrations (USFA) Learning Resource Center (LRC) during the second and third week of January 2001, while the author attended the Strategic Management of Change (SMOC) Program. The research continued in the months after the program in Enfield, CT. Material was obtained from journal articles, magazines, Connecticut State Statutes, North Thompsonville Fire Department Standard Operating Guidelines, Connecticut State Police administration and operations manual, Connecticut Department of Transportation Highway operations manual and a census survey. Additionally, searches were conducted online through Internet search engines to identify organization information with content that was relevant to the research topic.

According to Vincent Dunn who is a retired Deputy Fire Chief with the City of New York Fire Department, firefighters operating at a motor vehicle fire or extrication on the highway are not in the greatest danger from the flames or leaking gasoline but from oncoming, speeding trucks and cars. Additionally, firefighters arriving on a scene of a fire or accident on the highway must first control the traffic before turning their attention to the emergency in the event police are not on scene to control the traffic. Dunn goes on to state that any firefighter that is assigned to divert or stop traffic on the highway must never turn their back on the oncoming traffic nor should he believe that oncoming vehicles will stop for red warning lights, flashlights, flags or because the person is dressed in firefighter clothing (Dunn 1992).

Traffic diversion on an interstate highway is the subject of a U.S. Department of Transportation Federal Highway Administration manual named MUTCD 2000, the Manual on

Uniform Traffic Control Devices (MUTCD). Part six of the MUTCD manual is dedicated to temporary traffic control. The MUTCD manual states the primary function of temporary traffic control is to provide for the safe and efficient movement of vehicles, bicyclists, and pedestrians through or around temporary traffic control zones while reasonably protecting workers and equipment. In addition, of equal importance to the public traveling through any temporary traffic control zone is the safety of the workers performing the varied tasks within the workspace. Temporary traffic control zones present constantly changing conditions that are unexpected by the road user creating an even higher degree of vulnerability for the workers on or near the roadway (U.S. Department of Transportation 2000).

A review of Firefighter Fatality Investigation Reports completed by National Institute for Occupational Safety & Health (NIOSH) included several reports on firefighters that were killed after being struck by motor vehicles operating at incidents. Specifically, two reports, Firefighter Fatality Investigation Report 99F-38 and Firefighter Fatality Investigation Report 99F-27 discuss firefighter fatalities while operating on the highway. The first describes an incident which two career firefighters were struck on August 5, 1999 in Oklahoma. This incident occurred on a wet and busy interstate and was a secondary incident that occurred while the firefighters were attending to a victim of a motor vehicle accident. A second vehicle struck the median behind the operating fire company eventually striking two of the firefighters and the victim of the original accident. One of the firefighters was killed and the other seriously injured. The impact of the hit threw the three people that were hit forty-seven feet. (NIOSH 1999).

The second incident occurred on September 27, 1999, also at a secondary incident while the fire department was operating at an auto accident. The firefighter operating at this incident was

directed to set up for traffic control at an accident when about forty minutes in to the incident, he was struck and killed by a passing tractor-trailer. (NIOSH 2000)

Concluding both incidents, the NIOSH investigators clearly state that when operating on the highway there are several actions that a fire department should take to minimize the risk of similar accidents. First, fire departments must establish, implement and enforce standard operating procedures regarding operations at highway incidents. In addition, if police officers are not on scene to control traffic, firefighters must first control oncoming vehicles before turning their attention to the emergency at hand. NIOSH also concludes that a fire department should use fire apparatus appropriately positioned to protect firefighters on scene. Lastly, if fire department personnel are conducting traffic control measures, they wear a highly visible reflectorized vest and use a highly visible stop/slow paddle (NIOSH 1999).

The problem of secondary incidents on highway responses was the subject of a March 1999 White Paper which funded by the U. S. Fire Administration (USFA). In the introduction of the White Paper it is acknowledged that there appears to be a trend where emergency responders are falling victims of secondary incidents or mishaps that occur as the responders attend to the original incident to which they were called. The White Paper identifies the following two problem areas related to highway response. First, there is a lack of consistency, agreement and understanding of the minimum competencies necessary for all emergency personnel operating in or near moving traffic. Second, the paper states that the public lacks the understanding of the role of the emergency service personnel engaged in traffic control. The paper goes on to say that even our own colleagues in the fire, emergency medical service (EMS), law enforcement and other emergency services sometimes fail to appreciate the serious hazards routinely faced by those engaged in traffic control duties (Cohen 1999).

To address these problem areas, the White Paper makes several recommendations. The first recommendation is training. Training is required in traffic direction, diversion and road closure due to the varying tasks that a firefighter may be assigned. Additionally, the report identifies that Incident Commanders should be trained in order to effectively evaluate traffic directions and control. Lastly, preplanning for highway incidents is needed to effectively implement traffic detours as well as provide for effective scene management (Cohen 1999).

The problem of emergency responders being hit by vehicles is not something new and firefighters must always remain cognizant of motorists not fulfilling their responsibilities as a driver. Each year a number of emergency personnel are killed or injured on the freeway from motorists rubbernecking or under the influence of drugs or alcohol. Operating on the interstate is challenging under normal circumstances; however, nighttime operations or inclement weather will compound the potential hazard. Motorists stressed with operating in less than favorable driving conditions and emergency responders must use added caution and care (Staples 1991).

Mark McFall a safety and occupational health specialist with NIOSH says that firefighters don't realize that they are in much danger when they respond to an incident along the highway. McFall goes on to say Firefighters don't realize that they may be in as much danger from the passing traffic as they are when they enter a burning building (McFall 2001).

There are several recommendations that NIOSH makes for fire departments to consider for working along the roadside on emergencies. First, to develop, implement and enforce SOP's regarding emergency incidents along the roadway. The SOP should include the position of apparatus, closing and/or clearing traffic lanes, establishing a clear work area, wearing appropriate protective clothing and last releasing the incident back to normal. Second, NIOSH stresses that you must have an effective Incident Management System (McFall 2001).

Some suggest that the highway should be closed while an emergency incident is ongoing. Many fire officers would argue that the interstate should be closed immediately. In the State of Connecticut, a fire officer has the authority under Connecticut General Statute (C.G.S.) 313e to close the interstate to traffic in case of an emergency. C.G.S. 313e states:

Notwithstanding any provision in the general statutes or a municipal ordinance to the contrary, the fire chief of the municipality, or any member serving in the capacity of fire officer-in-charge, shall, when any fire department or company is responding to or operating at a fire, service call, or other emergency, within such municipality, have the authority to:

- (a) Control and direct emergency activities at such scene;
- (b) order any person to leave any building or place in the vicinity of such fire for the purpose of protecting such person from injury;
- (c) blockade any public highway, street, or private right-of-way temporarily while at such scene;
- (d) at any time of the day or night, enter any building, including a private dwelling, or upon any premises where a fire is in progress or near the scene of any fire, or where there is reasonable cause to believe a fire is in progress, for the purpose of extinguishing the fire or preventing its spread;
- (e) inspect for the purposes of preventing fires and preplanning the control of fire all buildings, structures or other places in their fire district, except the interior of private dwellings, where any combustible material, including but not limited to waste paper, rags, shavings, waste, leather, rubber, crates, boxes, barrels or rubbish, that is or may become dangerous as a fire menace to such buildings, structures or other places has been allowed to accumulate or where such chief or

his designated representative has reason to believe that such material has accumulated or is liable to be accumulated;

(f) order disengagement or discouragement of any convoy, caravan or train of vehicles, craft or railway cars for the purpose of extinguishing a fire or preventing its spread; and

(g) take command of any industrial fire brigade or fire chief when such fire company or department has been called to such industry (C.G.S. § 7-313e 1977) .

This is an extremely powerful statute for fire officers however; closing an interstate brings out additional problems. Staples notes that stopping traffic on freeways or expressways can cause serious problems throughout the highway system (Staples 1991). You may also face stiff opposition from State Troopers who have a responsibility to keep the highway open to motorists and traffic moving. In the event of a serious accident, hazardous materials incident, or if crews are operating in several lanes a closing may be warranted at which time you should receive the support and assistance of the State Police. For minor incidents that are off to one side or the other, alternate safe guards should be implemented. It is not practical to close the interstate each time a response is made on the freeway.

When operating on the interstate a designated incident scene safety officer should be assigned. It has become beneficial and at some incidents required, to designate a specific person as the Incident Safety Officer. Incidents on the interstate should also have a Safety Officer designated to insure a safe scene for the responders. A Safety Officer must be assigned to watch oncoming traffic and warn emergency personnel of potential problems (Staples 1991).

Until resources permit, the Incident Commander should fill the role on incident safety officer. The National Fire Protection Association (NFPA) in it's standard 1561 on Emergency Services Incident Management Systems dictates that the Incident Commander is responsible for

the overall command of the incident. NFPA 1561 also prescribes that the Incident Commander shall be responsible for the safety and health of all personnel and all other persons operating within the incident management system (NFPA 1561 2000).

Be sure to allow motorists the benefit of knowing what direction they should proceed in and don't allow a motorist to have to guess what direction they should travel. A secure well-defined incident scene (traffic control zone) will command the attention of motorists and pedestrians and clearly guide them around the scene without confusion. A traffic control zone that gives motorists adequate warning and reaction time must be established (Elvey 2001).

According to the State of Connecticut, when establishing traffic control patterns, a buffer space should be provided. The buffer space should extend from the end of the transition taper to the beginning of the work area and should be free of equipment, workers, material and parked vehicles. The buffer space should be not less than 350 feet in length. Traffic cones are then placed in a tapered line up to and along the work area ("Traffic Control," 1995).

Dunn agrees and says that roadway-warning devices must be properly and prominently displayed. Firefighters must not only be able to judge the stopping distance of vehicles traveling at sixty miles per hour, they must also be able to factor in the effects of a downgrade, curves in the road, darkness and various other weather conditions. Similarly to the State of Connecticut recommendations, Dunn says that warning devices on the highway must be placed at least three hundred and fifty feet away from the work area. They must also be able to be seen by motorists at least an additional three hundred and fifty feet giving the driver seven hundred feet to stop if needed (Dunn 1992).

NFPA standard 1500 states in section 6-4.7 that when personnel are working at an incident and their assignment places them in conflict with motor vehicle traffic, they shall wear a garment

with fluorescent retroreflective material. The standard goes on to say that apparatus with the warning lights on should be used to shield the work area from oncoming traffic (NFPA 1500 1997).

PROCEDURES

Definition of Terms

National Fire Protection Association (NFPA) - The NFPA is a voluntary organization that puts together consensus standards for the fire service as well as other professional organizations dealing with fire protection and life safety issues.

Incident Commander – The fire department member in overall command of an emergency incident.

Near miss - For the purpose of this paper a near miss indicated that a driver had to take evasive action or skidding to a stop to avoid hitting, equipment, personnel or another passing vehicle in the vicinity of an incident the fire department is operating at.

Standard Operating Guidelines (SOG's) – A set of written procedures that a department has instituted as the normal procedures for specific incidents and operations. Standard Operating Guideline and Standard Operating Procedure are synonymous for the purpose of this paper.

Secondary Incident – An automobile accident which occurred at a scene that the fire department was called to and while the firefighters were performing their duties. For example, while firefighters are extinguishing an auto fire on the highway, a passing vehicle hits the apparatus, firefighters, another vehicle, guardrail etc.

This research project employed a historical and action methodology to identify problems at past incidents where firefighters were injured or killed operating at highway incidents. Then a review of effective procedures used to minimize the risk and formulate a standard operating

guideline to insure safety for the responders on a highway response. The procedures used to complete the literature review included an examination of fire service journals, magazines, standards, a review of Internet web sites and convenience survey distributed to fire officers of the North Thompsonville Fire Department.

Literature Review

A literature review was performed to identify procedures and programs that are in existence and can be referenced in the development of a SOG for interstate highway operations by North Thompsonville Firefighters. Research material was obtained from journal articles, magazines, Connecticut State Statutes, North Thompsonville Fire Department Standard Operating Guidelines, The Connecticut State Police Administration and Operations manual and the Connecticut Department of Transportation highway operation traffic control pattern manual. A census survey was also conducted of the North Thompsonville fire officers to determine the occurrence of secondary incidents or near misses while operating on the Interstate. Lastly, searches were conducted online through Internet search engines to identify organization information with content that was relevant to the research topic.

Survey

Eleven North Thompsonville Fire Officers were asked to complete a survey concerning secondary incidents and/or near misses while operating on the Highway. The purpose of the survey was to determine which fire officers of this department witnessed secondary incidents or near misses while operating on the highway. If the officers witnessed a near miss or secondary incident, in their opinion what was the reason for the incident. This information would provide

feedback to the researcher relative to what has been witnessed by the fire officers on interstate scenes. The survey instrument used is included in the appendix section of this document.

There were eleven surveys returned. There was only one survey participant (11%) of the surveys returned, which stated he has not witnessed a near miss or a secondary accident while operating on the highway. It is important to note that this respondent indicated that he was a fire officer for only six months. This survey indicated that the fire officers of the North Thompsonville Fire Department have witnessed situations that have potential for serious secondary incidents. Seven (58%) of the fire officers said they have witnessed secondary incidents while operating on the interstate. Eight of the respondents (75%) checked off that in their opinion motorist “rubbernecking” was the main reason for near misses or a secondary incident, closely followed by seven respondents (58%) who suggested that lack of police presence was the reason for a problem. Lastly, when asked for other potential reasons for problems, the respondents indicated cars traveling too fast by an emergency scene, motorists “tunnel vision”, motorist disregard for emergency vehicles and one that indicated they thought motorist were blinded by apparatus lighting.

In summary, the survey concurred with the literature review concerning secondary incidents and near misses and the probable reason for the incidents as well. 11 surveys were distributed and 11 returned, for a return rate of 100%. This return rate provides a sufficient return rate to insure a confidence level of 95 percent (Krejcie, 1970).

Assumptions

Procedures used to complete the research included three basic assumptions. First, it was assumed that the author of the literature performed objective and impartial research. Second, it was

assumed that survey participants answered the questions honestly and without bias. Lastly, it was assumed that survey respondents did not participate in any collaborative effort.

Limitations

The limitations that affected this research paper included the limit of survey participants. The survey was conducted with eleven fire officers from the North Thompsonville Fire Department. The survey asked the fire officers to make some conclusions based on their experiences in the street.

RESULTS

1. Are secondary incidents or near misses at interstate highway operations a serious problem for fire departments?

The research indicates that the occurrence of secondary incidents is a problem on interstate highway operations. Each year hundreds of firefighters are severely injured while operating on the interstate.

While the injuries and deaths are not happening at near misses, the fact that near misses are occurring, prove that a department should look at the procedures that they are using to control traffic. Using present procedures may not be sufficient and motorist's may not be getting sufficient warning. Many firefighters have been severely injured and killed operating along the highway proving that secondary incidents are a problem.

2. What procedures do agencies other than fire departments that operate on the interstate highway use to enhance worker safety which can also be used by the North Thompsonville Fire Department?

The research indicated that the State of Connecticut uses a cone pattern for warning motorists of workers on the interstate. The initial cone pattern should be at least three hundred and fifty feet away from the first vehicle operating on scene. This would allow the motorists to see the impending operation with sufficient time to slow and move into the appropriate lanes of the highway. The Federal Highway Administration also publishes a document consistent with the State of Connecticut describing highway traffic patterns, detours for traffic, sign and cone patterns. State and Federal agencies that have traffic direction responsibilities equip those personnel with vests with reflectorized trim, unlike fire gear, which does have reflectorized material, the vests are in bright orange or bright green in addition to the reflectorized strips.

3. When responding to an incident on the interstate highway, what the responsibilities of the incident commander and other fire department members relative to highway safety?

The research concluded that the Incident Commander has the responsibility insuring that appropriate safeguards are taken not only for the protection of firefighters, but also for the victims of an accident, other personnel operating at a scene and by standers. Additionally, firefighters have a responsibility to insure that they comply with departmental operating guidelines, which were developed with their safety in mind. It was noted that firefighters often would be involved in their assignment to the point that they lose track of the conditions of the moving traffic. All firefighters have a responsibility to make sure they are using the work zone provided and not inadvertently moving into the path of an oncoming vehicle. The Incident Commander shall be the Safety Officer upon arrival at an incident on the highway. A dedicated incident safety officer should be appointed

as soon as practical into the incident. This will allow a dedicated individual to monitor the vehicle traffic and safety procedures in place for maximum protection to the workers and victims.

4. Should an interstate highway be completely closed to moving traffic when the fire department is operating at an interstate incident?

The research shows that it is not always practical to close an interstate highway. Further complications will develop if the volume of traffic, which operates on the interstate, is stopped and/or diverted to local streets. The local streets are not designed to hold the volume of traffic that uses the interstate. When the Incident Commander determines that moving traffic has the serious potential for further injury or secondary incidents, the Incident Commander must close the highway to flowing traffic. Serious consideration must be given to the impact of the closing on the alternate route infrastructure as well as other resources that will need to accommodate the flowing traffic. Prior to closing the interstate an Incident Commander must determine that other measures will not be sufficient to provide a safe work zone for the responders. The Incident Commander has the responsibility to protect the personnel and victims on a scene. If conditions warrant and present a hazard to responders and or victims, the Incident Commander does have the legal authority to close the interstate.

Taking the results and findings of the research allowed for the development of a standard operating guideline to address safety procedures for operations by the fire department on interstate highways. Several considerations had to be taken into account in the development of the SOG. First, the establishment of the scope of the guideline needed to be done; in this case, the guideline is to be used on an interstate operation. The scope of this guideline is liberal enough to allow an Incident Commander the ability to use this guideline on any roadway where there is flowing traffic.

The next step in developing the guideline was to establish definitions for any ambiguous terms so that all firefighters will clearly understand their responsibilities. Based on the research conducted, guidelines were established for protective clothing use, use of apparatus for blocking traffic, considerations for closing the interstate and sufficient motorist direction devices (cones, signs, etc.).

DISCUSSION

Fire fighting continues to be one of the most hazardous occupations the United States. Over the past nineteen years, an average of well over 100 firefighter deaths and 100,000 injuries per year have placed firefighting among those jobs rate highest for occupational death and injury (Peterson 1997). Many of the deaths and injuries occurred while firefighters were providing service to injured people, fires or hazardous materials incidents on the highway. Operations along the highways kill and injure a high percentage of firefighters each year (Wilbur 2000). It is widely known and accepted that the development and application of SOG's will reduce risk to firefighters in all phases of firefighting and emergency operations. Having SOG's in effect are a form of control. Control in any organization is necessary to minimize risk and ensure predictable outcomes during standard operations (Cook 1998). The research and product produced from the research for this ARP is no different. In doing the research and then developing a written procedure aimed to eliminate ambiguity by the responding personnel and enforcing the content of the SOG risk will be reduced. Also there is some degree of predicting the outcome of the incident.

Throughout the process of research for this project it became clearer as the researcher proceeded, that the frequency of secondary incidents and near misses is a problem to responders that has killed and injured. It is not only important, but also our mission to take precautions to

protect the responders in providing a safe work environment as well as to protect victims of injury from further injury.

There is an average daily count of vehicles passing through Interstate 91 in Enfield, Connecticut of 76,500. This represents an average of 3200 vehicles an hour passing through the highway area that is serviced by the North Thompsonville Fire Department (E. Lagosh, personal communication June 1, 2001). Without doubt, there are a great many more cars traveling through during the rush hour and fewer during the overnight hours. This represents two very genuine concerns for responders, first the large volume of vehicles passing an incident during the day and secondly, while the volume of vehicles during the nighttime is lower, the occurrence of crossing the path of a driver under the influence of alcohol or drugs would seem greater.

It was surprising to this researcher that after a complete review of the Connecticut State Police Administration and Operation Manual, a document of some several hundred pages, there wasn't reference or guidance to the State Police Troopers for sign patterns, cruiser placement or directing traffic on the Interstate. Granted, Troopers are trained in the academy for these operations and probably receive in service training, but with the potential on the highway, there should be some written direction to follow. There should be written procedures in their operations manual and those procedures should be followed and enforced by supervisors. Cook states that written SOPs are only effective if they are used and a SOP that management doesn't enforce isn't a true SOP (Cook 1992).

RECOMMENDATIONS

The fire service must realize that prior to working in a potentially hazardous environment, specifically on an interstate highway, we must train the responders to protect themselves from

secondary incidents. Additionally, standard operating procedures must be developed, maintained and enforced to protect the responders. The development of the standard operating guideline with this ARP is the first step in reducing the risk to firefighters operating on the interstate highway. The firefighters must now be trained in the contents of the SOG. If firefighters are going to provide traffic direction, they must also be trained in the proper method of traffic direction and what traffic direction aids they should use to minimize their exposure.

It is the nature of firefighters when we see people that need help to rush into the scene and help those individuals. On the interstate, this is done most often without properly providing safe guards to protect the same people responding to a call for aid, the firefighter. It took over a hundred years, however the fire service is now learning proper steps must be taken in order to protect ourselves before we can be of help to injured citizens or have the ability to mitigate some other emergency. This is no clearer in today's fire service, than with hazardous materials incidents. We are now training firefighters to know what they are getting into before they go in. The fire service must use this same type of attitude with operations on the interstate no matter how minor the incident. Precautions must be taken to protect the firefighters on the highway to avoid injury and death.

Finally, by having SOG's in place, training on the SOG's and outlining what steps must occur when arriving at an incident on the interstate, it will allow the incident commander to plan strategy and command the incident without having to plan apparatus placement for protecting the work zone. The SOG must have provisions for providing a safe work environment, including apparatus placement, methods of traffic direction, proper personal protective equipment, and provisions for closing the interstate to flowing traffic. Remember firefighters cannot help those they are called to help if protection isn't first provided for the responders.

REFERENCES

- Authority of Fire Officer during Emergency. CT Gen. Stat. § 7-313e (1999).
- Badger, S. (November-December 2000). 1999 United States Firefighter Injuries. *NFPA Journal*, 40-49.
- Cohen, H. (1999). Protecting Emergency Responders On The Highways The “Second Incident” Problem. Halfway, MD. A White Paper.
- Cook, J. (1998). *Standard Operating Procedures and Guidelines*. Saddle Brook, NJ: Fire Engineering Books & Videos
- Dunn, V. (1992). *Safety and Survival on the Fireground*. (1st ed.) Saddle Brook, NJ: Fire Engineering Books & Videos
- Elvey, R. (March 2001). Emergency Traffic Management. *Firehouse*, 100-103.
- Fahey, R. & LeBlanc, P. (July-August 2000). Report on Firefighter Fatalities. *NFPA Journal*, 46-53.
- Klaene, B. & Sanders, R. (January-February 2001). Structural Firefighting. *NFPA Journal*, 26.
- McFall, M. (March 2001). Roadside Assistance. *Fire Chief*, 62-64
- National Fire Academy Executive Development Student Manual. Author. p. SM 3-40. From: Krejcie, R. V. and Morgan, D.W. (1970). Determining sample size for research activities. *Educational Psychological Measurement*, 1970, 30, 607-610.
- National Fire Protection Association. (1997). NFPA 1500 Standard on Fire Department Occupational Health and safety Program. Quincy, MA: Author
- _____. (2000). NFPA 1561 Standard on Fire Department Incident Management Systems. Quincy, MA: Author

National Institute for Occupational Safety & Health (1999). CDC – Fire Fighter Fatality Investigation Report 99F-27 [on-line]. Available:

<http://www.cdc.gov/niosh/face9927.html>

_____. (2000). CDC – Fire Fighter Fatality Investigation Report 99F-38 [on-line]. Available: <http://www.cdc.gov/niosh/face9938.html>

Peterson, W. (1997). Fire Department Occupational Safety and Health. A. Cote (Ed.), Fire Protection Handbook (18th ed., pp. 10-59). Quincy, MA: National Fire Protection Association

Staples, W. (May 1991). Developing an Emergency Response Plan for Highway Incidents. *Fire Chief*, 80-82.

State of Connecticut (1995). Traffic Control Patterns for Highway Maintenance Operations.

U.S. Department of Transportation, Federal Highway Administration. (2000). Part VI Temporary Traffic Control. Manual on Uniform Traffic Control Devices. [on-line]. Available: <http://mutcd.fhwa.dot.gov/>.

Wilbur, M. (November 2000). Accident Scene Safety: Case Studies from the Field. *Firehouse*, 122-123

APPENDIX A

The purpose of this survey is to determine if fire officers of the North Thompsonville Fire Department who responded on Interstate 91 have witnessed “secondary” incidents or near misses while operating at an incident that we were involved with. Also to determine what the officer feels was the most significant reason for the secondary incident.

** For the purpose of this survey:

A secondary incident is when there is an accident that occurs while we are on scene and is within eyesight of the units operating on the highway.

A near miss is witnessing drivers taking evasive action to avoid a collision with another vehicle or emergency apparatus.

Fire Department Rank: _____

How long have you been an NTFD Officer: _____

Have you witnessed “secondary incidents” while operating on the Interstate?

Yes _____

No _____

Have you witnessed “near misses” while operating on the Interstate?

Yes _____

No _____

If you answered yes to either of the above questions go on to the next question. If you answered no to both of the above questions stop and return this survey.

Do you feel a major contributing factor to these incidents was:

Operator not paying attention or “rubbernecking” _____ yes _____ no

Poor placement of vehicles or cones by the fire department _____ yes _____ no

Lack of traffic control by police authorities _____ yes _____ no

Unavoidable _____ yes _____ no _____

Other: _____

Other: _____

APPENDIX B

SAFETY PROCEDURES FOR INTERSTATE HIGHWAY OPERATIONS

NT-242

Purpose: To specifically state safety procedures which shall be implemented for the protection of personnel when operating on the Interstate Highway.

Scope: The scope of this guideline is for fire department operations on the interstate highway. For an incident on a road other than the interstate, the Incident Commander may implement the procedures of this guideline for the protection of firefighters working in the roadway.

Always consider moving vehicles as a threat to your safety. Motorists drive at speeds from a slow creep to well over the speed limit. Many motorists are often looking at the scene and not the road. Others may be alcohol and/or drug impaired. Nighttime operations can be particularly hazardous. Visibility is reduced and the flashing of emergency lights tend to confuse motorists. Inclement weather conditions further deteriorate visibility for the approaching motorist and decrease safety for personnel operating in or near moving traffic. Priority must be given to the protection of the personnel working the scene. **ALWAYS BE ALERT!**

Definitions:

Block - positioning an apparatus or vehicle at an angle to approaching traffic to shield and protect the incident scene from moving traffic.

Work Zone – the area required for the personnel to safely work in.

Taper - Use of cones, flares, apparatus or vehicles to reduce and merge the number of approaching lanes of traffic.

Buffer Zone - a safe space or distance between the protected work zone and moving traffic

Upstream - traffic flow that is approaching the work zone of an incident.

Downstream - traffic flow that has passed and is departing the work area of an.

Protective Clothing for Personnel working in or Near Moving Traffic:

Structural fire gear must be properly donned at all times when working in or near moving traffic. Personnel engaged in traffic direction must don the reflective vests carried in the engineers compartment of the apparatus and use the reflective “slow-stop” traffic direction sign.

Safe Positioning of Apparatus and Vehicles when Working In or Near Moving Traffic:

First arriving apparatus and vehicles must position in a 'block' position to best protect the crash scene, patients and emergency personnel. Where possible, place apparatus in a 'block' angle of at least 45 degrees to approaching upstream traffic. The initial block should provide a safe work zone that includes adequate upstream traffic. The initial block should provide a safe work zone that includes adequate buffer space between operating personnel and moving traffic. Typically blocking one lane in addition to what is already obstructed by the damaged vehicles will provide this margin of safety allowing an area for personnel to work in and provide a buffer area for personnel.

If State Police are not on the scene upon arrival have the dispatcher determine their estimated time of arrival. If the State Police will be delayed, direct the dispatcher to send Enfield Police to

assist with traffic. Be specific when providing directions to police officers as to exactly what your traffic control needs are. If the incident is predicted to go longer than thirty minutes direct the dispatcher to notify the State Department of Transportation to deploy the sign trucks to the scene for traffic direction and possible diversion.

For vehicle fires or other incidents which hoselines may be needed, a block, which allows the pump panel to be downstream of oncoming traffic allowing the pump operator protection, is preferred. Personnel shall always exit the apparatus on the down stream side unless not possible to do so. Always look before stepping out of the vehicle or from around apparatus into any traffic areas. After exiting the apparatus, personnel must move to the protected work zone as soon as practical. When walking around fire apparatus or vehicles that are 'blocking' in or near moving traffic, remain alert to upstream traffic. Walk as close to fire apparatus as possible, reducing your profile and exposure to moving traffic.

The initial Command Officer shall operate as the Incident Safety Officer. As personnel permit and for an extended operation the Incident Commander shall assign a "scene safety officer". During daytime operations, leave all emergency lights 'ON' to provide warning to drivers. For operations during nighttime hours do not direct spotlights in the direction of oncoming traffic. When parked at incidents the use of "wig wag" headlights is prohibited. This will help reduce the blinding effect of headlights for approaching vehicle traffic. Additionally, the arrow stick on the back of the apparatus shall be positioned to indicate to oncoming traffic the appropriate direction you want them to proceed.

Place a sufficient number of traffic cones at the scene to direct all moving traffic. This should be initiated over a minimum distance of 350' upstream of the blocking apparatus by the first company arriving on the scene and expanded as needed. Always place and retrieve cones while facing on-coming traffic. Traffic cones should be tapered at a 45-degree angle to the direction the traffic is to migrate. This will allow motorists sufficient reaction time before arriving by the work zone. During nighttime incidents, inclement weather or reduced lighting levels, place flare (if safe to do so) adjacent to and in combination with traffic cones for improved illumination of the cones. Termination of the incident must be managed with the same aggressiveness as initial actions. Crews, apparatus, and equipment must be removed from the highway promptly to reduce exposure to moving traffic.

CLOSING THE INTERSTATE:

If the safety of operating personnel cannot be assured, STOP the flow of traffic until either the fire department task is accomplished and personnel move from the exposed position or the traffic flow can resume at a pace that the safety of personnel is guaranteed. Completely closing the Interstate is not always practical and may cause additional problems for responders. If in doubt or the safety of the victim(s) is in question close the Interstate until sufficient law enforcement resources are available to control moving traffic. Notify dispatch to notify the State Department of Transportation for possible implementation of the Interstate Highway Diversion Plan.

June 1, 2001