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## Creating a Tradition of Safety

Thomas Aurnhammer

BY THOMAS W. AURNHAMMER

THE FIRE SERVICE HAS MANY GOOD TRADITIONS. They include serving our communities, wearing our uniforms, the historical symbols that designate rank and office, the brotherhood and sisterhood among members, and the good standing we hold in our communities.

1 The chief is responsible for overall safety. Even though the chief delegates some or all of the functions associated with providing a safe work environment, the ultimate responsibility for department safety remains with the head of the department. The chief's main objective should be to ensure that improving safety is a continual process and that adequate resources are provided to meet that goal.

Fire officers now have ready access to a tremendous amount of information on a variety of firefighter safety-related issues through the Internet, the United States Fire Administration (USFA), and the National Institute for Occupational Safety and Health (NIOSH) Web sites, for example. This information can easily be incorporated into standard operating procedures or guidelines and training programs. Every department member, from the most senior member to the rookie, carries out some portion of the safety function. It is incumbent on the chief to help members understand their safety-related roles while training, on the fireground, responding to and returning from incidents, and in the station.

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2 Designate incident safety officers (ISOs). With the continued use of the incident command system (ICS), most fire officers are aware that the incident commander (IC) can establish the incident safety officer position as part of the command organization. As the IC's span of control starts to increase, the designation of an ISO will help to maintain a safe operation. The ISO can carry out these important duties during training, firefighting, and emergency medical and technical rescue operations. Although the IC is responsible for personnel safety, the ISO has the direct obligation to focus on the safety aspects of the operation.

**FORUM HIGHLIGHT**

"As a firefighter, whether it be engine or truck, what is going through your mind for a size-up? What is the first thing you look at when stepping off your rig? What about the second thing? Etc." -- *Billy Lewis*

POST A REPLY HERE!

Under the ICS, the ISO has the authority to alter, suspend, or terminate unsafe acts or dangerous activities and can bypass the chain of command to correct any perilous actions or remove personnel from immediate danger. Examples include ordering the evacuation of a structure in danger of collapse or prohibiting personnel from operating inside a wrecked vehicle that has not been properly stabilized. Of course, the ISO must communicate these actions to the IC so the incident action plan can be revised accordingly.

The individual assigned to the ISO position must have the knowledge to function effectively in this position and the skills to recognize the inherent dangers present in all fire department operations. Courses offered by the National Fire Academy are among the resources that provide this training.

**CORBETT'S TRIVIA**

Corbett's Trivia  
What was the engine that first incorporated a crosslay, better known by the town's name?

More Corbett's Trivia 

3 Develop a safety culture. Embrace the concept of working safely and no longer tolerating behavior that may be potentially hazardous to members. Management must participate in this movement if there is to be a successful transition. We should not hang on to behavior that can get us injured or killed. Have the members participate in the process of establishing and evaluating safety goals and objectives. Delegate the responsibilities for managing the projects or assignments to meet those goals and objectives.

Indoctrinate new members with the importance of the safety tradition from their first day of training. Create a training standard that incorporates safety considerations into all aspects of entry-level training and that stresses the importance of keeping themselves and their fellow firefighters safe.

This need for a culture of safety applies to all types of departments. Making firefighter safety second nature to our personnel offers the potential to greatly reduce the number of line-of-duty injuries and deaths.

4 Employ crew resource management (CRM). This refers to the effective use of all resources to minimize errors, improve safety, and improve performance.<sup>1</sup> It has also been noted that the technological "fixes" imposed by the industry reduced accidents only until the next time a human error occurred. A new approach to preventing disasters was created when the industry looked at ways to "fix" the primary cause of these incidents, human error. Originally called "Cockpit Resource Management," the title was changed to "Crew Resource Management" to incorporate all members of the flight team. The U.S. Military adopted the program in the 1990s, and the United States Coast Guard has realized a 74 percent reduction in injuries and fatalities since implementing CRM. Air disasters have also dropped from approximately 20 to one or two per year.



**FIREFIGHTER FATALITIES**

Notice of Firefighter Fatality: Roslyn, PA  
Albert G. Eberle Jr. of the Roslyn Fire Company in Roslyn, PA has died as the result of an on-duty incident that occurred on 2009-02-15.

More Firefighter Fatalities 



(1) Make sure adequate resources are on-scene to address the problem at hand. (Photos by author.)

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CRM optimizes human performance by reducing the effect of human error through the use of resources such as people, hardware, and information. The principles of CRM include error management through improved training and skills development in six areas: communication skills, teamwork, task allocation, critical decision making, situational awareness, and debriefing.

Although the fire service has made great strides in incorporating improved technology into our operations, we are still experiencing preventable deaths and injuries. If we continue on the current path of injuries and line-of-duty deaths, we have the potential to experience more than 900 fatalities and 950,000 injuries over the next decade. The many similarities among the aviation, military, medical, and fire service arenas suggest CRM will provide another tool for a fire department's safety improvement "tool box."

5 Apparatus safety is paramount. Since about 25 percent of line-of-duty fatalities occur while responding to or returning from a call, safety must be the paramount consideration *before* stepping



**The next Generation of SCBA brackets has arrived**



onto that first apparatus step. All personnel riding the apparatus should be in full turnout gear prior to climbing aboard the apparatus. Once on the apparatus, they should don their SCBA (if needed) and be seat-belted prior to the apparatus' moving. *It must become a "tradition" that all persons riding in fire apparatus be seated and belted securely by seat belts in approved riding positions any time the vehicle is in motion.* According to the National Highway Traffic Safety Administration, in the past 26 years, safety belts prevented 135,000 fatalities and 3.8 million injuries, saving \$585 billion in medical and other costs. Seat belts should not be released or loosened for any purpose, including the donning of respiratory protection equipment or protective clothing, while the vehicle is in motion.

The driver and the officer are responsible for ensuring that personnel are seated, with the seat belt attached, before leaving the station. Standing or riding on tailboards, sidesteps, running boards, or any other exposed position is prohibited. Some departments do not require the driver to be in turnout gear because it is difficult to operate the apparatus in bulky clothing. Follow your department's policies.

The apparatus driver must give his full attention to the safety of the apparatus in traffic. All of the emergency signaling lights need to be turned on prior to leaving the station. Reaching around and turning on emergency light switches while driving can lead to an accident.

Before leaving the station, the driver and officer must ensure that the overhead door is fully opened. The door could be damaged or destroyed if hit by the responding apparatus. Once outside the station, close the overhead door, especially if the station is vacant. If you have to operate the door by a manual switch, make sure the apparatus has cleared the door before pushing the button. Radio-controlled door openers can save a lot of trips in and out of the apparatus but can also lead to door accidents unless you are cautious. When the apparatus has cleared the station door, the driver should check to ensure that the apparatus brakes are operable.

6 Know where you are going. The driver must know the location of the incident site. Check the directions over a mobile data terminal, if available, or a map book. The driver and officer should agree on where they are going. Miscommunications can occur when streets, avenues, and lanes have the same name. When in doubt, ask the dispatcher to repeat the location.

In some departments, policy requires that the address be repeated to the dispatcher when radioing in at the start of the response. Notices of street closings and road construction require some preplanning and should be communicated to members by a reliable method when they are reported to the department.

Depending on the location of your station and the amount of traffic encountered, members may have to perform traffic-control duties for responding apparatus. Members performing these duties should wear a traffic safety vest and use a traffic control device such as a sign or a flashlight.

7 Develop and enforce driving standards. Establish training requirements for operating emergency vehicles. All department members, especially drivers and officers, need to recognize that a safe response is the first benchmark of a successful emergency operation. Examples of driving policies and procedures are available from fire department insurance carriers; you can tailor them to your needs. Consult with your local law enforcement agency when developing or updating these standards.

Inclement weather, slippery road conditions, and poor visibility are a few situations that necessitate slower response speeds. Even light rain causes roads to become slick. Slow down when driving in heavy rain and fog conditions, and turn on emergency lights and headlights to make the apparatus as visible as possible. Test the brakes and windshield wipers before you respond.

In the winter, remember that even though a vehicle is equipped with tire chains, traction will always be an issue. Winter conditions create unsafe roads and highways. Fire apparatus are large and cannot stop on a dime. The shifting of 500 to 1,000 gallons of water can create the most dangerous ride of your life. Take all the actions and time you need to arrive safely.

8 Be fully prepared for interior firefighting operations. The IC must maintain safe operations. Personnel operating in a hostile environment must have basic training in fire behavior and firefighting tactics. It is even more dangerous in departments where initial staffing on the fireground is below minimum standards (NFPA 1710, see below) for initiating an interior fire attack. Follow basic safety concepts such as a strong command presence, sound risk management practices, useful and disciplined communications, personnel accountability, and the establishment of an initial rapid intervention crew (IRIC).

The necessary number of personnel must be on-scene before initiating interior operations. It may be difficult to gather those resources in smaller communities. Short-staffed combination or all-volunteer departments may have to compensate for the lack of firefighters for the initial response by developing automatic mutual-aid agreements or calling for additional resources immediately after being dispatched to an incident. The response distances for these additional personnel and equipment must be factored into the action plan.

ICs must consider alternative tactics such as a blitz or an indirect attack, if appropriate; establishing a water supply; securing utilities; placing ladders; getting additional hoselines in place; protecting exposures; and other exterior operations while gathering resources for an interior attack.

9 Implement an adequate IRIC and RIC. National Fire Protection Association (NFPA) 1500, Standard on Fire Department Occupational Safety and Health Program; 1710, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and

Special Operations to the Public by Career Fire Departments; 1720, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Departments; and OSHA 29 CFR 1910.134, the Respiratory Protection Standard, call for an initial rapid intervention crew (IRIC) to be in place before commencing operations in hazardous areas or immediately dangerous to life or health (IDLH) atmospheres. The IRIC stands by outside the building in the early stages of another crew's starting the interior operation. As additional companies and personnel are committed to the interior fire attack, the IRIC must expand as well.

An escalating fire incident requires the establishment of a full rapid intervention crew (RIC) and, depending on the circumstances, a Rescue Branch. The needs and resources for this undertaking vary according to the type of building and the conditions encountered by the interior forces. One fact that has become evident from data gathered at real-life downed firefighter incidents and training exercises is that multiple companies are needed to execute a firefighter rescue. Preincident training in IRIC and RIC operations will help ensure that what has the potential to be an emotionally charged operation will come to a successful conclusion.

NFPA 1500 also provides the IC with some guidance when facing an immediate rescue problem. A section of the appendices of that document states, "If members are going to initiate actions that would involve entering a structure because of an imminent life-threatening situation where immediate action can prevent the loss of life or serious injury, and four members are not yet on the scene, the members should carefully evaluate the level of risk that they would be exposed to by taking such action. If it is determined that the situation warrants such action, incoming companies should be notified so that they will be prepared to provide necessary support and backup upon arrival."

10 Implement and enforce respiratory protection standards. OSHA's respiratory protection standard, in addition to the two-in/two-out requirement, also calls for the employer to develop and implement a written respiratory protection program with required worksite-specific procedures and elements for required respirator use. Just having a program does not ensure compliance. Enforce the program, which should address standard operating procedures or guidelines; training; respirator fitting and seal check, inspection, storage, maintenance, and air supply; medical evaluations; and record keeping.

The chief has the overall responsibility for administering the program-development of the program and the associated policies, rules, and regulations. The chief is also responsible for developing and implementing a budget to administer the program, designating a program administrator, and determining which individuals are required to participate in the program.

The administrator may delegate certain responsibilities and duties to other officers. Company officers are generally responsible for making sure that the program is implemented. Supervisors must ensure that all members under their charge understand the program. This includes the availability of SCBA for all personnel working in an IDLH atmosphere and the enforcement of SCBA and rehab procedures. Company officers can also see to it that the respirators are properly cleaned, maintained, and stored according to the program.

You are obliged to wear your SCBA when and where required and in the manner in which you were trained. You must also care for, maintain, and store the SCBA as instructed and inform your company officer if an SCBA face piece no longer fits well.

11 Reading the smoke. The fireground is a dangerous place, and sometimes fire conditions change rapidly. ICs and safety officers are responsible for monitoring immediate risks as well as situations that may become hazardous. They have to look ahead and forecast the risk of the operation. This should start with a scene assessment and an ability to "read" smoke conditions. Key safety issues can also be identified by watching the smoke conditions.

The smoke conditions can tell you a number of points that need to be factored into strategic and tactical decisions. What is the volume of the smoke? How much of it is coming out the building's openings? At what speed is the smoke leaving the structure? How about density? What is the quality of burning? Does it have the potential for a flashover or backdraft? Note the color, which provides information on the stage of burning as well as the probability of a flashover or backdraft.

Consider the following also. Look at the building and the location from where the smoke is coming. Is it the origin of the fire, or is the smoke having to travel to that opening? Weather conditions will affect the smoke. Low temperatures and relative humidity may cause the smoke to hang low. Firefighting efforts must be evaluated to determine if entering the building or creating other openings has allowed the smoke to travel from the area of origin.

The smoke also provides information that can help you determine the fire's status. Decreasing smoke volume, velocity, density, and color changes (i.e., from black or brown to white) can indicate that fire conditions are improving. Conversely, increases in the above mentioned items with visible flames or other evidence of compartment-by-compartment flashovers can indicate that fire conditions are worsening.

12 Conduct a risk management assessment. The risk management process begins with the first unit's arrival on the scene and the company officer's performing the initial size-up. Basic risk management principles must be applied to determine the course of action to be taken as it relates to an offensive or defensive fire attack. The classic risk management matrix looks at the level of risk in the fireground operations and the frequency with which the operation has been carried out in the past.

As an example, a fire in a single-family dwelling may be considered to be a high-frequency/high-risk operation whereas a fire in a large commercial building may be considered a low-frequency/high-risk operation. Low-frequency/high-risk operations demand the highest level of safety we can provide.

Consider also other risk factors-size, location, and stage of the fire and the capabilities of the fire suppression resources. Before initiating an interior attack, the IC must be assured that a safe and effective operation can be accomplished with the resources on the scene. Life safety must also be considered. The acceptable level of risk when the saving of a life is involved is greater than the acceptable level for saving property alone.

The IC has extensive authority when making risk management decisions. These decisions should not needlessly place firefighters' lives in danger, nor should they be so overly cautious so that lives or property that could have been saved are lost or fireground actions that should have been executed are not accomplished. A balance of experience and judgment is essential when applying risk management principles on the fireground.

13 Abide by the "10 Rules of Engagement." In August 2001, the International Association of Fire Chiefs (IAFC) Health and Safety Committee published "The 10 Rules of Engagement for Structural Firefighting," which follow:

- No building or property is worth the life of a firefighter.
- All interior firefighting involves an inherent risk.
- Some risk is acceptable, in a measured and controlled manner.
- No level of risk is acceptable where there is no potential to save lives or savable property.
- Firefighters shall not be committed to interior offensive firefighting operations in abandoned or derelict buildings.
- All feasible measures shall be taken to limit or avoid risks through risk assessment by a qualified officer.
- It is the responsibility of the incident commander to evaluate the level of risk in every situation.
- Risk assessment is a continuous process for the entire duration of each incident.
- If conditions change and risk increases, change strategy and tactics.
- No building or property is worth the life of a firefighter. (The committee felt this condition was so important that it should be mentioned twice.)

14 Use a thermal imaging camera. Thermal imaging is one of the most significant technological advances to be introduced to the fire service in many years. Thermal imaging enables firefighters to see through smoke conditions and also allows for other operational improvements: a more effective primary and secondary search of the fire building; an efficient and quick assessment of fire conditions and spread potential; the ability to read temperatures (from cameras equipped with a temperature readout) within a room about to flash; and the ability to search for hot spots behind walls, above ceilings, in overheated light ballasts, and in electrical equipment. Thermal imaging cameras also help an IRIC or RIC to locate and extract downed firefighters in a Mayday.

Thermal imaging measures the infrared thermal radiation and temperature differences in a combination of objects and transforms them into a visible black and white image. Objects that appear white in the camera are hotter than those that look darker. Heat sources release infrared wavelengths that are not affected by smoke. Improvements in size and the sensors used have made these units easier to handle and have also reduced the "white-out" effect produced in first-generation cameras.

This technology can cause overconfidence by allowing firefighters to see objects in an environment that has zero visibility. The camera provides a two-dimensional view of a smoke-filled environment, and depth perception is limited. Interior firefighting crews must stay low even if the camera allows them to see that most of the heat is at the ceiling. Although the camera can also serve as a tool for detecting heat during overhaul, training with the thermal imaging camera must reinforce the fact that the camera cannot penetrate most construction materials including drywall, plaster and lath, concrete, glass, plastic, and water.

15 Be aware of overhaul hazards. Overhaul is a potentially dangerous function. As the emergency stage of the operation gears down, you must use a more cautious and planned approach. Haphazard overhauling causes injuries. Safety procedures, including the use of PPE, are required during overhaul operations.

Prior to beginning overhaul tasks, initiate steps to address and eliminate inhalation hazards. A number of fire departments are now using instruments that measure carbon monoxide and oxygen levels during overhaul. Inhalation hazards are present when portions of the scene are still smoldering. Burned buildings can release other airborne contaminants as well. Eliminating these hazards through fire extinguishment, ventilation, and atmospheric monitoring can reduce some potential injuries.

Overhaul only when the main body of fire has been extinguished and the building has been thoroughly ventilated. This break in the action can also provide an opportunity for firefighter rehabilitation, allow for an assessment of structural damage, and provide time to develop an overhaul strategy. Do not remove your PPE while performing overhaul operations. In addition to smoke inhalation, be aware of tripping hazards and sharp objects such as metal, nails, or broken glass.

If the structural integrity of a fire building is a concern, have an engineer or building inspector assess the structure before engaging in overhaul operations. The time of day and weather conditions also affect the safety of performing overhaul. ICs must be ready to modify overhaul operations to reduce or eliminate these risks.

16 Know when to call for a Mayday, and DO it. For years, tradition has dictated that firefighters are supposed to be part of the solution and that if they should encounter a problem, they should not let anyone know about it. Firefighters may not call a Mayday for a number of reasons: a lack of training in the procedure, complacency, not realizing they are in trouble, pride, or embarrassment. Often, by the time a firefighter calls a Mayday, it may be too late to address the problem.

Train on Mayday procedures, especially in recognizing situations that could lead to a Mayday if there is an interior attack. A tradition that would contribute to safety would be educating firefighters to the fact it is not a sign of weakness to call for help. Learn how to recognize when you are in trouble. If you *think* you may be in trouble, assume that you are and let somebody know. Don't become complacent. It can cause you to call for help too late.

17 Residential fires and commercial structure fires are not the same. Train in both types.

18 Manage your air supply based on the size of the structure. Air consumption varies with the individual's physical condition and level of training, the task performed, and the environment. Waiting until the low-air alarm sounds may not provide adequate time for exiting the hazardous environment.

When working in large structures, be aware of the distance you traveled and the time it took to reach the fire from your point of entry. Develop an average or "rule of thumb" pertaining to air consumption. A Phoenix (AZ) Fire Department study that involved a series of simulated drills and training exercises after the tragic Southwest Supermarket fire (in which a firefighter was lost) found that the Phoenix firefighters were consuming a 3,000-psi SCBA bottle in 16.5 to 18.5 minutes. Some might be able to remain inside the structure longer and still have enough air to exit prior to a low-air alert activation; some will have less.

19 Learn how moisture affects your personal protective equipment and can cause injuries. Testing has shown that the type of moisture barrier and the water-absorption characteristics of the different layers of the garment-not the type of outer shell fabric-are critical factors in burn injuries. Slight changes in the thermal environment can cause serious burn injuries. You generally are not aware of the change in the moisture level until you feel pain and suffer skin damage. Train so that you can recognize how moisture affects your PPE so that you can avoid being burned.

20 Constantly be aware of your situation. Situational awareness has three components: awareness, reality (what is really going on), and perception (what we think is going on). Fireground mishaps (small or large) are the result of getting lost in the activity at the incident scene. Situational awareness is an internal ongoing process much like size-up. Update it constantly through observation and communication. Maintain a high state of alertness and attention at all times on the fireground. Remain vigilant for conditions that can cause a loss of situational awareness such as distraction, fixation, information overload, complacency, using improper procedures, unresolved discrepancies, and lack of command or supervision.

21 Rehabilitation is an important component of the operations. Establish a Rehabilitation Sector at all working incidents. Safety officers or company officers should direct personnel in need of medical evaluation, fluid replenishment, and rest to the rehab area. The officers need to monitor for signs of fatigue and heat exhaustion, especially during weather extremes. Personnel should be assigned to rehab after 20 to 30 minutes of exhaustive work or after they have gone through two SCBA bottles.



(2) Shut down roadways if the incident and the safety of responders dictate it.

[Click here to enlarge image](#)

22 Be ever vigilant when operating on roadways. Never trust approaching traffic, and avoid turning your back to approaching traffic. Use the first-arriving emergency vehicle to establish an initial "block." Wear high-visibility reflective vests, your structural firefighting helmet, and other appropriate PPE. Turn off any lights that can impair the vision of approaching motorists at nighttime incidents, including vehicle headlights and spotlights. Initially, use fire apparatus and police vehicles to redirect the flow of moving traffic. Establish advance warning and transition systems for traffic upstream of the incident to reduce motorists' travel speeds. Use traffic cones or cones illuminated by flares where appropriate. Use a "flagger" to monitor approaching traffic, and activate an emergency signal if a motorist is putting responders at risk. Preplan with law enforcement. Some police officers take great

offense to the fire department's shutting down highways. At these meetings, determine each agency's expectations and needs, and conduct joint training exercises.

23 Choose your fire attack plan based on available staffing. At least two-thirds of the nation's fire departments are understaffed, according to the NFPA. The worst shortage is in rural volunteer departments, which have trouble recruiting new members. Although staffing companies to nationally recognized standards is desirable, it may be beyond the reach of many financially strapped communities.

What is adequate staffing? NFPA standards 1710 and 1720 provide some guidelines that can be factored into your need for the proper number of personnel. NFPA 1500, Section 8.4.7, reads: "In the initial stages of an incident where only one crew is operating in the hazardous area at a working structural fire, a minimum of four individuals shall be required, consisting of two individuals working as a crew in the hazard area and two individuals present outside this hazard area available for assistance or rescue at emergency operations where entry into the danger area is required."

NFPA 1710 calls for the following personnel to be gathered on the fireground to start an interior fire attack: (1) Incident Commander; (1) Pump Operator; (2) Attack Line; (2) Backup Line; (1) Attack Line Support; (1) Backup Line Support; (2) Victim Search and Rescue Team; (2) Ventilation Team; (2) Initial Rapid Intervention Crew; and (1) person for turntable operation when using an aerial.

NFPA 1720, Section 4.3.1, states: "The fire department shall identify minimum staffing requirements to ensure that a sufficient number of members are available to operate safely and effectively. Table 4.3.2 shall be used by the AHJ to determine staffing and response time capabilities, and the fractal (data relating to level of service, deployment, and the achievement of each response time objective in each demand zone) accomplishment of that for reporting purposes as required."

Carefully consider defensive vs. offensive strategies when determining the number of personnel for the initial apparatus and on additional responding apparatus and the time needed for adequate resources to arrive on the scene. The question becomes: Do you have the capabilities to deliver the required fire flow?

The level of risk a community is willing to accept needs to be an informed decision. Educational programs should enhance public awareness of the balance between resources and operational capabilities. We need to ensure that the subject of safe staffing is addressed on a national level. We also must make certain that previous studies that view staffing as just an efficiency or economic issue are recognized for what they are. Firefighter safety should be the paramount reason for maintaining a working minimum.

•••

It is incumbent on us to pass along the good traditions of the fire service to our new members. Keeping these traditions alive is just one way to instill in them the importance of our culture and values. It is also our responsibility to intertwine the "safety factors" into what we have learned from our past. Not only will this create greater safety awareness, but it will also honor those who have made the supreme sacrifice and give meaning to their deaths.

#### Endnote

1. The International Association of Fire Chiefs (IAFC) brought this concept to realization when it published *Crew Resource Management: A Positive Change for the Fire Service* and initiated a national effort to embrace CRM into the fire service.

THOMAS W. AURNHAMMER is deputy chief of the Los Pinos Fire Protection District in Ignacio, Colorado. A 31-year veteran of the fire service, he retired as chief of the Farmington (NM) Fire Department in 2003. He is a graduate of the National Fire Academy's Executive Fire Officer Program and has an associate's degree in fire protection. He is a member of the adjunct faculty at the National Fire Academy and the New Mexico Fire Fighter Academy, the Colorado Fire Fighter Academy Advisory Committee, and the Board of Directors of the National Fire Academy Alumni Association.

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