



FIREFIGHTER FATALITY INVESTIGATION

**Assistant Fire Chief Jarrell "Jay" B. Hinkie
Silsbee Volunteer Fire Department**

Investigation FFF FY 17-03
Silsbee, Texas • August 2, 2017


State Fire Marshal's Office

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The subsequent investigation of this incident provides valuable information to the fire service by examining the lessons learned, to prevent future loss of life and property.

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Silsbee Volunteer Fire Department
Silsbee Police Department
Texas Department of Public Safety
Forensic Medical Management Services of Texas, Jefferson County

The following members provided assistance as part of the Texas Non-Metro Tactics Review Team. The team conducted the review of the operations and tactics, and provided recommendations. We commend these individuals for their commitment to the review of this incident, in pursuit of firefighter safety for the Texas and National Fire Service.

David Martinez, Fire Chief, City of Coleman
Tim Bogisch, Fire Chief, City of McQueeney
Jim Schultz, Assistant Fire Chief, City of McAllen

Texas Fire Service representatives reviewed the report. These representatives are:

Texas Commission on Fire Protection
Texas Fire Chiefs Association
Texas State Association of Firefighters
Texas A&M Forest Service
State Firefighters' and Fire Marshals' Association
Texas A&M Engineering and Extension Service (TEEX)
Texas Fire Marshals' Association
Texas Chapter of the International Association of Arson Investigators

Executive Summary

On August 2, 2017, at approximately 4:43 p.m., 61-year-old Silsbee Volunteer Fire Department Assistant Chief Jarrell B. Hinkie was struck by a motor vehicle while working the scene of a single-vehicle accident on East Farm to Market (FM) Road 418. Assistant Chief Hinkie and other Silsbee Volunteer Fire Department units had responded to a single-vehicle accident off the roadway. While they were clearing the scene, a vehicle driving 56 miles per hour struck Assistant Chief Hinkie. EMS was immediately called to the scene and transported Assistant Chief Hinkie to Saint Elizabeth Hospital in Beaumont; however, he succumbed to the injuries.

The Texas State Fire Marshal's Office Firefighter Fatality Coordinator was notified of the incident and Investigator Paul Ayres was assigned to this incident.

This death is classified as a Line of Duty Death (LODD). Thorough analysis of the circumstances indicates that the death of Assistant Chief Hinkie was preventable. The findings in this report collectively outline what led to this tragedy. This report's goal is to challenge the Silsbee Volunteer Fire Department (Silsbee VFD) to meet national fire service best practices identified in this report's recommendations, in order to minimize risk exposure to the men and women of the Silsbee VFD; this will honor the memory of Assistant Chief Hinkie and take the fire department to an even higher level of performance.

The State Fire Marshal's Office recommends that fire departments incorporate the following into department policies and procedures.

- Conduct a size-up of the traffic incident. *(Page 22)*
- Operate only in safe work zones. *(Page 24)*
- Employ a method to warn responders of immediate hazards. *(Page 26)*
- Demobilize in an orderly manner. *(Page 26)*
- Wear appropriate personal protective equipment (PPE). *(Page 28)*
- Form a policy to address traffic incident management training. *(Page 29)*
- Form a policy to address personally owned vehicles (POVs) responding to a traffic incident. *(Page 30)*

- Form a policy to address traffic incident operations. *(Page 31)*
- Increase apparatus visibility. *(Page 32)*
- Incorporate “move over or slow down” law into public education. *(Page 33)*
- Develop a local interagency agreement with clearly established responsibilities. *(Page 34)*
- Develop a strategic plan for departmental health, safety, and risk management. *(Page 34)*

This report is intended to honor the memory of Assistant Fire Chief Jarrell B. Hinkie by taking the lessons learned from this tragedy so that others may benefit from enhanced training and safety.



**Assistant Fire Chief Jarrell B. Hinkie, 61
Silsbee Volunteer Fire Department**

Introduction

The Silsbee Volunteer Fire Department notified the Texas State Fire Marshal's Office that Assistant Chief Jarrell B. Hinkie was fatally injured while operating at a single motor vehicle accident scene on August 2, 2017.

SFMO commenced the firefighter fatality investigation under the authority of Texas Government Code § 417.0075(b), which reads:

If a firefighter dies in the line of duty or if the firefighter's death occurs in connection with an on-duty incident in this state, the state fire marshal shall investigate the circumstances surrounding the death of the firefighter, including any factors that may have contributed to the death of the firefighter.

Lieutenant Brian Fine with the Texas State Fire Marshal's Office assigned Investigator Paul Ayres to investigate the firefighter fatality. Silsbee Volunteer Fire Department and Silsbee Police Department staff assisted throughout the investigation of the incident.

Silsbee Volunteer Fire Department

The Silsbee Volunteer Fire Department has an active membership of 40: a fire chief, an assistant fire chief, two deputy chiefs, seven captains and 29 firefighters. Fire department activity includes fire suppression, vehicle extrication, rescue (water, high angle, confined space, heavy), hazardous material spill response and control, maintenance of fire response records, firefighter training and safety and maintenance of training records, fire station and equipment maintenance, coordination and planning with area fire departments for mutual aid for any of the above-mentioned emergency responses.

Mission Statement

The mission of the Silsbee Volunteer Fire Department is the protection of life and the preservation of property from and during such fires and emergencies that may occur in the City of Silsbee. This is accomplished through the training of members in the latest and most proven methods of fire suppression and handling of other disasters that may occur.

Goals

To protect the lives and the property of the citizens of Silsbee from damage or loss due to a mishap from fire, flood, explosives, hazardous materials accidents and other forms of mishaps.

Objectives

- To maintain firefighter readiness through proper training programs;
- To maintain equipment and personnel so as to respond quickly and provide quality service whether the incident is a fire or other emergency or public service;
- To acquire the latest information and training on haz-mat response and public safety;
- To strategically locate and acquire sites for new stations and equipment.

Recruitment and Training

Volunteers are not required to have any prior training or experience. After being voted into the department, the new member is placed on a 90-180 day probationary period. During probation, the member receives training and must prove competency in basic firefighting skills referenced in SFFMA skills sheets. Members are not allowed to fight fires from the

interior or perform extrication at a motor vehicle accident until they have completed probation. Probationary duties are restricted to exterior firefighting duties or traffic control operations. The probation period ends with the completion of SFFMA skills sheets.

Assistant Fire Chief Jarrell B. Hinkie

Assistant Chief Hinkie began volunteer firefighting in 1991, serving the City of Silsbee and surrounding communities for 26 years. Assistant Chief Hinkie did not hold any certifications through SFFMA or TCFP, but he received extensive training through his employer and Silsbee Volunteer Fire Department. As a Refinery Supervisor with South Hampton, Inc., he had completed many hours of training in workplace safety and security, disaster planning, and confined space rescue. He had also accrued years of experience in industrial firefighting and hazardous materials response. Hinkie became Assistant Chief in 1997.

As the Assistant Chief, he actively participated in department functions. Most recently, he had participated in an in-house training program focused on the *Essentials of Fire Fighting* (6th Edition). Assistant Chief Hinkie was tested on a variety of topics and demonstrated knowledge in firefighter health and safety, firefighter personal protective equipment, portable fire extinguishers, and Critical Incident Stress Management (CISM). He had also completed a wildland firefighting course through the Texas A&M Forest Service.

Assistant Chief Hinkie completed multiple FEMA Independent Study Courses, including IS-100, IS-200, IS-700, and IS-800, as well as ICS-300 and ICS-400 for command and control of large and expanding incidents.

Autopsy Results

An autopsy conducted by Forensic Medical Management Services of Texas in Jefferson County revealed Assistant Chief Hinkie's cause of death was blunt force trauma.

Incident Timeline

The following information is provided by the Silsbee Volunteer Fire Department and Silsbee Police Department. Times noted are approximated from interviews, statements, incident reports, and dispatch recordings.

August 2, 2017

Weather conditions were cloudy and light rain with a temperature of 77°, dew point 72.1°, and humidity of 85%.

- 15:56** Silsbee 911 Dispatch received a call of a motor vehicle accident at the curve on East FM 418 headed toward Business Highway 96.
- 15:57** Silsbee Police Department was dispatched.
- 15:59** Silsbee Police Unit 91 arrived on scene.
Acadian EMS was dispatched for SUV occupants.
- 16:04** Silsbee Volunteer Fire Department was dispatched.
- 16:09** First SVFD unit arrived on scene.
Apparatus: Chief's Truck, Engine 61, Engine 67, Rescue 61 (Total: 4)
Personnel: G. Avery; A. Brown; J. Hinkie; S. Hogan; T. Jewett; R. Jones; C. Martin; J. Miller; J. Reeves; K. Reeves; S. Reeves; M. Segrest; C. Spurlock; D. Stanley; L. Strother; D. Venable; C. Whigham; B. Wright. (Total: 18)
- 16:42** SVFD 601: "601, Silsbee."
Dispatch: "Go ahead 601."
SVFD 601: "Yes ma'am, **inaudible** all units released."
- 16:43** SVFD 601: "601, Silsbee. Get me an ambulance back out here now!"
Dispatch: "10-4 601"
SVFD 601: "I've got a firefighter down, hurry up."
Dispatch placed call to Acadian EMS.

SPD 91: "I need EMS here right now."

Dispatch: "I'm on the phone getting them. I'll get them to y'all as soon as I can."

Dispatch placed call to Alpha Rescue.

16:44

SPD 91: "Right now, we're going to need, uh, probably an air rescue as well."

SPD 91: "We're going to need some back up here."

Dispatch asked for more assistance at dispatch console.

SVFD 601: "601, Silsbee. Launch the bird! Launch the bird!"

SPD 99: "91, what you got Grant?"

SPD 91: "Fireman got hit."

SVFD 601: "CPR is in progress."

SVFD 641: "641 to Silsbee, did you copy we need air rescue?"

Dispatch: "10-4, we copy."

SPD 91: "Shut down all of 418, Old Evadale to 92."

16:45

SPD 99: "OK, we're coming Grant."

SPD 91: "Air rescue's going to be right here at Dump Road."

SPD 71: "I don't want to get on the radio, Chris, very much, but can you tell me what's going on?"

SPD 99: "A fireman working the scene just got hit. They're calling in air rescue. They need help shutting everything down."

SPD 71: "10-4."

Dispatch: "601, I've got Acadian and Alpha headed your way so we can get one to you, and I've also got them notified to get the bird in the air for you."

16:46

Dispatch called Acadian to check on status of helicopter.

16:47

SVFD 601: "601, Silsbee."

Dispatch: "Go ahead 601."

SVFD 601: "Yes ma'am, can you get an ETA on that helicopter?"

Dispatch: "601, be advised the weather has grounded the bird. Air Rescue's

not going to be able to fly.”

SVFD 601: “Alright then, I’m going to need an ambulance and I need it now.”

16:48 Dispatch: “I’ve got two of them coming to you as fast as they can sir.”

SVFD 601: “ETA on them?”

Dispatch: “601, can you give me a status update on your firefighter?”

Dispatch: “91, can you give me a status update for EMS so they know what they’re coming into, what they need when they get there?”

16:49 SVFD 601: “601, Silsbee. I got an ambulance.”

Dispatch: “10-4.”

16:53 Dispatch was notified that Alpha Rescue was transporting Hinkie to Saint Elizabeth Hospital.

17:20 Assistant Chief Hinkie succumbed to his injuries at the Emergency Department of Saint Elizabeth Hospital in Beaumont.

Incident Details

Silsbee Volunteer Fire Department was dispatched to a single motor vehicle accident on FM 418 at Dump Road. The 911 caller reported that a vehicle had left the roadway and was in the ditch on the eastbound side. The incident happened in the curve of a two-lane roadway. Weather at the time of the incident was cloudy with light rain. The temperature was 77° Fahrenheit with a dew point of 72.1° Fahrenheit and 85% humidity.

The Silsbee Volunteer Fire Department responded with four fire department apparatus (Chief, Engine 61, Engine 67, and Rescue 61) and 18 firefighters. Most firefighters responded to the scene in their personally owned vehicles. Fire department apparatus and personally owned vehicles were parked on the shoulder of either side of the roadway. No traffic control devices were used; however, firefighters were directing traffic at each end of the scene and traffic was allowed to continue driving through the area. With emergency vehicles lining the roadway on either shoulder, most traffic had slowed to an acceptable and safe speed. Based on the needs of the initial incident, firefighters determined the work area was off the roadway and did not block any lanes of traffic.

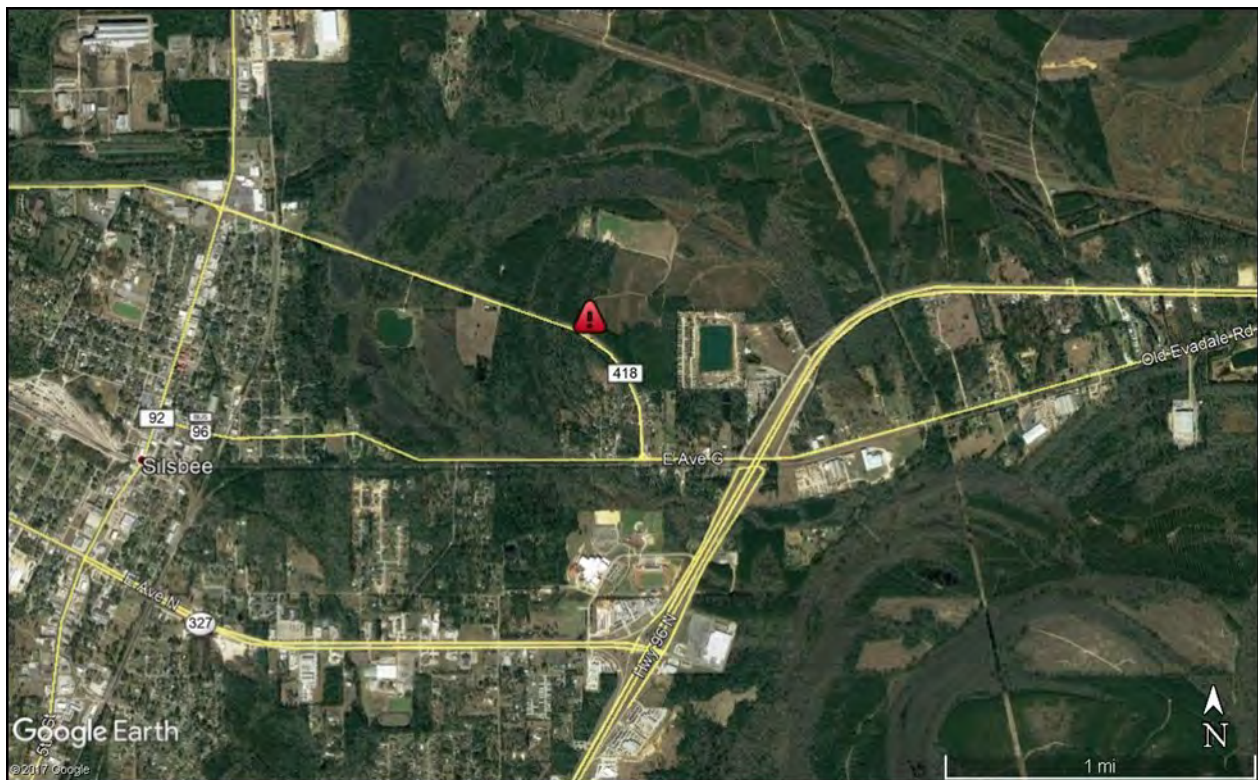


Figure 1: Aerial view of incident scene; Source: Google Earth

Firefighters positioned Engine 67 in a location that would provide advanced warning to drivers approaching from the eastbound side. A reasonably safe work area was established for the eastbound shoulder and ditch. The dynamic nature of the emergency incident, however, created a situation where firefighters and EMS personnel were operating in the unprotected lanes of traffic. At one point during the incident, firefighters stepped into the eastbound lane with their hands up to stop traffic. EMS personnel brought a patient on a stretcher into the

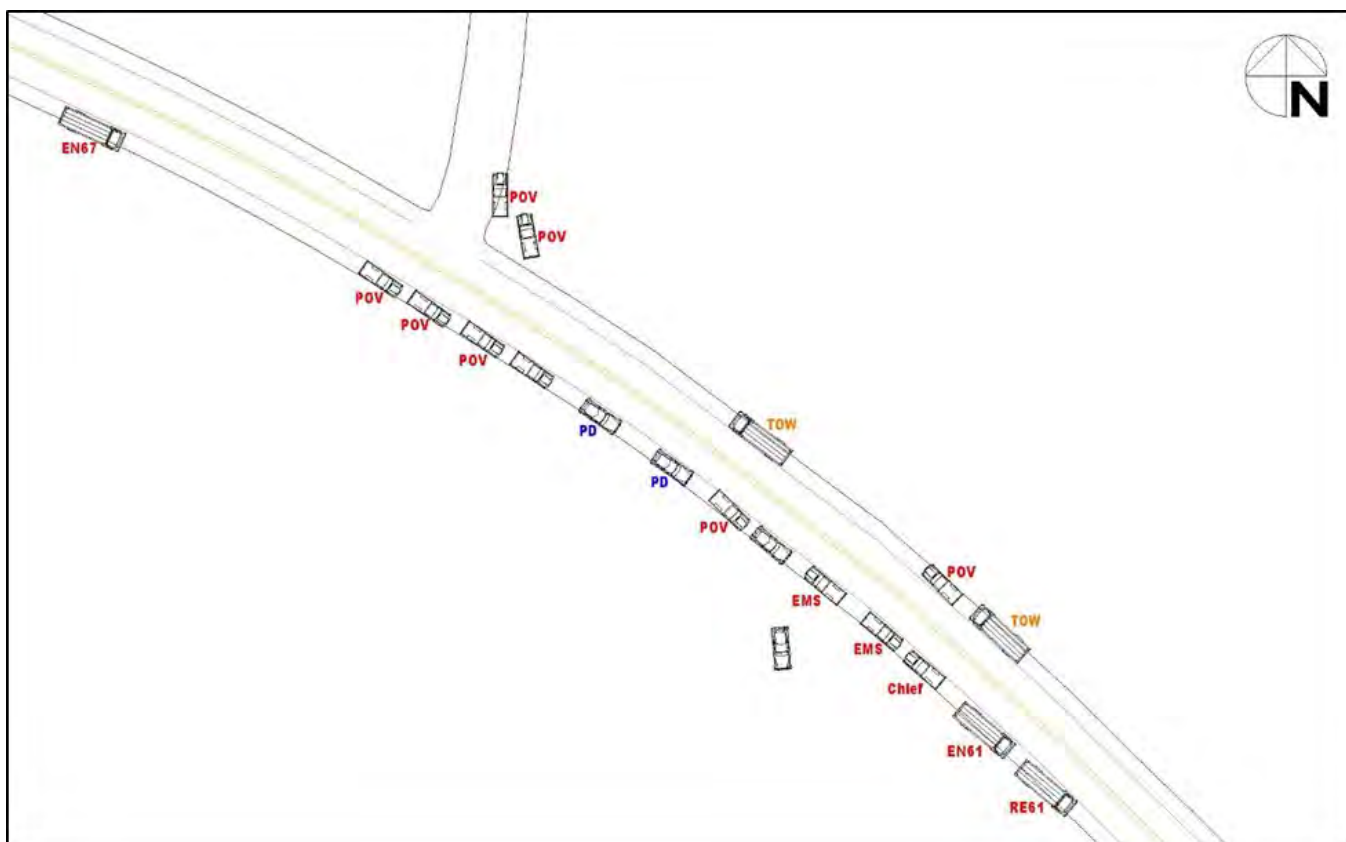


Figure 2: Apparatus placement during initial traffic incident

Source: TXSFMO, created by referencing Silsbee Police Department Body and Dash Cameras

eastbound lane to move to the back of the ambulance. The eastbound lane was never blocked by an emergency vehicle. There was never anything more than a person in a reflective vest to stop an oncoming vehicle.

After the fire department completed their assignments at the initial traffic incident, the incident commander notified dispatch that all units were clear. Firefighters began returning to their vehicles and clearing the scene.

Assistant Chief Jay Hinkie was at the eastern end of the scene and had been directing the

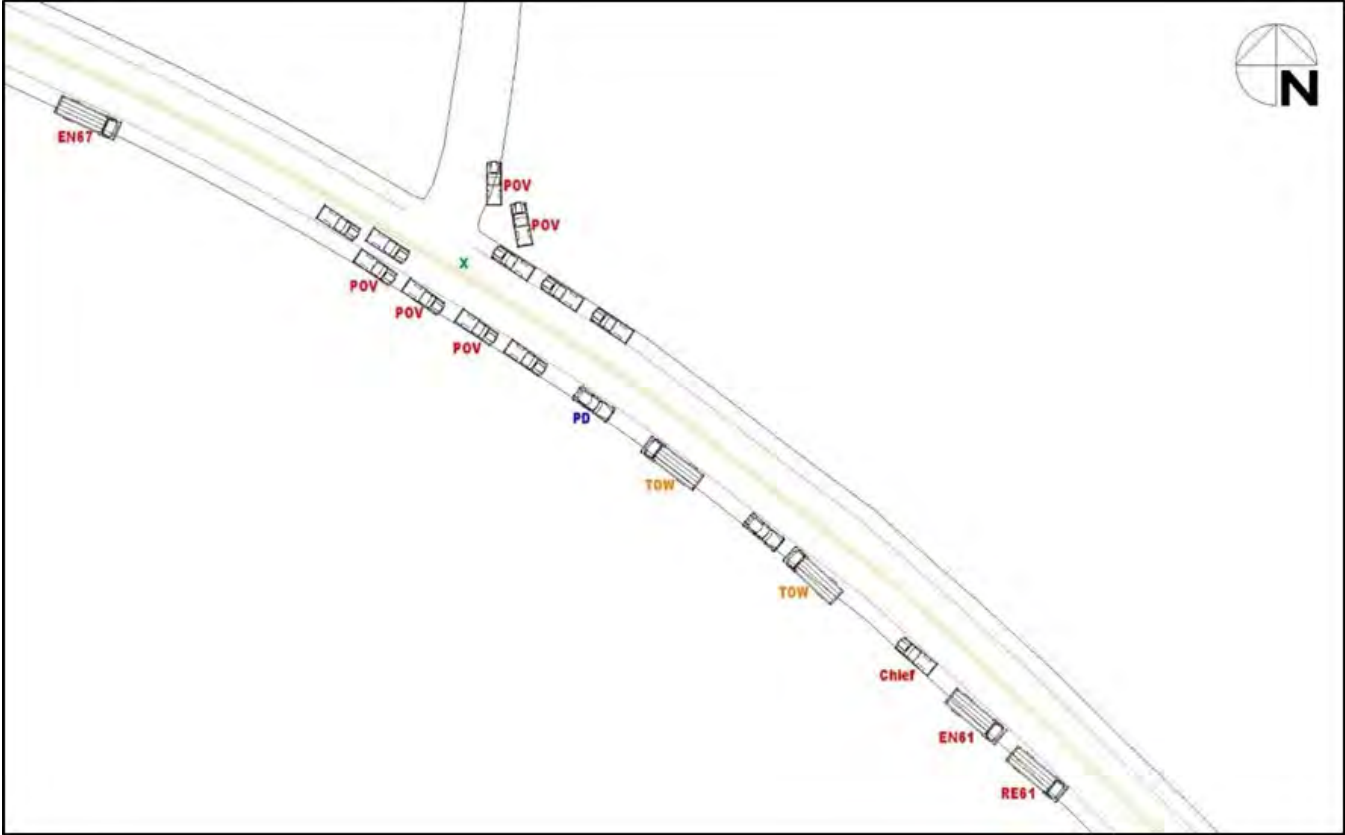
westbound traffic. When the incident was terminated, Assistant Chief Hinkie began walking back to his vehicle. In dash cam video provided by the Silsbee Police Department, Assistant Chief Hinkie can be seen walking in the middle of the westbound lane, directing westbound traffic to drive around him on the shoulder. Eastbound traffic was also continuing through the scene, meaning Assistant Chief Hinkie had vehicles driving on either side of him. Because he had directed the westbound vehicles to drive slowly around him on the shoulder, the westbound lane was left completely open. He had essentially created a funnel and was standing in the middle of it.

All emergency vehicles along the westbound shoulder had cleared the scene, leaving no warning for traffic approaching in the westbound lane. During the demobilization of resources, an SUV traveling westbound around the blind curve entered the scene at approximately 56 miles per hour. Witnesses and other first responders observed the vehicle drive into the scene at a high rate of speed and were concerned, but there was not enough time to give warning to anyone in the roadway. Assistant Chief Hinkie was struck while walking in the westbound lane. He was wearing a reflective vest at the time he was struck.

First responders still on scene immediately provided medical assistance to Assistant Chief Hinkie and requested a response from EMS. Dispatchers notified two different EMS companies to have the closest unit respond. A request was made for a medical helicopter, but weather conditions prevented the helicopter from responding. Assistant Chief Hinkie was transported via ground ambulance to the Emergency Department of Saint Elizabeth Hospital in Beaumont, where he was pronounced at 5:20 p.m., August 2, 2017.

According to defensive driving courses, there are three generally accepted methods of avoiding a collision: braking, steering, or accelerating. A fast approaching vehicle in the westbound lane would not have been able to steer to into the shoulder or into the eastbound lane due to the “funnel” created by other vehicles, nor would it have been able to accelerate to avoid the collision. The SUV driver’s only option was to brake. The Crash Data Recorder in the vehicle was recovered and indicated that the brakes were applied just before striking Assistant Chief Hinkie. During interviews with the vehicle’s driver, she stated that the car went into a skid when she applied the brakes, she saw brake warning lights appear on the dash panel, and she heard a noise commonly associated with ABS activation. The driver was driving below the posted speed limit; approximately 56 mph in a 60 mph zone. Legally, the

driver was not required to slow down or move over because no emergency vehicles were on the westbound side of the roadway at the time the vehicle entered the scene.



*Figure 3: Apparatus placement and traffic at the time Assistant Chief Hinkie was struck
Source: TXSFMO, created by referencing Silsbee Police Department Body and Dash Cameras*

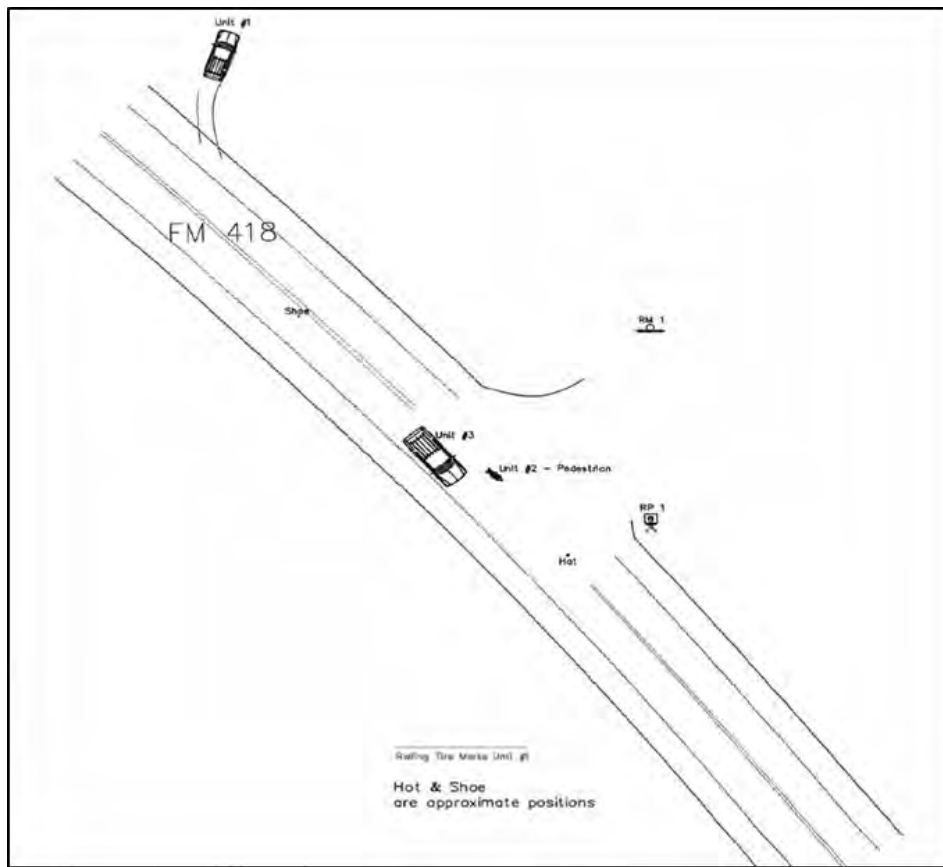


Figure 4: Scaled scene diagram
Source: Texas Department of Public Safety, CR-3



Figure 5: Westbound FM 418 at location of impact
Source: Silsbee Police Department



*Figure 6: Eastbound FM 418 showing blind curve
Source: Silsbee Police Department*

Findings and Recommendations

The findings and recommendations section of this report assesses the circumstances surrounding the tragic death of Assistant Chief Jarrell Hinkie and presents recommendations to prevent future similar tragedies. The report also seeks to gain credibility by referencing multiple authoritative sources widely recognized in the fire service.

Recommendations are based upon nationally recognized consensus standards and safety practices for the fire service. Fire departments and firefighting personnel should know and understand nationally recognized consensus standards. Fire departments should create, maintain, and educate personnel on Standard Operating Guidelines (SOGs) and Standard Operating Procedures (SOPs) to ensure effective, efficient, and safe firefighting, emergency, and training operations.

Methodology

In 2005, President George W. Bush signed into law the Safe, Accountability, Flexible, Efficient Transportation Equity Act. Section 1402 of this act specifically required the Department of Transportation to develop regulations ensuring all workers operating on federal highways wear high-visibility safety apparel to prevent injury. This was an important step to increase safety of first responders operating on roadways. The nation currently looks to the 2009 *Manual on Uniform Traffic Control Devices* (MUTCD) as the standard of care. According to commentary given during the development of the manual, “The wearing of high-visibility apparel alone does not prevent vehicles or equipment from striking workers in the roadway, and that other measures, such as engineering controls, administrative controls, and/or work practices provide greater opportunity for hazard mitigation ...”

Occupational Safety, Health, and Wellness (IFSTA, 2010), which is based upon NFPA (National Fire Protection Association) 1500: Fire Department Occupational Safety, Health, and Wellness Program, cites two distinct ways a fire department can mitigate risk: (1) reduce exposure, and (2) control the hazard. In the fire service, it is difficult to reduce the exposure to hazardous environments; the occupation is inherently dangerous. But this should not be an excuse for not implementing risk reduction strategies. Departments should be familiar

with engineering, education, and enforcement methods for controlling hazards.

The point these two sources make is that risk reduction involves multiple methods of control. There is no single policy, training session, or piece of reflective clothing that makes everything safe. Effective risk reduction requires a series of controls that are consistently monitored and adapted to meet the needs of the environment. First responders must be able to assess their environment and proactively address threats to their safety. This report offers a variety of control measures that, collectively, will increase safety of fire service professionals working traffic related incidents.

An Appeal to the Fire Service of Texas

This is not a comprehensive list of everything that can be done to mitigate the risk involved in working traffic incidents. Departments should be creative in developing ways to mitigate risk to their personnel and assets. One great example is the Irving Fire Department, which became one of the nation's first departments to deploy "blocker" units to highway incidents. These "retired" apparatus are dedicated to blocking traffic and managing traffic incidents, increasing firefighter safety and reducing the cost of damage to front-line apparatus.

The State Fire Marshal's Office encourages all departments to adopt the characteristics of a learning organization. There are always methods to improve upon and ways to provide better service to our communities. While we recognize the limitations that many departments face, we urge departments to implement these recommendations to their best ability.

Organizational change begins with recognizing and accepting the need for change. This report identifies areas for improvement, but each department is responsible for overcoming barriers to change that may exist within their organization. This requires patience, persistence, and coordination between all levels of the department. Administrators should evaluate barriers within their department and develop a plan to successfully implement risk management controls.

Risk management is not accomplished by one-time implementation of these recommendations. Risk mitigation requires regular monitoring, evaluation, and adaptations

to the processes involved. Successful implementation of these recommendations will require the combined and continual efforts of operational staff, administrative staff, and local government leaders.

It is never easy when a fire department is forced into change as the result of a tragedy. A firefighter fatality is a humbling experience for any department; however, Silsbee Volunteer Fire Department has been receptive and attentive to the adjustments necessary in their department. Department leadership is in the process of implementing several of the recommendations mentioned in this report.

Although the following recommendations may not have prevented the death of Assistant Chief Hinkie, the State Fire Marshal's Office offers these recommendations in an effort to reduce injury and loss of life at traffic incidents. The State Fire Marshal's Office appreciates the dedication and assistance of the Non-Metro Tactics Review Team in developing recommendations in order to prevent future similar occurrences. All fire departments should be aware of the content of the following standards and are encouraged to develop programs based on them to increase the level of safety for fire department personnel.

Finding 1

Firefighters arriving on scene did not perform an adequate size-up. Firefighters failed to recognize the risks imposed by a blind curve, weather conditions, and time spent in lanes that were open to traffic. While plenty of resources were called to the scene, a size-up should also include minimizing response to only the number of resources required to mitigate the incident.

Recommendation 1

The first unit on scene should complete a size-up, similar to what would be performed at a structure fire. Size-up should include an assessment of the current situation and resources required (or not required) to mitigate the incident. On traffic incidents, emergency personnel should be especially aware of how terrain, blind curves, and weather conditions will impact traffic. One of the most important aspects of size-up is to communicate your assessment and give instructions to incoming resources, including the most effective positioning of apparatus and traffic control devices. This ensures an orderly response with clearly established

responsibilities. Departments may benefit from developing a pre-incident plan for roadways that pose a significant risk due to terrain or blind curves.

National Highway Institute: National Traffic Incident Management Responder Training

Lesson 3 of the training program states that a “windshield size up report” should include the following:

- Unit identification
- Exact location of the incident
- Number and types of vehicles involved
- Degree of damage
- Number of lanes closed
- Hazards or problems
- Establishment of command

Lesson 3 also states that additional progress reports should be given at regular intervals (15 minutes). These progress reports may include details about injuries/fatalities, incident duration estimates, on-scene conditions, hazardous materials, traffic conditions, towing and recovery efforts, and additional resources needed.

The final point of lesson 3 is to communicate unique locations and roadway conditions that may complicate incident response. The incident commander should communicate instructions for response and provide recommended approach strategies for incoming units.

Finding 2

Emergency personnel were observed working outside of the safe work zone throughout the entire incident, exposing them to oncoming traffic. Firefighters were observed directing traffic from the middle of the roadway, standing on the double yellow lines (no-pass zone indicating limited visibility around the curve). At one point during the incident, a firefighter stepped into the lane of traffic and put up his hand to stop oncoming vehicles. A patient on a stretcher was then brought into the lane of traffic to move to the rear of an ambulance. This was done without a physical barrier to oncoming traffic. In addition, Assistant Chief

Hinkie walked for a prolonged period of time in lanes open to traffic, with his back turned to oncoming traffic.

Recommendation 2

All emergency response personnel should be aware of and operate within the designated safe work zone at traffic incidents. At this particular incident, apparatus positioning and traffic control devices were not effectively used. Emergency personnel were consistently working in lanes open to traffic. While most drivers slowed to a safe speed, emergency personnel cannot rely on good faith to keep them safe. First responders must set up positive controls of the environment they will be working in. This means strategically placing heavy apparatus to create a physical barrier from oncoming traffic. Traffic control devices provide early warning to drivers, but have limited abilities when it comes to stopping an oncoming vehicle.

Once apparatus are positioned, the incident commander should communicate the location of the safe work zone, describing it over the radio for all responders. The incident commander must also enforce adherence to working inside the safe work zone.

Every effort should be made to minimize time spent in an unprotected area. Firefighters directing traffic are at most risk and should operate as closely to a safe work zone as possible. In this case, Hinkie had vehicles driving on either side of him, and the westbound lane he was standing in was completely open to traffic. He had unintentionally positioned himself in a traffic funnel with no escape.

If staffing allows, a safety officer or lookout should monitor traffic and alert emergency personnel of dangerous drivers approaching. Ideally, traffic should be forced to slow down to a safe speed well in advance of the work area.

NFPA 1500: Fire Department Occupational Safety, Health, and Wellness Program

Section 9.3: *“Apparatus and warning devices shall be placed to provide a safe work zone as well as early warning to the motoring public with specific consideration to be given to topography and weather conditions and to protect firefighters from traffic.”*

Section 9.4: *“First arriving apparatus shall be placed in a blocking position order to protect the*

scene and create a safe work zone from oncoming traffic.”

Section 9.4.3.1: *“Ambulances shall be positioned in a safe location to allow patient loading away from traffic.”*

Section 9.4.5: *“The following warning devices shall be used to warn oncoming traffic of the emergency operations and the hazards to member(s) operating at the incident:*

(1) A minimum of 5 (five) 28 in. or greater fluorescent orange traffic cones with double reflective markings that are compliant with the MUTCD

(2) Retro-reflective warning signs compliant with the MUTCD”

Section 9.4.6: *“Warning devices shall be placed and utilized with proper considerations given to visual obstructions such as hills, curves, blind spots, or unusual localized weather conditions such as fog or rain.”*

Section 9.4.7: *“Members shall position themselves and any victims in a safe area.”*

Everyone Goes Home

“Advanced warning in the form of signs, cones and flares should be placed upstream of the incident to get the attention of approaching motorists. Fluorescent pink signs have been designated for use at emergency scenes. Cones should be orange and 28 to 36 inches tall with reflective striping. Each emergency vehicle should carry a minimum of 5 cones.

Teach your personnel how to park apparatus at an incident to block the work area and protect victims and responders. Fire apparatus should be parked at an angle with the front wheels turned away from the work area. Be sure to deploy properly designed and sized chock blocks for each rig. EMS rigs should be parked in the safe area to protect the loading zone. Company officers should remind personnel to disembark from the apparatus on the side away from traffic as you arrive at the scene.”

National Highway Institute - National Traffic Incident Management Responder Training

Lesson 4 of the training program states that “positioning emergency vehicles to establish a safe work area is another foundational decision for responders arriving at an incident scene.” It also states that responders should consider using the “lane + 1 blocking” technique to ensure there is plenty of work space provided to responders. In this particular incident, the initial accident was off the roadway but patients and first responders were working in the lane of traffic. It is crucial that responders think

about work space required, not just where the vehicles involved in the accident are located.

Finding 3

No one was watching oncoming traffic to provide warning to other responders. A police officer did notice the vehicle driving toward the scene at a speed which appeared to be unsafe for road conditions and turned to look at the vehicle. He likely did not know anyone was standing in the path of the vehicle. In addition, he did not have a method to warn other responders on scene since Police and Fire were on separate channels.

Recommendation 3

Emergency personnel tasked with traffic control and scene safety should have a method to communicate an immediate threat to other responders, such as using radios or other signaling devices.

According to the United States Fire Administration (USFA) training course titled *Traffic Incident Management Systems*, the MUTCD recommends *“equipping flaggers with a horn or whistle to provide an audible warning to workers of oncoming danger. An air horn or compressed-gas horn would work well. If a whistle is used, make sure the necklace has a breakaway attachment allowing it to pull loose if caught on an object or moving vehicle. The device used to warn workers of dangers when working at a traffic incident should be loud enough to be heard above the noise of traffic and any equipment being used by emergency workers. Ron Moore of “Firehouse Magazine” states that relying on a radio call may not be sufficient for all to hear during highway operations. The radio channel may be busy, not everyone on the scene may have a radio, or not everyone may be on the same channel.”*

Finding 4

The incident commander of the scene released all firefighters at the same time and did not use blocking apparatus to facilitate the safe departure of POVs. Some POVs were located on the opposite side of the roadway, leaving firefighters to cross the unprotected roadway to get back to their vehicles.

Recommendation 4

All resources should be demobilized in an orderly manner. When demobilizing/

clearing the scene, fire apparatus should remain on scene to help mark the scene and help control traffic until all member POVs have safely left the scene. Coordinate fire department vehicles (including POVs) leaving the scene with Law Enforcement still on scene to help ensure the safety of all personnel.

If the accident scene is approached from around a blind curve or over a hill, it is vital to have a marked vehicle and/or appropriate signage before the blind curve/hill to warn drivers what they are approaching. This should be the last warning removed from the scene.

Emergency Responder Safety Institute

“Termination is the final phase of response to a roadway incident, after major rescue and remediation operations have been completed. Termination involves tasks like removing vehicles, cleaning up debris, picking up temporary traffic control devices, and other tasks to reopen the remaining closed lanes. Although it seems as if the incident is “over,” termination is actually a very dangerous time; remaining responders may be less protected, motorists may be frustrated by backups, and termination operations by nature require responders to be exposed on the roadway as they secure vehicles, pack up and stow equipment, and remove traffic control devices. Successful, safe termination depends on executing many diverse tasks properly while keeping an eye on and being aware of approaching traffic and the possible errant vehicle.”

National Highway Institute - National Traffic Incident Management Responder Training

Lesson 9 of the training program states that termination of the incident includes demobilizing and removing equipment, personnel, and response vehicles. The goal is to gradually restore traffic flow to normal. NHI emphasizes that the scene should be dismantled backwards from the termination area to the advanced warning area. Advanced warning should be the last element or resource to leave.

Finding 5

Members of Silsbee Volunteer Fire Department should be commended for the fact that the majority were wearing high-visibility apparel while on scene; however, only two firefighters on scene were wearing helmets, and some members were observed wearing footwear inadequate for an emergency incident. Assistant Chief Hinkie was not wearing a helmet during the incident.

Recommendation 5

All personnel on scene should wear appropriate Personal Protective Equipment (PPE). Best practices include wearing high-visibility apparel, a helmet, and slip resistant footwear. If volunteer members respond with inadequate footwear, they should don bunker pants and boots while on scene. Additional PPE may be necessary depending on the scene and based on a risk assessment performed during size-up.

NFPA 1500: Fire Department Occupational Safety, Health, and Wellness Program

Section 9.4.9: *“When member assignments place them in potential conflict with motor vehicle traffic, they shall wear a high-visibility garment that meets ANSI 107, American National Standard for High-Visibility Apparel and Access, unless exposed to fire, heat, flame, or hazardous materials where NFPA-compliant turnout gear is more appropriate.”*

Everyone Goes Home

“All personnel operating at roadway incidents should be wearing proper personal protective equipment including helmets. The use of helmets has helped save lives on several occasions, when firefighters have been struck at roadway incidents. Make sure your personnel wear appropriate footwear that features slip-resistant soles.

Provide your personnel with high-visibility garments to wear when they are working near moving traffic. Personnel should not wear vests while engaged in firefighting operations but all other personnel at roadway incidents should be wearing garments that provide reflective and fluorescent features. The garments should be compliant with the most recent edition of the American National Standards Institute (ANSI) 107 or 207 standards.”

Manual on Uniform Traffic Control Devices (MUTCD)

Section 6D.03: *“All workers, including emergency responders, within the right-of-way of a roadway who are exposed either to traffic (vehicles using the highway for purposes of travel) or to work vehicles and construction equipment shall wear high-visibility safety apparel ... ”*

Finding 6

Silsbee Volunteer Fire Department did not have a policy dictating the minimum training level for members responding to traffic incidents. Traffic control was considered a minor task often assigned to probationary members with very little training. While more

experienced in responding to traffic incidents, Chief Hinkie did not have any documented training in traffic incident management.

Recommendation 6

Develop a policy addressing the minimum level of training required for members responding to traffic incidents. Firefighting is a hazardous job that does not discriminate between volunteer or paid status. Regardless of status, the job performance requirements are the same. A minimum level of training should be required before an individual is permitted to respond to an emergency incident. At an absolute minimum, responders should know when they do not have enough training to manage the situation, and need to request additional resources.

The volunteer fire service of Texas remains unregulated, but departments are strongly encouraged to certify their members in accordance with NFPA standards. Departments with existing members that do not currently meet those standards should develop a plan to provide necessary training to those members.

The Texas Commission on Fire Protection (TCFP) and State Firefighters' and Fire Marshals' Association of Texas (SFFMA) have links to National Traffic Incident Management Responder Training. This training is required for TCFP certified individuals, but it is optional for SFFMA certified individuals. SFFMA also distributes the Guidelines for Highway Incident Scene Safety CD, which is a great resource for in-house training. Training Officers should adapt the curriculum to make it applicable to the department's response area and note particularly dangerous areas.

National Highway Institute - National Traffic Incident Management Responder Training

The National Traffic Incident Management Responder Training program is required for all TCFP-certified firefighters. While the initial training is required, it is up to the department to provide refresher training. Volunteer fire departments are not required to offer this training, but it is highly recommended.

NFPA 1001: Standard for Firefighter Professional Qualifications

Section 5.3.3 (B): *“Requisite Skills. The ability to use personal protective clothing, deploy traffic and scene control devices, dismount apparatus, and operate in the protected work areas as directed.”*

NFPA 1201: Providing Fire and Emergency Services to the Public

Section 8.1: *“The FESO shall provide resources, planning, and training that are consistent with the level of service identified in the scope of authority and responsibilities for emergency operations.”*

NFPA 1500: Fire Department Occupational Safety, Health, and Wellness Program

Section 9.2.1: *“Each department shall provide training on roadway hazards and safety for all personnel.”*

Section 9.4.10: *“Personnel assigned to traffic control shall receive training that is commensurate with their duties and in accordance with NFPA 1091.”*

Finding 7

A large number of personally owned vehicles (POVs) responded to the scene, creating congestion and parking issues. Some POVs were parked on the opposite side of the road, requiring firefighters to walk across lanes open to traffic to reach the scene. At one point in the incident, POVs were used to warn oncoming vehicles of a traffic incident and used for linear blocking.

Recommendation 7

Develop a policy addressing POVs responding to and parking on scene. Regardless of incident type, an influx of POVs has the potential to disrupt normal traffic flow and increase risk to responders. A policy should be developed to address POV response/driving policy and include parking at a scene.

Using a POV as the initial traffic control vehicle should be discouraged unless absolutely necessary while awaiting additional resources. If POVs will be used, the POV policy should include minimum requirements for emergency lighting and visibility.

This policy should also consider ways to limit the number of POVs on scene. Having all members respond to the station and ride the apparatus works in many

jurisdictions but may not work for all departments due to the size of their response area, etc. Some jurisdictions encourage members responding in POVs to meet at a "rally point" on the way to the scene and carpool to the scene.

This policy should include disregarding (or releasing from the scene) any unneeded personnel as soon as possible. This will greatly reduce the danger to personnel and the public traveling through the scene.

NFPA 1201: Providing Fire and Emergency Services to the Public

Section 8.1: *“The FESO shall provide resources, planning, and training that are consistent with the level of service identified in the scope of authority and responsibilities for emergency operations.”*

NFPA 1500: Fire Department Occupational Safety, Health, and Wellness Program

Section 9.4.3: *“All additional responding vehicles, when arriving on the scene, shall be positioned downstream from the blocking vehicle with warning lighting reduced, unless their function requires placement before the temporary control zone.”*

Section 9.4.8: *“Members shall park or stage unneeded fire apparatus and personal vehicles off the roadway or downstream of the incident work area.”*

Finding 8

Silsbee Volunteer Fire Department did not have a policy addressing traffic incident operations at the time of Chief Hinkie’s death.

Recommendation 8

Develop a policy addressing on-scene operations at a traffic incident. This policy should include required PPE, size-up procedures, establishment of a safe work zone, and demobilization of resources.

NFPA 1500: Fire Department Occupational Safety, Health, and Wellness Program

Section 9.2: *“Each department shall establish, implement, and enforce standard operating procedures (SOPs) regarding emergency operations involving traffic.”*

Finding 9

The driver of the vehicle that hit Chief Hinkie stated that emergency vehicles were not visible from her direction of travel. While this was due in part to apparatus positioning, efforts should be made to ensure all front-line apparatus are highly visible with emergency lighting and reflective decals.

Recommendation 9

Increase the visibility of existing apparatus. Departments should ensure their apparatus are well equipped with emergency lighting and high-visibility graphics. It is crucial that drivers see the apparatus, even in the worst conditions. Even though NFPA 1901 applies to new apparatus, departments should consider using it as a guide to outfit their existing apparatus as well.

Everyone Goes Home

“Design emergency lighting equipment and high-visibility graphics into emergency apparatus and consider retrofitting existing rigs with features that will enhance scene safety. High-visibility chevrons on the rear of fire and EMS apparatus are now called for in NFPA standards. The NFPA 1901 and 1917 standards offer specific guidance for the design of high visibility markings on fire apparatus and ambulances.”

National Highway Institute - National Traffic Incident Management Responder Training

The National Highway Institute also mentions the importance of emergency response vehicle visibility in Lesson 5. *“Making responder vehicles more visible improves safety by reducing the chances they will be hit at incident scenes. Markings are referred to as passive treatments that complement emergency lighting.”*

MUTCD

Section 6I.05: *“The use of emergency-vehicle lighting (such as high-intensity rotating, flashing, oscillating, or strobe lights) is essential, especially in the initial stages of a traffic incident, for the safety of emergency responders and persons involved in the traffic incident, as well as road users approaching the traffic incident.”*

Finding 10

Members of the general public are either unaware or indifferent to the “move over or slow down” law adopted by the State of Texas.

Recommendation 10

Incorporate “move over or slow down” lessons into adult public education programs and social media campaigns.

Everyone Goes Home

“Most states have a law that requires motorists to move over or slow down when approaching stationary emergency vehicles. Those of you who respond on a routine basis know that it seems like very few motorists seem to be aware of that law. We need to do our part to educate the public to “Move Over or Slow Down.” We can do that by providing handouts and displays in our fire stations for visitors. We can do community outreach presentations to tell people about the dangers we face on the roadways. We can collaborate with school systems and school resource police officers to do presentations in high school driver’s education classes. Be sure to include roadway safety as one of the topics you cover during Fire Prevention Week activities. Write articles for your local community based newspapers. Put message signs up at your stations about the subject. Work with local cable service providers, television and radio stations to develop and present public service messages about the subject.”

Texas Transportation Code 545.157

“(b) On approaching a vehicle described by Subsection (a), an operator, unless otherwise directed by a police officer, shall:

- (1) vacate the lane closest to the vehicle when driving on a highway with two or more lanes traveling in the direction of the vehicle; or*
- (2) slow to a speed not to exceed:*
 - (A) 20 miles per hour less than the posted speed limit when the posted speed limit is 25 miles per hour or more; or*
 - (B) five miles per hour when the posted speed limit is less than 25 miles per hour.”*

Finding 11

Agency responsibilities were not clearly communicated at the traffic incident. If firefighters are responsible for traffic control, they need training in traffic management. Police officers are taught traffic management and control techniques in basic academy and should be utilized in those roles, unless otherwise established by local interagency agreements.

Recommendation 11

Develop an interagency agreement regarding each agency's responsibilities while operating at a traffic incident. There are times when it is not always clear who is responsible for directing/controlling traffic. If possible, each agency's responsibilities should be identified prior to an incident response. This ensures operational staff will have sufficient training to fulfill their assignments. The agreement should be flexible and have contingency plans in place to allow for unforeseen changes in resource availability. Either way, responsibilities should be clearly communicated.

NFPA 1500: Fire Department Occupational Safety, Health, and Wellness Program

Section 9.2.2: *“Each department shall communicate, collaborate, and coordinate with other response agencies when developing SOPs, planning, and training for incident response.”*

Finding 12

Silsbee Volunteer Fire Department did not have a policy or plan in place to address safety, health, and risk management at the time of Assistant Chief Hinkie's death.

Recommendation 12

Develop a departmental strategic plan to address safety, health, and risk management initiatives. All fire departments should be familiar with NFPA 1201: *Providing Fire and Emergency Services to the Public*. Section 8.5 of this document states “The Fire and Emergency Service Organization (FESO) shall develop a safety, health, and risk management implementation plan to comply with all federal, state or provincial, and local applicable laws, codes, regulations, or standards and NFPA 1500.” With NFPA 1201 being a nationally recognized consensus standard, every department, regardless of volunteer or paid status, has a duty to develop these policies.

The department should conduct a risk assessment and prioritize the acquisition of resources which will increase safety to operational staff. With a potentially considerable cost, a strategic plan should be developed to phase in capital improvements and large purchases. Departments may benefit from reviewing the VFIS NFPA 1500 checklist to see how their department compares to the standard and develop plans/policies as necessary. NFPA 1250 also provides recommended practices in fire and emergency service organization risk management.

U.S. Fire Administration

National Safety Culture Change Initiative

FA-342/April 2015



FEMA



U.S. Fire Administration

Mission Statement

We provide national leadership to foster a solid foundation for our fire and emergency services stakeholders in prevention, preparedness, and response.



FEMA



National Safety Culture Change Initiative

Study of Behavioral Motivation on Reduction of Risk-Taking Behaviors in the Fire and Emergency Service

Developed by the
International Association of Fire Chiefs
through a partnership with the
U.S. Fire Administration

April 2015

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Executive Summary

Controlling and extinguishing hostile fire comes at a great cost to human life and secondarily at great financial expense. Despite improvements in personal protective equipment (PPE), apparatus safety devices, more availability of training, greater emphasis on firefighter health and wellness, and decreases in the number of fires and dollar loss due to fires, the rate of on-duty firefighter death and injury has remained relatively unchanged in the past four decades. The National Safety Culture Change Initiative (NSCCI) project is

a joint partnership of the U.S. Fire Administration (USFA) and the International Association of Fire Chiefs (IAFC) aimed at identifying both positive and negative culture and climate found in the American fire and emergency service community. NSCCI, through this study and its website, www.ffsafetyculture.org, and other project efforts, will identify adverse behaviors and recommend changes to both culture and climate for occupational safety and health within the fire and emergency service.

Contributors

The organizations and individuals who contributed to this paper were selected as a representative cross section of the fire service. The intent was to capture both the breadth of the fire service, encompassing the different delivery models of emergency response, and the depth of the fire service by including groups that had agendas

to look at the specific needs of the fire service. Additionally, the individual experiences of those connected to the creation of this paper, both within and outside of the fire service, provided a rich backdrop for discussion and comment of diverse viewpoints throughout the development of the paper.

Introduction

The National Fallen Firefighters Foundation (NFFF) has asserted that the culture of the fire and emergency service is a major contributor to the fatal trend in firefighter health and safety (Siarnicki, 2010). This culture has not been concisely defined, but literature suggests both that it exists as a stand-alone concept and that it has unique characteristics that are uncommon to nonuniformed professions. Soeters, a leading scholar in the organizational culture of military and emergency service units, states that the peculiarities of organizations, such as the fire and Emergency Service, “justify the special attention of researchers to the culture and identity of these ... organizations” (Soeters, 2000, p. 466). An understanding of the culture can be used to develop safer practices to reduce the number of firefighters killed and injured each year.

This effort is directly related to three of NFFF’s 16 Firefighter Life Safety Initiatives (FLSIs). FLSI 1, which states: **Define and advocate the need for a cultural change within the fire service relating to safety; incorporating leadership, management, supervision, accountability, and personal responsibility** (NFFF, 2011), is an overarching initiative, acknowledging that the organizational culture of the fire service must undergo a change to accept the other 15 recommendations. Without understanding the culture within a fire and emergency service organization, it is likely that changes called for in the other 15 initiatives cannot be successfully implemented or sustained.

Initiatives 2 and 6 are also very relevant to this project. Since 50 percent of line-of-duty deaths (LODDs) are attributed to cardiovascular events and one-third of these deaths are in people with known cardiac histories, health and safety of agency members is a controllable risk factor (NFFF, 2011, p. 13). Initiative 6 encourages implementation of and adherence to existing medical and fitness standards, while Initiative 2 focuses on empowerment of all members of a department to be involved and engaged with departmental health and safety while around the station, while responding to and returning from calls for service, and while operating at emergency scenes.

The initial research phase of this study was directed toward clearly identifying and defining the problem. There is widespread acceptance of the presumption that behavioral issues contribute to both firefighter injuries and LODDs and that some type of cultural change is needed to alter the perceptions of acceptable and unacceptable risks. The objective of the research effort is to narrow the focus to identify the particular behaviors that need to be addressed.

The NSCCI project is aimed at identifying the aspects of fire and emergency service culture that contribute to preventable occupational illnesses, injuries and fatalities and subsequently changing those cultural norms that either promote or tolerate excessive risk behaviors. The Project Team developed this document based on the perspec-

tive that the expansion of a more appropriate safety culture should not be seen as a challenge to the overall fire service nor contrary to the mission of saving lives and protecting property. This document focuses on integrating safety into the fire service culture without diminishing any of its existing positive aspects.

It should be mentioned that understanding fire and emergency service culture as it relates to fire prevention activities is also important, although this project does not include that perspective.

Throughout this paper, the term fire and emergency service is used to broadly capture any type of emergency response organization that responds to fires or other crises that erupt in

communities throughout the U.S. An effort was made to be inclusive of nonfirefighting areas, but there is little literature available that looks broadly at emergency services that are not directly engaged in firefighting. However, a study produced under a cooperative agreement between the National Highway Traffic Safety Administration (NHTSA), with support from the Health Resources and Services Administration's (HRSA's) Emergency Medical Services for Children (EMSC) program, and the American College of Emergency Physicians (ACEP) looks specifically at an "EMS Culture of Safety" and can be accessed at <http://www.emscultureofsafety.org/wp-content/uploads/2013/10/Strategy-for-a-National-EMS-Culture-of-Safety-10-03-13.pdf>.



Photo by Ron Moore, Courtesy of Cornbelt (Illinois) Fire Protection District

Understanding the Fire and Emergency Service Culture

From the origins of an organized fire and emergency service in the U.S. through the early 1970s, very little attention was directed toward firefighter safety (Granito, 2003); the inherent risk factors of firefighting and emergency operations were recognized and simply accepted as unavoidable occupational hazards. Generations of firefighters were subjected to extreme risks, in most cases because their mission was considered essential and there were few alternatives available to them. The image of the firefighter, which is the foundation of the fire and emergency service culture, was built around selfless heroism — the firefighter is always ready to face any risk and, if necessary, to make the supreme sacrifice in order to save lives and property.

Serious efforts to address firefighter safety began during the 1970s and expanded significantly through the 1980s and 1990s, coinciding in part with major advances in protective clothing and equipment, as well as the development of more effective tools and procedures that allowed for fire suppression operations to be conducted with better calculated risks to the firefighter. During that time period, operational procedures began to incorporate firefighter health and safety as primary objectives, on a par with saving civilian lives and as a higher priority than saving property (Linke, 2008). National Fire Protection Association (NFPA) 1500, *Standard on Fire Department Occupational Safety and Health Program* was published in 1987 as the first consensus standard to address occupational safety and health for organizations delivering emergency services.

The NSCCI project is directed toward this particular aspect of the effort to further reduce LODDs, as well as decreasing occupational injuries and illnesses within the fire and emergency service. It is intended to identify and examine the factors that cause or influence firefighters to make decisions and engage in actions that involve unnecessary and avoidable risks, which often places their own lives, and potentially the lives of their fellow firefighters, in danger when there are less dangerous options available. Expressing the concept in terms of risk management, this would refer to situations where the potential gain is out of balance with the potential loss.

This paper and its proposed strategies for reducing risk-taking behaviors in the fire and emergency service are based on a literature review, focused discussions, and the experiences and collective knowledge of members of the Project Team and reviewers.

What Drives Firefighter Behaviors?

U.S. society as a whole may contribute to the risk behaviors that are demonstrated within the fire service. Communities expect an urgent and timely response to emergencies and disasters with fully trained individuals arriving on adequately staffed apparatus. However, public knowledge of the complexities and challenges of building, maintaining and delivering such service capabilities is often transparent or invisible to those funding the services until the system fails to meet public expectations. Some fire and emergency service organizations do not have the resources to implement advanced training programs or provide training beyond that which is minimally required for each position.

Firefighters who are questioned in relation to their high-risk behaviors often refer to either public or organizational expectations of selfless heroism. Such perceptions are consistent with the popular image of the firefighter as a daring individual who is willing to risk life and limb to save the life of a total stranger and who is lauded for doing so.

Those with a traditional outlook often express disagreement with the emphasis that has been directed toward “acceptable risks” and “rules of engagement,” claiming that they promote nonaggressive and ineffective operations. The opposing viewpoint asserts that there are times when it is appropriate to be boldly aggressive and times to be intelligently cautious. The focus of this paper is to seek out areas where the level of safety in the provision of a fire and emergency service organization can be improved without diluting or lessening the critical mission of service delivery.

Examples of Inappropriate Risk Behaviors

Firefighters are routinely called upon to deal with situations that involve risks that could result in their death or injury or contribute to an occupational illness or disability. Several of these risk factors are inherent to the nature of the work that firefighters perform; however, the level of exposure to those risks varies depending on decisions that are made and actions that are taken — or not taken — when faced with a particular situation and set of circumstances. A general risk management philosophy in the fire service is risk

a lot to save a lot, risk a little to save a little, and risk nothing to save nothing (Linke, 2008).

Most of the discussion of risk exposure is written in the context of structural firefighting, where the concepts of offensive versus defensive strategy are easily defined. Offensive strategy places firefighters in close contact with the fire, inside the burning building, and involves a certain level of inherent risk. Defensive strategy keeps firefighters outside, in what should be safe exterior locations, to minimize risk. This concept requires some extrapolation to be applied to other emergency responses and scenes.

While the Incident Commander’s (IC’s) decisions establish a theoretical level of acceptable risk that applies to every individual involved in an incident, at times, individual firefighters knowingly or unknowingly expose themselves to higher levels of risk than the IC has deemed acceptable. This is a particular problem when individual perceptions of acceptable risk are different from the IC’s perceptions.

Fire and emergency service organizations should concentrate on implementing and demonstrating an effective and measurable model of firefighter training. This model supports and emphasizes the behaviors learned during initial firefighter training (recruit training) and continuously builds upon those experiences to build advanced skill sets throughout their service as a firefighter/EMS provider. This training should subscribe to the philosophy that health and safety are the capstone of any model. The focus areas of risk behavior modification are education, training, health and wellness.

With regard to vehicle operations for both personally owned and agency-owned vehicles, fire and emergency service organizations should concentrate on implementing and demonstrating an effective and measurable model of driver/operator training that advances skill sets throughout tenure as a firefighter, ensures quality, and provides for driver/operator accountability. The focus areas of risk behavior modification are driver capability, quality assurance and accountability.

Fire and emergency service organizations must also focus on moving toward compliance with national standards for health and wellness, fitness for duty, and emergency scene rehabilitation.

In each of these cases, scenarios can present themselves where emergency responders act without a full understanding of the potential scope and fallout from their actions, leading to illness, injury or death that is out of alignment with the potential value of the chosen action.

What Is Culture?

To change the undesirable components of fire and emergency service culture, one must first understand the broad construct of culture and then apply this framework within the fire and emergency service. Schein describes the culture of a group as the “basic, shared, assumptions” learned by a group as it solves problems (2004, p. 17). He indicates that when this problem-solving is successful, the methods are taught to new members as correct solutions to the problems (Schein, 2004). Hofstede refers to these methods and assumptions as the “collective programming of the mind” (2001, p. 1). Kluckhorn similarly defines culture as “patterned ways of thinking,” based upon traditional and historical ideas (1951, p. 86). All three of these definitions identify culture as a process that occurs in the individual, based upon learned behaviors that are influenced by a group and the group’s history.

Culture is reflected in a group’s internal characteristics, its character, and its daily existence (Goodman, Zammuto, & Gifford, 2001). It is influenced by organizational history, policies, uniforming, facilities, vocabulary, leadership and management within an organization (Compton, 2003). Uniformed professions, such as police departments, fire and emergency service organizations, and military units, have such unique cultures unto themselves that they have characteristics, such as a sense of duty and allegiance, that are not found in such a strong degree in other professions.

“Culture can be difficult to substantively define, but culture truly describes how things are done in the [fire and emergency service] organization” (Compton, 2003, p. 24). This comment may allude to how entwined the culture of the fire and emergency service organization is with all aspects of the operations and delivery of services. The culture impacts how the firefighters interact with each other, from where a firefighter or officer sits at the dinner table, which seat they can occupy in the TV room and when they may sit down, where they sit on emergency apparatus and what their roles at emergency scenes will be, to how they may interact with other members of the company. While these rituals and values have some commonality across the different fire and emergency service organization types and sizes throughout the U.S., it would be both inaccurate and irresponsible to assume that these traits and values are reflected identically in all fire and emergency service organizations. However, since the fire and emergency service functions as individual organizations within the framework of a larger organi-

zational culture, there should be some common themes and values that are present throughout most fire and emergency service organizations.

Uniformed organizations, such as fire and emergency service organizations, represent “specific occupational cultures that are relatively isolated from society” (Soeters, 2000, p. 465). Archer (1999) supports this with his assertion that the fire and emergency service is “characterized by its strong culture,” which includes the use of a uniform, hierarchical command structure, promotion solely from within the existing ranks, and long-standing traditions (p. 94). Fire and emergency service organizations further differ from other organizations/businesses in that they are exposed to uncommon levels of danger, work unusual or shift schedules, require a great deal of physical and mental stamina from their members, and can recall staff and cancel their prescheduled leave due to emergencies or staffing shortages (Soeters, 2000).

This culture of the fire and emergency service has evolved through a complex process of group learning (Thompson & Bono, 1993). This group learning occurs during training, emergency responses, downtime around the fire station, and informal activities, such as cookouts, meals at the department, storytelling, and watching TV. In some cases, in the fire and emergency service, methods espoused as solutions may be incorrect, but they are perpetuated because they are viewed as traditions (Gasaway, 2005). Pessemier supports this in his 2008 discussion of improving fire and emergency service organization safety by stating:

“Normalization of unsafe practices can also occur as a result of the fact that other individuals take the same [incorrect or unsafe] actions. If, in general, nothing bad happens as a result of unsafe practices, and if everyone else in the organization participates in the same practices, then these practices become part of the normal and accepted way of accomplishing tasks. As a result, Fire and Emergency services organization history and traditions can create a culture that is difficult to change” (2008b, p. 3).

In June of 2007, nine firefighters from Charleston, South Carolina, were killed in a fire in a large furniture store. The analysis of operations of the Charleston Fire and Emergency Services organization revealed that, among many factors, “The culture of the Charleston Fire Department promoted aggressive offensive tactics that exposed firefight-

ers to excessive and avoidable risks and failed to apply basic firefighter safety practices.” As a result, in the initial report on changes that need to be accomplished in the department to prevent a reoccurrence of a similar tragedy, one of the highest priority items is a change to the department’s “Culture and Leadership” (Routley, 2007).

In addition to the number of fatalities, it is important to consider the number of on-the-job injuries that firefighting contributes to annually. NFPA reports that in 2012, there were 69,400 job-related injuries. Peterson identifies over 95,000 injuries per year (2010), and Houdous, Pizatella, Braddee and Castillo support this with a calculation of 90,000 injuries per year, with an increasing rate of injury in the fire and emergency service (2004). Brennan (2011) extracted from NFPA the number of on-scene emergency injuries to be 32,205 in 2009 and compared these to the number of members of the U.S. military who were wounded in combat. In the period from October 2001 through August 2008, there were 30,568 U.S. service members wounded in action — less than the number of firefighters injured in the single year 2009 (Brennan, 2011). It should be mentioned here that the likelihood of all on-the-job injuries and related illnesses being reported consistently is suspect and that the numbers are probably higher.

Aspects of the Culture

Being service-focused, having a strong identity and role in the community, and being willing to accept risk are all positive traits when they exist in an environment that is safety-focused (Compton, 2003).

Before discussing some of the negative traits that have been documented about the culture of the American fire and emergency service community, one must remember that no culture is all good or all bad. Traits offered in this paper are to further the point that a change is necessary, so more of the negative traits are elucidated. Additionally, there are more examples in the peer-reviewed literature of the failures of the culture, as these events tend to receive more attention than the daily successes and examples of positive action. According to Brunacini, the original firefighters in colonial America in 1740 were selected to protect their community based on their ability to do three things: (1) They had to be **fast**, to get to emergencies in a minimum amount of time; (2) they had to be willing to take great personal risks to get **close** to the fire; and (3) they had to be able to put water on the fire, to get the fire **wet** to extinguish it (1998). Brunacini identifies these

three traits as the core tenet of even the modern firefighter’s culture, even though actions should be more measured and risks should be better assessed in this modern age. Firefighters should operate in full protective clothing and within an accountability system in the performance of their duties (1998). Having a fire and emergency service that embraces the notion of “fast/close/wet” may misalign with the goal of operating safely. Clark furthered Brunacini’s message by adding that if firefighters continue to ascribe to fast/close/wet as the way to respond to fire emergencies, the inevitable result is risk, injury and death (2011).

Firefighter fatalities are closely linked to unsafe practices and a fire and emergency service culture that is not fully committed to safety (Cross, 2010). This lack of commitment to safety is not a new problem in the fire and emergency service. In 1973, the National Commission on Fire Prevention and Control published the landmark study “America Burning.” This initial look at the fire problem in the U.S. revealed that 6,200 people, including firefighters, died annually as a result of hostile fire (Bland, 1973). Additionally, over 100,000 injuries were reported annually, with a dollar loss of over \$10 billion (in 1973 dollars) (Bland). The report estimated a nationwide rate of 300 fires per hour, which translates to over 2.7 million fires annually. In 2007, there were less than 1.6 million fires in the U.S., leading to 3,430 fire deaths and a property loss of \$14.6 billion (Federal Emergency Management Agency (FEMA), 2008). This represents a 44 percent reduction in the number of civilian deaths from fire, and a 40 percent reduction in the number of fires overall. During that same time period, there was no reduction in the number of firefighters who died in the performance of their duties.

In 2011, Kunadharaju, Smith and DeJoy conducted an analysis of 189 National Institute for Occupational Safety and Health firefighter fatality reports for the time period 2004-2009. They found that there were four higher-order causes of firefighter death and injury: insufficient resources, inadequate preparation, insufficient incident command structure, and suboptimal personnel readiness (Kunadharaju, Smith & DeJoy). They concluded that these four higher-order causes “may actually be tapping the basic culture of firefighting ... the job must get done, get done as quickly as possible, and with whatever resources are available” (p. 179). They also advocated for additional research in the area of defining the culture of the fire and emergency service.

As has been shown for other occupational safety problems, the true root causes of many firefighter fatalities may be traceable back to basic cultural attributes (Pidgeon & O'Leary, 2000). The focus on culture as a factor in firefighter fatalities is not new, with IAFC, NFFF and the International Association of Fire Fighters being three high-profile organizations identifying culture as a critical area for change within the fire and emergency service. Various task forces and panels have called for culture change within firefighting organizations. What is new here is an initial attempt to probe for cultural symptoms using a very important and valuable data source: firefighter fatality investigations. Although the conclusions presented in the present research are not in any way definitive or final, they do highlight the importance of cultural factors in firefighter line-of-duty fatalities and suggest some specific factors that should be examined in future research.

David Archer concurs with this description of the fire and emergency service culture, and elaborates on what he calls the discipline code, which "is highly prescriptive, promotes ... from within the organization only ... has long standing traditions, and is predominantly white-male dominated" (1999, p. 1). He further discusses that this system is perpetuated through the cultural processes that individuals are introduced to when they go through the paramilitary-style initial training.

Baigent identified five key areas of culture that are common in interactions between firefighters (2001, p. 7):

1. Ostracizing anyone different.
2. Ostracizing anyone who doesn't conform.
3. Bullying and threatening anyone who resists the dominant group.
4. Excluding outsiders from fire station life.
5. Frequent joking as an instrument to continue bullying.

Brunacini's description of the treatment of new firefighters who don't follow the direction of the older firefighters is consistent with Baigent's criteria.

Lewis, a scholar studying issues of gender and racial inequity in firefighter selection and training, juxtaposes the image of firefighters as heroes against the culture of firefighting: "Firefighters around the world are heroes in the hearts and minds of the public. ... However, research into the culture of firefighting worldwide has also shown disturbing and quite 'uniform' characteristics have been normalized by many under the guise of tradition" (2004).

Phillip Schaeffer conducted a study of over 1,000 firefighters' attitudes and perceptions regarding safety in the wildland firefighting environment. Respondents described the culture as being one "of hardship, adventure, close friendships, and commitment; experience over rank ... enjoys stories of conquest and danger," and pride at how different a wildland firefighter's life is from the rest of society (1996, p. 193). One respondent described the culture as one with "long traditions" (p. 196). These varied descriptions of aspects of the culture make up the tightly woven fabric of the American fire and emergency service community that bears closer investigation and analysis. Organizational cultures such as this are more complicated and have a greater impact on decision-making than insiders to the culture typically realize (Vaughan, 1997). Organizational values within the fire and emergency service are the "shared standards and core beliefs that guide decisions and actions within" the fire and emergency service (Cochran, 2006, p. 454).

Cultural Change

It is evident that many interrelated factors must be addressed in order to produce a significant change in outcomes in terms of reducing line-of-duty injuries and deaths and improving overall firefighter safety and health. The existing fire and emergency service culture, as it relates to occupational safety and health, was identified as both a cause and an effect of the current situation. A cultural change would set the stage for many incremental changes that would produce the desired positive impact.

Cultural researcher Edgar Schein identified the fundamental components of an organizational culture as a system of shared behaviors, values, assumptions and beliefs (2004). He describes these components as a three-layer system:

- Assumptions and beliefs.
- Values.
- Behaviors.

This model begins with a system of shared assumptions and beliefs that provides the foundation for organizational values. Those values, in turn, create expectations for acceptable and unacceptable behaviors. To apply this model to one particular aspect of the fire and emergency service, it could be stated that firefighters tend to attack fires in a manner that is bold and aggressive because their value system provides positive recognition for this type of behavior. These values are based on the belief that the mission of the fire and emergency service is to extinguish every fire as quickly as possible and the assumption that the best way to control a fire is to hit it hard and fast.

All three layers of this model were described by the symposium participants in the discussions that produced the 16 FLSIs. It was noted that unsafe attitudes and behaviors often prevail in spite of the common knowledge that there are less risky alternatives that could result in fewer deaths, injuries and illnesses. In fact, it was noted that efforts to promote health and safety were often met with resistance and scorn, reinforcing the notion that they created conflict with established attitudes, assumptions and values.

The existing system of assumptions and beliefs reinforces particular values:

- Every LODD is automatically labeled as heroic, no matter the circumstances (versus an occupational fatality that is preventable).

- Recommendations to follow standard operating procedures and exercise appropriate caution are described as cowardly.
- The urgency of quickly arriving at the scene of an emergency justifies driving in a manner that endangers the lives of other motorists and pedestrians who may be encountered en route, as well as the responders themselves.

The same sense of urgency:

- Justifies attempting to don protective clothing and equipment en route as opposed to being properly seated and belted in an approved riding position.
- Allows inadequately trained drivers to operate emergency vehicles.
- Allows poorly designed and poorly maintained vehicles to be operated.

The three-layer model suggests that cultural change has to occur progressively, beginning with changes in assumptions and beliefs that gradually bring about changes in the values that are accepted and shared by the individuals within an organization. Changes in the organizational values legitimize and promote changes in behavior. These behaviors need to be reinforced by an ongoing commitment to safety culture at the organizational level and among individual firefighters and their crews. This three-stage process is described as the most natural and effective manner of accomplishing a cultural change.

The application of this approach to the firefighter safety issue suggests that the first priority should be to convince individuals, companies, departments, and society as a whole that the current rates of death and injury are unacceptable and that operating with a higher regard for safety would not compromise the mission of controlling fires and saving lives. The large-scale acceptance of these new assumptions and beliefs would lead to a change in the value system so that being safe would be given equal weight to being effective in controlling fires and saving civilian lives. The new values would encourage firefighters to be more careful and to stop engaging in reckless behaviors that lead to preventable deaths and injuries.

It is also possible to work in the opposite direction, from the top down, although this approach is much more likely to encounter resistance. Every fire chief has the ability to establish rules and regulations that require changes in behavior within his or her own fire and emergency service organi-

zation. For example, the consistent enforcement of a strict policy requiring the use of seat belts in fire apparatus would probably, over a period of time, result in a change of values — at least with regard to seat belt use. Ultimately, the members of the fire and emergency service organization would come to accept and integrate seat belt use as part of their organizational culture.

Members of the fire and emergency service, especially fire chiefs, must align their personal values with the organizational values, and they must model these values (Cochran, 2006). The leader must then ensure alignment of values within the organization in order to ensure a strong work ethic; appropriate treatment of stakeholders; a cooperative atmosphere; teamwork; and high levels of dedication, discipline and commitment (Cochran). Therefore, not having a description of the values or culture makes it difficult, if not impossible, for a leader to initiate organizational change, since there is a limited baseline upon which to center the change interventions.

The difference between the two approaches is that the bottom-up strategy should enable much more comprehensive changes in behavior once the new values become accepted, especially since firefighters would be involved with identifying solutions (and doing so could bolster their buy-in). The top-down approach is likely to encounter resistance for every individual change in behavior that is introduced. The large-scale cultural adjustment may eventually be accomplished; however, it is likely to be a slow and lengthy process.

The statement within FLSI 1 that the cultural change must incorporate leadership, management, supervision, accountability and personal responsibility is an expression of the need to

address the process with a unified effort at every level in order to accomplish the objective, working from the bottom up and from the top down. The successful insertion of occupational safety and health into the fire and emergency service value system should support numerous behavioral changes that could lead to a significant reduction in occupational deaths, injuries and illnesses.

Resistance to Change

Resistance to change, even change initiated internally, is often cited as a significant characteristic of fire and emergency service culture. This factor is often expressed with a mixture of pride and amusement by slogans such as “200 years of tradition unimpeded by progress” (Fire Department of New York (FDNY)).

Resistance to external influences is sometimes described as a particular characteristic of the American fire and emergency service culture. Although it is evident that more and more external influences are demanding compliance and adjustment, particularly in relation to occupational safety and health, there is no question that the fire and emergency service culture strongly resists being told what to do.

These factors underline the point that the type of cultural change that is the target of FLSI 1 will require significant adjustments to some of the values and beliefs that are commonly associated with fire and emergency service culture. This can only be accomplished by convincing firefighters at every level that the change is both desirable and necessary, and that the adjustments may be accommodated without compromising any of the highly valued aspects of fire and emergency service culture.

Toward a Safety Culture

The culture of the American fire and emergency service community is a contributing factor to the high incidence of injury and death. Daniels (2005) asserts that until the fire and emergency service is willing to make substantial changes in training, procedures, equipment and recruiting, this fatal trend shall continue. In some cases, the injurious behaviors may have originated as a bad habit that evolved slowly over time into a tradition, slowly injecting a poor practice or dangerous procedure into the fire and emergency service organization over generations (Gasaway, 2005). Firefighters may engage in an unsafe act, thinking it is the correct way to operate or behave because the unsafe act or technique was how they were originally instructed (Gasaway). Storytelling and instruction from an older generation of firefighters to a younger generation of firefighters is a trait of the tightknit culture. This can be advantageous when the information is appropriate and relates to current department operating guidelines and situations, but it can be detrimental when there is no “filter” to ensure that the hand-me-down messages are safe and effective (Schaenman, 1996).

An additional issue cited by Pessemier is that “the U.S. Fire and Emergency Service does not have an institutionalized methodology for managing safety” (2008b, p. 1). He identifies this as a conflict between the organizational mission of the fire and emergency service and the view of safety as completing demands, instead of synergistic values.

Schneider (1973) suggests that cultures should be “for” something, for example “for service” or “for safety.” One possible solution to the American fire and emergency service community’s dilemma of how to change this culture is to develop an understanding of what it is and then refocus it to be “for” a different value or concept. Slight shifts in the practices within the fire and emergency service are likely to be more successful than large, sudden change (Daniels, 2005b). Schaenman identified that firefighters recognize the importance of safety, but they aren’t always sure about how to accomplish an activity safely (1996). Incrementally moving the current values, and therefore the culture of the fire and emergency service, toward a safety culture can provide the framework and strategies for how to address both of these potential issues.

A safety culture reflects the values, norms, assumptions and expectations regarding safety (Mearns, 1999). A company’s safety culture is expressed by management’s safety practices, which

are reflected in the workplace safety climate (i.e., employees’ perceptions, attitudes and beliefs about risk and safety) (Mearns, 1999). A positive safety culture, as part of comprehensive safety improvement interventions, has been shown to influence safety behaviors by maximizing employee motivation and improving safety knowledge, which, in turn, helps to improve employee compliance, thereby resulting in safer behaviors and fewer injuries.

Pessemier (2008a) furthers this notion of moving toward a safety culture in the fire and emergency service. For illustration, the Phoenix Fire Department has shifted from a transactional service model to one of building longer-term and deeper relationships by shifting the focus of its culture from “for service” to “for building long-term relationships” (Schneider, Bowen, Ehrhart, & Holcombe, 2000). This ability to change a culture in the fire and emergency service is supported by Hofstede, who states that an organizational culture is easier to change than a national culture (2001).

The culture of the U.S. could be modified toward a safety culture. The nuclear industry coined the term following accidents at Chernobyl in 1986 and at Three Mile Island in 1979 and used it to describe what was lacking in these two events. It is a concept that encompasses “a combination of managerial, organizational, and social factors” that contribute to accidents and near misses (Freimuth, 2006). Once cultural goals and expectations were identified, they were reinforced by managers to instill and then reinforce these changes. Regarding culture in the American fire and emergency service community, it has been said that “without the emergence of a new safety culture, all attempts [at increasing firefighter safety] will be in vain” (Siarnicki, 2010, p. 9).

Climate exists within a culture, so moving toward a safety culture would require movement toward a safety climate. While the main focus of this paper is cultural (versus climate) change, it is worth acknowledging the concept of climate and its close relationship to culture while differentiating the two concepts. Safety climate is not only a set of values, beliefs and perceptions about safety as a concept, but also the policies, procedures and practices that support safety in an organization (Colley, Lincolne, & Neal, 2013; Goulart, 2013). Climate is more temporal and local to a particular unit, whereas culture is broader and spans the entire organization, and in some cases, the profession (Mortenson, 2014).

One of the gradual shifts that can be made from the current culture toward a safety culture is to focus on fire-safe behavior, shifting away from heroic acts. Alan Brunacini, former chief of the Phoenix Fire Department and a firefighter there since 1958, describes the problem with the current nonsafety culture that focuses on heroic acts in this way:

“For 225 years, it was OK for a burning building to kill us. When the fire kills us, our department typically conducts a huge ritualistic funeral ceremony, engraves our name on the honor wall, and makes us an eternal hero. Every Line of Duty Death gets the same terminal ritual regardless if the firefighter was taking an appropriate risk to protect a savable life or was recreationally freelancing in a clearly defensive place ... Genuine bravery and terminal stupidity both get the same eulogy. Our young firefighters are motivated and inspired to attack even harder by the ceremonialization of our battleground death” (2008, pp. 6-7).

By emphasizing actions that violate safety guidelines and awarding firefighters for heroic acts that come at a greater-than-usual level of risk or unnecessary danger (Walton et al., 2000), the message being communicated within the culture is that these types of behaviors are acceptable and will be rewarded. “Most of the awards for valor usually involve ... doing things you aren’t supposed to do. It’s in our nature to want to save someone. If nothing goes wrong despite ignoring the rule, you’ll be praised for saving someone” (Peterson et al., 2010, p. 27). Brunacini explains this disregard for safety by suggesting that today’s firefighters “... have never stopped hearing Ben [Franklin]’s voice tell them to be Fast/Close/Wet when they are responding to a fire. I think this is what culture really means in the current safety discussion” (2008, p. 9). Firefighters need a safety culture message that speaks louder than Ben Franklin’s whispers to effect a change within a system that promotes and rewards appropriate risk management behaviors.

A concise summary for the role of culture in the fire and emergency service is provided in this quote from the Charleston, South Carolina, report on nine firefighters killed in 2007: “The cultural lessons may be the most important and also the hardest to embrace” (Laws, 2008, p. 64). Making sense of cultural lessons such as this requires a solid understanding of the organization’s history (Hofstede, 2001). While much of the work on injury

and fatality reduction in firefighting has focused on technology and increasingly more stringent regulations, little has focused on the culture.

A closing thought from Hofstede (2000) serves as a fitting end to the discussion of the organizational culture and values in the fire and emergency service and the need for a shift in this culture to reduce on-duty fatalities. “Uniformed organizations have to balance their attempts to introduce new ways of working ... with the necessity of preserving traditional basics. Changing uniformed cultures requires patience and wisdom” (p. 481). It is the intent of this research to develop some of the wisdom necessary to effect a positive change in the fire and emergency service by reducing the number of on-duty deaths through first understanding the existing values of the fire and emergency service.

Areas of Focus for Cultural Change in Fire and Emergency Services

Thus far, this report has defined culture, described the origins and characteristics of the culture of the American fire and emergency service community, and made a case to move toward a safety culture. The staggering death and injury toll within the fire and emergency service has also been detailed, and from that description, it is clear that the losses experienced are disproportionate to the decreasing number of fires in the U.S.

The culture of unsafe practices may be so deeply ingrained that efforts to change are viewed as challenges to fundamental beliefs, while other unsafe practices are created by the culture of the fire and emergency service as a whole. Still other behaviors, which are not cultural or motivational, are the result of an individual’s health or family history. The Project Team focused on the changes that could be standardized and easily implemented within an organization to effect change.

Using the focus areas and their objectives, the Project Team concentrated on developing sets of behaviors for chief officers, Company Officers (COs) and firefighters that minimize risk. These behaviors were derived using a frequency analysis and consensus of the working group. Risk-taking behaviors have been shown to be an organizational problem and not one that lies solely with firefighters’ behaviors; therefore, strategies to change firefighter behavior need to address multiple levels of influence. The working group identified the following areas of focus: situational awareness, individual responsibility, leadership, health and wellness, training, vehicle operations, seat belt usage, recruiting, and environmental factors.

Situational Awareness

Fire and emergency service organizations should concentrate on implementing and demonstrating an effective and measurable model to improve situational awareness of all responders, along with the command and control of all incidents. One way to encourage this change is for fire and emergency service organizations to draw on a risk management approach that obtains input from firefighters and involves a cyclical process of identifying operations or activities that pose high risk for injuries, redesigning operating procedures to reduce risks, implementing these changes, and evaluating their impact. The focus areas of risk behavior modification are situational awareness and inadequate command, control and supervision.

There is considerable room for discussion in defining the boundary limits for acceptable and unacceptable risk in relation to potentially survivable or nonsurvivable conditions, and increased situational awareness aids in establishing these limits. Situational awareness is defined as “the perception of the elements in the environment within a volume of time and space, the compre-hension of their meaning, and the projection of their status in the near future” (Endsley M., 1988).

The study of decision-making with its many subsets, including situational awareness, is at its core: the study of human factors and human error. It is the study of complex interactions of human behavior and the consequence of those actions. One area of scholarly agreement is that understanding of the complex interaction between human causal factors is always likely to see changes, though it is imperfect and incomplete (Wall, 2012). S. Dekker points out that some labels, such as complacency or loss of situational awareness, are a better and more accurate description of events than labeling an accident as human error; they appear to give a reason behind the behavior. In high-risk occupations that have already failed to predict complex situations, it is nearly impossible to completely engineer all safety mechanisms; thus, human decision-making must be studied and well-understood (Dekker, 2002).

Situational awareness becomes a key factor in cases where it is not known whether a building is occupied or unoccupied and whether the occupants are still alive or already deceased. Should firefighters risk their lives to search for potential occupants under extreme fire conditions when there are no clear indications that the building is occupied, or where fire conditions suggest that it is extremely unlikely that anyone could be saved?



Photo by Ron Moore, Courtesy of Cornbelt (Illinois) Fire Protection District



Photo by Ron Moore, Courtesy of Prosper (Texas) Fire Rescue

Individual Responsibility

The two key aspects that apply to every member of the fire and emergency service at every level are accountability and personal responsibility. Every individual, from entry-level firefighter to fire chief, must be accountable for meeting the expectations assigned to his or her role and position within the fire and emergency service. All individuals must also accept personal responsibility for their own health and safety, as well as for that of their co-workers and particularly for that of anyone they supervise.

Accountability is an inherent aspect of management and supervision, expanding at each successive level of hierarchy. The fire chief cannot avoid accountability for the overall performance of the fire and emergency service organization and for every positive or negative occurrence. The fire chief must hold subordinates accountable for

performance within their areas of responsibility. The same principle applies to every level, down to the individual firefighter who is accountable to the organization as a whole but directly accountable to a supervisor and usually also to a group of co-workers.

Accountability is often ignored until something bad happens — in this case, an incident that results in on-duty injury or death. Positive accountability is associated with ensuring that all of the proper policies and programs are in place to prevent this type of occurrence, whereas negative accountability begins with attempting to explain why they were not in place after a preventable event has occurred.

The most undesirable type of accountability comes from outside an organization, when individuals have to defend the organization, or even themselves, in legal proceedings.



Photo by Ron Moore, Courtesy of Prosper (Texas) Fire Rescue

Leadership

Leadership is often mentioned as a key component in relation to implementing safety policies and programs. Change is unlikely to occur unless the leaders of an organization embrace the effort and demonstrate a commitment to the endeavor. This applies directly to the formal leadership, which includes labor as well as management, and it often includes informal but influential leaders within the organization.

Effective leadership must go beyond simply issuing directives and policy statements. The members of a fire and emergency service organization can generally differentiate between policies that are intended to satisfy a duty or responsibility and legitimate efforts to lead the organization in a specific direction. There are many examples of fire and emergency service organizations that have issued policies that are based on recommended safety and health standards and then failed to demonstrate a true commitment to those policies.

Health and Wellness

Almost half of all firefighter fatalities in the U.S. are cardiac-related (USFA), and the majority of those deaths are found to be related to pre-existing and preidentified medical conditions. These factors reinforce the message that all firefighters should be periodically evaluated to ensure that they are medically and physically fit to perform their expected duties. This message is incorporated within NFPA 1500. It is also expressed in FLSI 6, which states: **Develop and implement national medical and physical fitness standards that are equally applicable to all firefighters, based on the duties they are expected to perform.**

Although the message is clearly stated and its importance is widely accepted, the American fire and emergency service community has been very slow to adopt mandatory policies to implement such requirements. The necessary standards have been developed and adopted, yet there are still fire and emergency service organizations without programs of this nature and tens of thousands of active firefighters who have not been medically certified for emergency duty.

The two primary factors that inhibit the adoption of mandatory medical and fitness standards are cost and the belief that a substantial percentage of fire and emergency service members would be unable to meet the requirements. This behavioral aspect reflects the determination of many individuals who join the fire and emergency service or who continue to serve in spite of their medical status and physical fitness limitations. Indeed, many fire and emergency service organizations would face a serious crisis if the recommended policies were immediately mandated, as they may lack the resources to medically screen all personnel and to recruit new members to replace those who are found to be ineligible for service.

Cost is a significant problem for the various types of fire and emergency service organizations; however, the potential loss of active members may be a more critical concern for many volunteer fire and emergency service organizations that are already dealing with recruiting and retention issues and don't have the added incentive of pay to bring new recruits in. In addition, volunteer fire departments face additional barriers, such as the fact that they typically do not provide health insurance for their members, they typically don't have access to a department doctor, and departments in

rural areas may not have easy access to medical resources. Within the career fire and emergency service, the concern tends to be associated with the fate of career employees who are determined to be unfit for duty.

The individual determination of many fire and emergency service members to remain active in physically demanding positions in fire and emergency service organizations, in spite of risks to their own health, is evident from the half of LODDs that result from medical causes. This behavior may be driven by dedication to the fire and emergency service mission, as well as the sense of membership within the fire and emergency service community.

Training

While training is often viewed as an essential component to accomplish any type of positive change in firefighter behavior, it is also frequently noted that inappropriate training is encouraging or reinforcing high-risk behaviors. This suggests

that the problem may not be limited to inadequate training; it may also involve applicable training that establishes inappropriate attitudes, actions, beliefs and behaviors.

Fire and emergency service training organizations must be conscious of the behavioral influences that are incorporated within the content of their training programs, as well as the manner in which training is being delivered. The attitudes, beliefs and behaviors of the instructor may be more influential than the program content itself.

In addition to ensuring that the intended content is delivered and the desired attitudes and behaviors are developed, it is essential to ensure that training activities are conducted with a high degree of safety. The annual reports of firefighter fatalities almost invariably include deaths associated with training activities, whether from traumatic injuries or medical causes. The latter category often includes overexertion, heat stress, and a variety of known and unknown medical conditions.

Initial Firefighter Training

Firefighter competency is foundational to firefighter safety. Training for firefighters (NFPA 1001, *Standard for Fire Fighter Professional Qualifications*) should include educational components that discuss the new science and research now available, including fire behavior based on factors such as fuels present, the limitations of PPE, and the limitations of the human body when fighting fire in the new protective ensembles. Back to basics isn't more hose evolutions — it is the **why** behind what we do. Fire and emergency service organizations should continue to monitor research and the ensuing evidence to adapt/update protocols and practices that improve safety and fire protection. Firefighters should be taught to evaluate the risk of every action so they never have to answer "I don't know" when asked why they took a particular action. Firefighters should not take action without knowing the possible consequences.

The fire and emergency service has seen and heard of presentations based on the Underwriters Laboratory (UL) and National Institute of Standards and Technology (NIST) research conducted with the Chicago Fire Department; FDNY; Spartanburg, South Carolina Fire and Rescue; and others that suggest a change to traditional first-arriving actions. These research reports, based on science, suggest changes to the initial on-scene report and operational mode, which are designed to limit exposure to risk, that include "aggressive defensive operation being performed in preparation for an interior attack."

The UL and NIST live burn tests are aimed at quantifying emerging theories about how fires are different today. This difference is largely due to new building construction and the composi-

tion of home furnishings and products that in the past were mainly composed of natural materials, such as wood and cotton, but now contain large quantities of petroleum-based products and synthetics that burn faster and hotter. Whereas a fire in a room once took approximately 20 minutes to experience "flashover" — igniting all the contents — this can happen with today's products in as little as four to five minutes.

The primary motivation for the live burn experiments is the changing dynamics of fires. The contents of American homes have changed significantly in the past few decades. Plastics and other synthetic materials have replaced the natural materials that once made up the bulk of furniture items. In addition, modern living spaces tend to be more open, less compartmentalized and better insulated than homes built years ago, leading to increased fire spread in "modern dwellings."

The UL/NIST studies suggest that a change in traditional tactics begins with a direct exterior attack, making the interior safer for entry when the interior attack begins. This is being viewed as particularly appropriate in reduced staffing or delayed backup situations. These changes may pose a cultural challenge with the use of the verbiage, such as "aggressive exterior attack" instead of the traditional "defensive operation," which implies that we are giving up. Regardless of how the incident begins, in the most critical situations, the IC has to make the decision to switch from an offensive strategy to a defensive strategy and withdraw firefighters from interior operating positions based on an ongoing assessment of incident scene hazards.

Officer Training

Training for COs (NFPA 1021, *Standard for Fire Officer Professional Qualifications*) should include educational components, such as health and safety, leadership, and tactics for new building construction features, in addition to those changing components for firefighters. Back to basics for COs is not simply more leadership classes — it also includes the principles of reading smoke, adequate size-up with a declaration of strategy, understanding fire behavior, building construction, victim survivability profiling, and using the Incident Command System to help manage the incident with safety as the overarching, guiding principle. COs should be asking themselves:

- “Am I training on the types of incidents to which we actually respond?”
- “Do we have experience or training on this type of incident?”
- “Is another company better trained or equipped to handle this incident?”

Training for chief officers (NFPA 1021) should also include educational components related to budgeting (execution and understanding) and maximizing partnerships to improve service delivery. Back to basics for chief officers who operate on the fireground should include skills needed for proper apparatus placement, managing multiple divisions/groups, and managing personnel accountability, in addition to those new skills being learned at the CO level.

Officers who have responsibilities for overseeing a fire and emergency service organization’s health and safety program should be meeting the requirements of NFPA 1521, *Standard for Fire Department Safety Officer*. Training for such officers should include educational components, such as health and safety program management, workplace safety compliance, fireground tactics, hazard recognition, and Incident Safety Officer’s responsibilities. While not every department has a designated Health and Safety Officer, it should be every officer’s responsibility to function as a “safety officer” both on and off the fireground.

Emergency and Personal Vehicle Operation

The operation of fire and emergency service organization vehicles and apparatus warrants specific attention. As indicated by the NFPA, during the time period 1998-2013, 13 percent of LODDs occurred while responding to or returning from calls for service. Organizations should concentrate on implementing and demonstrating an effective and measurable model of driver/operator training that advances in skill sets throughout a career and that ensures quality and driver/operator accountability. The focus areas of risk behavior modification are driver capability, quality assurance and accountability.

Factors Influencing Safe Emergency Response

The basic nature of the emergency response mission encourages drivers to reach the scene of an incident as quickly as possible, and in the case of more rural departments, firefighters are encouraged to first reach the fire station more rapidly. Traffic laws provide specific allowances and exemptions for emergency vehicles in order to reduce response times. Sirens, air horns, warning lights, as well as larger and more powerful engines tend to increase the sense of urgency and the driver's perception of invincibility.

The two factors that are most often identified in relation to reducing emergency vehicle crashes are increased driver training and enforcement/strict adherence to safe driving procedures. The logic of these influences is self-evident; however, attention must also be directed toward the factors that encourage drivers to stretch the limits of reasonable and prudent driving habits.

In addition, response time is often used as a primary performance indicator for fire and emergency service organizations, and shaving a few

seconds from the annual average response time is considered to be a significant accomplishment. All of these factors appear to justify higher levels of risk when responding in an emergency mode. Driving faster is closely associated with driving more aggressively — taking chances and forcing or challenging other drivers to yield the right of way. Excessive speed is a known risk factor for crashes and crash-related death and injury.

Additional factors have been identified as encouraging inappropriate emergency vehicle driving habits. Competition and peer pressure may encourage faster response simply to get to the scene of an incident first or ahead of a rival company. In some fire and emergency service organizations, faster response speeds have been noted when multiple companies are responding to the same incident than when only a single company is responding. At the same time, each of these factors is offset by the expectation to drive safely and with due regard for the safety of all others who may be encountered en route to the location of the emergency incident. Safety is presented as a legal and moral obligation as well as an organizational value.

Driver/Operator policies will assist every jurisdiction in establishing the guidance needed for their members to safely operate all vehicles when responding to or returning from an incident, beginning with proper licensure for the jurisdiction, as well as proper training on how to drive and operate the specific emergency vehicles that the driver will be responsible for. It is prudent that not only departmental policies but also national guidelines be established that define tiered emergency responses for all departments. These policies must address both personal and department vehicles and cover both emergency and nonemergency driving expectations.

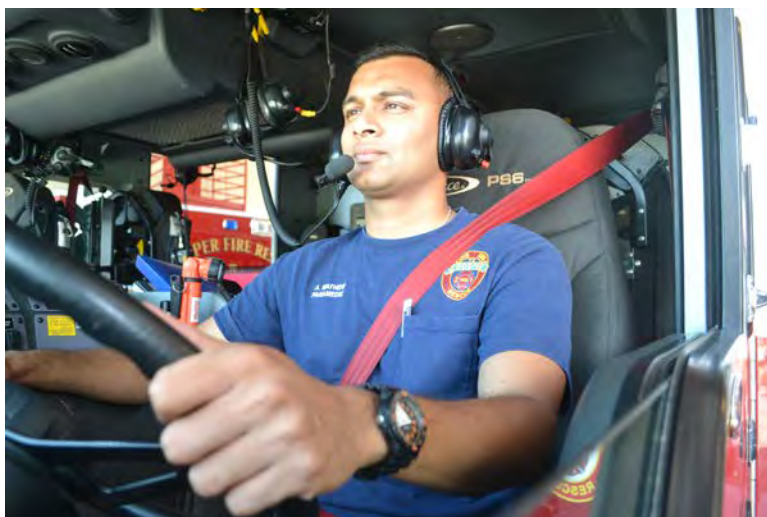


Photo by Ron Moore, Courtesy of Prosper (Texas) Fire Rescue



Photo by Ron Moore, Courtesy of Prosper (Texas) Fire Rescue

Based on the assumption that every organization may need to create or revise driver/operator policies, a list of potential incentives that organizations can use to promote driver/operator behavioral changes and a list of possible consequences that organizations may face if they choose not to adopt a driver/operator policy are provided at www.ffsafetyculture.org.

Seat Belt Use

The broad scope of the cultural issue becomes evident when it is applied to the question of why many firefighters do not use seat belts when riding in fire apparatus. While the adoption and enforcement of a policy requiring the use of seat belts appears to be relatively uncomplicated, the issue is considerably more complex than it appears.

The vast majority of fire and emergency service organizations have adopted official written policies that require firefighters to use seat belts whenever vehicles are in motion. There are no known written policies in fire and emergency service organizations that allow for the nonuse of seat belts. Requirements to use seat belts are incorporated in many state vehicle codes, and the same policy is clearly stated in NFPA 1500. In addition, tremendous efforts have been put forth to educate firefighters on the need to use seat belts and promote their use as a personal safety decision.

Considering all of these efforts, it is appropriate to ask why so many firefighters continue to not use seat belts. Below is a list of factors that have been identified as contributors to the problem:

- The belief that the urgency of emergency response requires donning protective clothing and equipment en route.
- The belief that a fastened seat belt will delay the firefighter's ability to exit the vehicle upon arrival at the scene of the emergency.
- The difficulty of manipulating inadequately designed seat belts in the limited seating space that is available and in the presence of breathing apparatus straps.
- The sense of personal invincibility that comes from riding in a vehicle that is larger and heavier than most other vehicles on the road.
- The fear of being viewed as nonconforming when others are not using their seat belts.
- The failure to enforce officially adopted policies creates the impression that compliance is not a high priority for managers and supervisors.

While all of the noted rationalizations apply to emergency response, they often carry over to nonemergency situations. Firefighters may easily develop the attitude that if it is acceptable to ride to an emergency without a seat belt, then there is no need to wear a seat belt when returning from the emergency or when riding in a fire and emergency service organization vehicle for any other reason.

One key factor appears to be the priority that is directed toward seat belt use by the fire chief and senior level officers of the fire and emergency service organization. A strong policy statement accompanied by a serious enforcement policy is usually effective in achieving a high level of compliance. In larger organizations, the policy must be enforced at each successive level of supervision down to the individual firefighter.

Where there are valid technical issues, such as problems with the design and installation of seat belts, management must be prepared to address those problems as part of the overall strategy. Members cannot be expected to work with equipment that does not perform the required function.

Recruiting

An important point made by Hofstede (2000) is that one way to change the culture of a uniformed organization, such as the fire and emergency service, is to recruit more members with values that are different or independent from the organization. Soeters and Boer (2000) found this to be the case to help reduce military aircraft accidents. By incorporating more civilians and fewer people who had been indoctrinated into the military value system, a cultural shift toward a safer work environment ensued, and the number of aircraft accidents was reduced.

The same factors tend to influence individuals to become firefighters, both career and volunteer. The fire and emergency service is often viewed as an attractive outlet for individuals who are seeking opportunities to face extreme challenges and imminent danger. The recognition that is often associated with heroic actions is further motivation for many individuals to become involved in the fire and emergency service. The strongest, bravest and most daring individuals are often motivated to become firefighters.

The whole notion of daring and death defiance is continually applied to the fire and emergency service from external sources. The public tends to view firefighters as individuals who are willing to face extreme risks in order to save lives and

property. These public perceptions are naturally incorporated into the firefighters' self-image and tend to further promote risky behaviors.

The media portrayal of fire and emergency service workers is generally not realistic, and it does not represent a true slice of what the work of the fire and emergency service is. Protective clothing may be altered or not used to show an actor's face or demonstrate a level of aggression or risk that is unreasonable in a real-world setting. This image is further reinforced by slogans such as "No Fear" and "Are You Tough Enough to Be a Hero?" as well as graphics portraying firefighters as dragon slayers and warriors facing overwhelming threats with nothing more than courage and daring. Peer pressure and competition often entice a "more daring" spirit than other individuals, companies, or fire and emergency service organizations. In some cases, actions that demonstrate appropriate caution are viewed as cowardly or impossible.

The warrior image is increasingly used to promote a sense of preparedness to engage in actions that require high levels of training and involve extreme physical challenges. These concepts are not inconsistent with the values of a strong safety culture. In many cases, the warrior image is presented in a context that appears to label the safety movement as a cowardly approach, expressing the notion that warriors are not concerned with safety because they are able to overcome any adversity.

Environmental Factors

It has been observed that the current fire and emergency service generation has been raised in an environment that glorifies risk and expresses little or no concern for the potential negative consequences of bad decisions. The Internet along with tremendous expansion in the use of social media outlets, such as Facebook, Twitter and Instagram, and the influence of national fire service websites provide a continual supply of video clips and photos showing individuals risking life and limb in the pursuit of thrills and recognition. While many of these efforts result in obvious injuries, the consequences of such misadventures are never included in the video that is posted. There is an aura that even anonymous recognition for extreme daring is sufficient justification to accept the consequences of failure. Additionally, newer members who are accustomed to playing video games that allow individuals to experience simulated confrontation with every conceivable danger, with absolutely no risk of death or injury to the thrill seeker, may contribute to a lack of understanding of real-life consequences of high-risk behaviors.

Summary

The culture of the American fire and emergency service community is rich and time-honored. The culture has aspects that provide superior protection for life and property, while it also has portions that contribute unnecessarily to firefighter and emergency worker injury and death. The culture can be changed at national, state and local levels without diminishing the quality of services provided by enhancing firefighter competencies needed at emergency scenes. Both the culture and climate can be moved toward a common sense, safety-oriented approach to balance the risks and rewards of questionable behaviors better.

This report generates important ideas that can be implemented to address culture and climate in an effort to change behavior in the American fire and emergency service community, which will lead to fewer injuries and deaths.

This document provides a foundation for future work in this area that will involve developing enhanced online educational materials and outreach. Fire and emergency service organizations and individual responders can begin to engage in this move toward positive cultural change by visiting www.ffsafetyculture.org.

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