WRTFD Training

February 2014 Training Packet

"FIREFIGHTERS NEED TO BE COMBAT READY WITH TRAINING AND COMBAT READY APPARATUS AND EQUIPMENT"

February 2014

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All attendance of training should be entered into Emergency Reporting. Each Individual Employee is REQUIRED to complete attached test and the test MUST be turned into the Training Division

Topic	Required For:	Date	Time	Location	Instructor
FIRE					
Working In Extreme Temperatures	All Employees	February 2014	n/a	Target Solutions	Get with Company Officer
Customer Service for Fire Dept Personnel	All Employees	February 2014	n/a	Target Solutions	Get with Company Officers
NFPA 1021 Assuming the Role of Company Officer	Company Officers	February 2014	n/a	Target Solutions	Individual Officer
Hands on Search Drills	Fire Suppression	February 24, 25, 26	1930 – 2200	Southland Church	Chief Saucier
FIRE BEHAVIOR					
Mandatory ALIVE Online Training Portal	Fire Suppression	February 2014	n/a	See instructions in Training Packet	Individual
EMS					
Online Trainings	All Employees	February 3, 4, 5	n/a	Target Solutions	
SPECIAL OPERATIONS					
Ice Rescue Hands On	All Employees	February 17, 18, 19	0900 - ?	Off site Location TBD	Lt Witham
COMMAND					
Blue Card Vocab Primer	Fire Suppression	February 2014	n/a	Training Packets	Individual Employee
Blue Card Hands on	Fire Suppression	February 7, 14, 21	0900	CTC	Battalion Chiefs
GENERAL TOPICS	*THESE TOPICS USED FOR	ARE TO BE COMPANY	COMPLETED LEVEL	BY INDIVIDUALS TRAINING*	BUT MAY BE
NIOSH LODD Report "Electrocution"	Fire Suppression	February 2014	n/a	Training Packets	Individual Employee
Glass Dust Confusion	All Employees	February 2014	n/a	Training Packets	Individual Employees
Mental Poison Article	All Employees	February 2014	n/a	Training Packets	Individual Employees
Portable Ladder Safety	Fire Suppression	February 2014	n/a	Training Packets	Individual Employees
Vehicle Fire Checklist	Fire Suppression	February 2014	n/a	Training Packets	Individual Employees

February 1, 2014 [MONTHLY TRAINING PACKET EVALUATION]

Name:_____

1. When attacking a vehicle fire, the firefighter should attack the fire from the _____ and _____ side.

2. Burn injuries to your skin are caused by _____, _____, _____.

3. Laminated safety glass is located where on a motor vehicle?_____

4. List four contributing factors listed in the NIOSH LODD Report?
   1.
   2.
   3.
   4.

5. Safety and rescue are best served when the tips of the ladder are at or slightly _____ the sill.

6. What are the seven components of "Today's Fire Enviroment"?
   1.
   2.
   3.
   4.
   5.
   6.
   7.

7. In late _____ laminated glass will be located in all areas for motor vehicles.

8. What lesson is to be completed in the ALIVE online training portal?_____

9. The three major challenges associated with managing _____ _____ include air management, the standard company work cycle, sustaining the attack and maintaining a tactical reserve.

10. What is the "movement you make to keep your SCBA's pass alarm from going off while standing still"? _____

SAVE YOUR SKIN

BURN INJURIES ARE CAUSED BY A COMBINATION OF

- **TIME**
- **TEMPERATURE**
- **CONTACT**

SWEEP & SWITCH

SWEEPING THE FLOOR REDUCES TEMPERATURE
SWITCHING KNEES REDUCES PROLONGED SURFACE CONTACT

SQUAT

SQUATTING ELIMINATES SURFACE CONTACT TO KNEES AND SHINS

SHIFT

SHIFTING YOUR WEIGHT ALTERNATES TIME OF SURFACE CONTACT

SWEEP-SWITCH-SQUAT-SHIFT

SAFETY COMMAND - FDNY

NEW YORK FIREFIGHTERS BURN CENTER FOUNDATION

Today's Fire Environment

Larger Homes

+

Open Spaces

+

Evolving Fuel Loads

+

Inc. Voids Spaces

+

Changing Bldg. Materials

+

Smaller Lots

+

New Technologies

=

- **Faster fire propagation**
- **Shorter time to flashover**
- **Rapid changes in fire dynamics**
- **Shorter escape times**
- **Shorter time to collapse**
- **Inc. Exposure Problems**
- **New and Unknown Hazards**

PORTABLE LADDER SAFETY

JANUARY 1988

Editor's note: *Oftentimes we and our authors find we'd like to make a few comments on a subject without addressing each and every aspect of the topic. This new department is intended to provide that outlet. Herein, each month, we'll present short clips of information on fire related matters—short "tips" on related or unrelated themes that should stimulate conversations and communication.*

INJURIES ON THE FIREGROUND account for 60 to 70 percent of firefighter injuries and deaths. Even though the fireground is the least controlled environment in which we operate, there are some thoughts we can share to help reduce the mishaps there. Portable laddering operations is a good place to start.

First of all, we never seem to have enough ladders in place at a structural fire. The interior search team's route should be known to those operating outside, and secondary means of egress—the portable ladder—should be in place for escape. I can vividly recall photographs of firefighters tumbling out of a shaft window or calling wildly from a bedroom window on the floor above the fire. A better answer is training, to put a ladder there in the first place.

How safely we can use ladders depends on where they're placed in relation to windows.

Next to the window is fine if our plan is to ascend and break the glass for horizontal ventilation. And access is possible from this position if you step from the ladder to the sill, hold onto the window frame, and then step through the fully cleared opening.

But how do you get out the window and onto the ladder for egress? It's one of the most difficult operations even in a calm situation. If you've found someone, getting out to a ladder that's next to the window will be nearly impossible—if the person's conscious. If the victim's unconscious, you'll have to stay until the ladder is moved or leave the victim.

Safety and rescue are best served if the tips of your ladder are at or slightly below the sill. Every inch (hopefully not foot) that the ladder extends above the sill into the window opening places an obstacle in the opening into the fire structure. If exit becomes necessary because of interior heat and smoke build-up, you'll want to slither out that opening as low as possible.

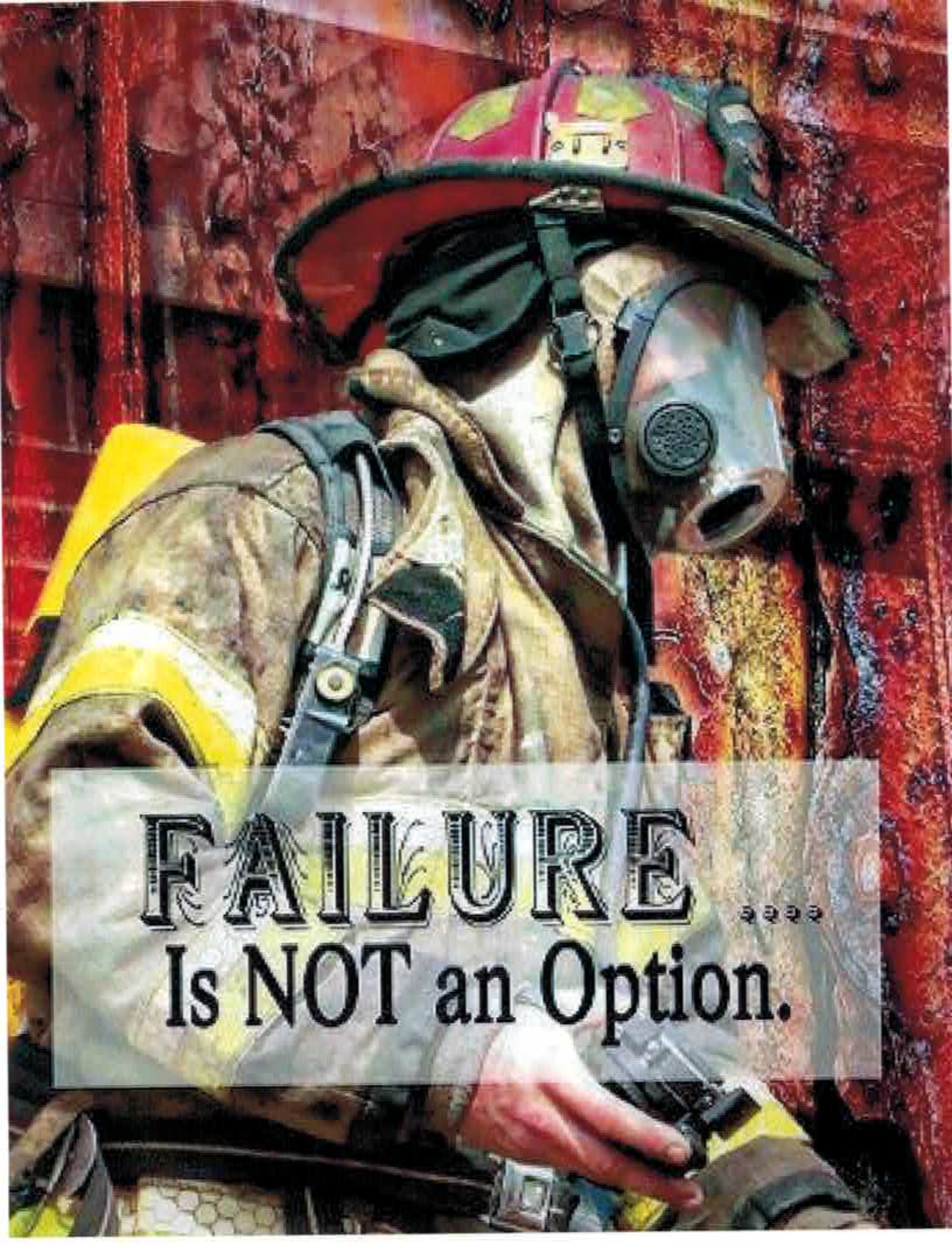
When a firefighter is working on a flat roof at a top-floor fire, wind shifts, poor judgment, flashover of the roof material, or collapse can easily cause the person to be trapped behind an extending fire, opposite the ladder. Placing a minimum of two ladders at opposite sides of the structure should be the standard operating procedure for all roof operations.

Countless injuries occur on roofs only because the firefighter can't find the ladder needed for escape. Ladders at or under the parapet or roof edge give easy access, but they're virtually impossible to find and use for emergency egress. Ladders should be extended above the roof line. Some departments require an extension of two or more rungs or two or more feet of ladder. But the point is for it to be seen in near-panic situations.

All ladders—including wood ladders, when they're wet—conduct electricity. Insulating materials are great until they're negated by such things as water—and it sure is hard to envision a fireground that's dry. On any fireground, you have to be aware of—and keep ladders away from—electrical wires and services. Heads up! Know where the tip of your ladder is.

Climbing techniques can also account for injuries. Whether to place your hands on the rungs or the beams seems to be a matter of choice and locale. But only one of these practices is safe. If we hold onto the rungs (never mind additional tools, equipment, and human beings), we can grasp safely only every 14 inches on center. The chances of grabbing air are one in six. Using the beams for hand security, contact can be maintained constantly, and the beams are always in the same place when you need them.

A ladder placed must remain in place. Any ladder to an opening or location must be assumed to be in use until proven otherwise. If you want to move a ladder, you must contact the user before doing so. If, as a user, you're running into the problem of other firefighters swiping your ladders on the fireground, carry your own 25-foot rope. Quickly secure the tip of the ladder as you leave it and take one or two turns around a radiator or sofa. Other firefighters thinking they're free to move the ladder at will get the message. ■


FAILURE
Is NOT an Option.

Mental Poison

This one has been brewing for years, and I think it is time to get it out in the open for everyone to share. I really struggle with this topic and it creates a lot of frustration for me to try and comprehend that this is something we are even talking about. Lets just start it out bluntly.

If you're already set in your ways, and have long ago decided that not only are you going to just simply gather a paycheck but at the same time hold a deep never ending grudge for the guys that are trying to move forward and make this job better, then go ahead, hold on to that mediocre mentality, sit back for the ride and finish your career in that state, but by all means KEEP IT TO YOURSELF!

I am truly sick of new, young, great minds on this job coming to me discouraged because these people have decided to demotivate them and talk trash about myself, my crew and everything we believe in. You know who you are, and I hope you sit back for a second and realize that you are mentally poisoning the youth and future of our job. It is easier for you to verbally bring us down to new guys (because they won't talk back) then it is to step up and bring your own crew to the front and raise the bar. This is criminal, do you know how big of an impact you have on these guys that are just trying to do the right thing and work hard. They are at a point in their career where they are just looking for guidance on how to do their job right, and trying to figure out what that really means. The good ones are attracted to places where they have mentors that will actually teach them, but then you try and spin us off as "those guys", and proceed to describe to them every single way that I will ruin their career if they come around me. That is garbage.

We have a great bunch of people that have come on our job in the last few years, some of the best new guys that I have ever had come through our firehouse and other great ones I didn't get to work with. Hungry, motivated, self driven, and ready to get better everyday. They are blowing the old expectations of what it meant to be a good new guy out of the water. When they finish their probation and move on to their own firehouse I watch with great satisfaction as these new guys start making an impact on their own with their highly motivated mentality of holding themselves to a standard of pursuing mastery of their craft. At the end of the day, my only goal for them as they rotate through our firehouse, is to mentor and teach them the way I would want to be

taught.

If we hold up on our end of the deal of what it means to be mentors, then we will reap the rewards across the entire job as that mentality slowly moves around the city. However, as I have learned first hand, be prepared to put yourself out there and take a beating from a group of people that will fight this type of energy everyday of your

career.

Here's some examples of the mental poison that is being put into these young motivated minds by others who are threatened by what we are teaching. They tell these guys to be very careful at my firehouse and never let yourself become one of "those guys". They will say that it's an easy thing to get sucked into down there and you will see in the long run it is a waste of your time and energy. They will make accusations that we only care about fires but never focus on any other aspect of our job. They will try to convince them that it is all shallow egos, cockiness, and bravado. They will even go as far as to tell these guys that they are training too much and that they will never make it through a career if they don't take it easy. The list goes on of a hundred different examples that are being used in an attempt to scare them (the new guys) away from ever "being a part of that".

Let me tell you what being "a part of that" is. Expectations are high, you come to work everyday knowing full well it could be the day where we need you at your best. You check your truck out in the morning like it's actually your job. That doesn't mean a walk around the truck, that means halyards are dressed and tied around only one rung. It means batteries are fresh on tools and blades have been replaced. It means running your hands down the chains on the saw to make sure they are sharp enough to grab your skin so you know they are fresh. It means the power heads/saws are getting run everyday. If lines are sloppy they are pulled and re loaded, yes, even in the winter or on a Sunday (what a concept). That is how important our apparatus is to us.

It means training comes first. If your priorities aren't regularly based around quality company training, I can assure you nothing else will replace it. No amount of drawing on a whiteboard, or talking about hose lays at the tailboard will replace actually doing it. Your email management is not what makes you a good officer! We need leaders who are willing to get dirty and be the first one to step up at the next drill. If you are leading an engine company with one of these new guys on it right now and it has been more than a few shifts since you pulled a line, shame on you. You are verbally telling them how wrong we are, but your inaction at your own firehouse is sending a far stronger message to them. I have noticed a

common denominator to the trash talking over the years. **The more frequently you talk down about us, directly correlates with how infrequently you teach your new guy hose management.**

Early on in my career, I was surprised how you almost had to feel bad for feeling this way about the job, I had plenty of times were that atmosphere made it feel like you were in the wrong and almost as if you should apologize for being at a certain firehouse. I got the same talks from guys telling me not to be a part of that, to choose my battles (and that this was not one to be involved in), I was that new guy receiving the same demotivating talks that the current ones are still hearing.

Company Pride does not have to equal unchecked Egos and cockiness. Can they go together sometimes? Sure they can. But 99% of this negative light that is brought on about my firehouse is created outside of it. I am not sure if it is insecurities about their own companies performance, or if they feel bad about the time spent in the lounge chairs while we are out training. But something makes them feel as if they need to discredit everything about us. When you have a group of guys that want to build a crew and their common goal is to be the best they can possibly be, company pride and espirit de corp will always be present. When another fire company does not have this common goal, does not believe in company pride, and sees training as more of a bother, then clearly it doesn't take a genius to see why they are offended by a highly motivated crew with strong company pride.

We understand that this high energy mentality that is starting to gain traction with our youth is intimidating. It requires a lot of hard work, dedication to training your new guy, and an all around commitment to raise the bar on your own performance. I am not sorry that we are choosing the hard way, because it is the right way. For those of you who truly believe in this mental poison you are spreading among our youth, keep it to yourselves. If you feel you have to talk to someone about it, I honestly welcome a phone call from you any day I am on shift. I will always have a discussion about this topic, but I will always ask you one question. **Can you tell your Chief word for word these beliefs that you are so quick to tell to the new guys? Because I can tell him mine, and I stand behind every word.**

For the young guys that are working hard and trying to be masters of their craft….Keep on going, you are doing the right thing and we will always stand behind you. The right way is rarely the easiest way, and at the end of the day it is pretty clear who's who.

-Ryan Royal

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>> BY STEVE BERRY

SHELF FULL FILLING

Stop hoarding supplies in the ambulance

It's estimated there are close to 15 million hoarders in the U.S. I'm not sure exactly where that statistic comes from. I read it somewhere in a magazine that could be buried in any one of the 58 stacks of publications I have in my office. Either way, it's a new year and a time to begin afresh. Out with the old and in with the new—and I mean that literally. So take all those archaic EMS books and magazines you've amassed over the years and toss them into the abyss of antiquatedness—unless, of course, they contain even just one page or paragraph of my ageless etchings or verbiage.

Illustration Steve Berry

Every living creature hoards things to some degree. Squirrels hoard nuts, my dog hoards tennis balls, ambulance owners hoard money, and congress hoards stupidity. Even proctologists hoard crap, but due to limited word space I will not delve deeply into the compulsive hoarding phenomena that has been shamelessly portrayed on reality TV. Instead, I will limit the heaping trash talk to CRAP (Critiquing Rescuer Addictive Peculiarities).

So where do we begin with all this CRAP? Personally, I believe it's the ambulance manufacturers who are partly to blame. What's with all this excessive shelving crap (not to be confused with CRAP)?

When EMS providers encounter an empty cabinet in their ambulance, they're instinctively inclined to fill it up with some sort of EMS paraphernalia. And even if you fill just one cabinet with one particular item, it can become disproportionate in number to the needs of the crew. For example, 10 stocked IV bags of one liter normal saline? Really? Unless you're attempting to rehydrate the Mummy or assist the fire department in extinguishing a fire, what's the liquidation point?

I once found 25 18-gauge angiocathes neatly aligned, for which I can only assume were prepared and battle-readied to instigate a psychotic blitzkrieg proliferation of the patient's sheathed dermal tissue. Either that or the angiocathe handler SUCKS (Sadly Unskilled Cannulating Klutz Specialist). And speaking of cannulation, 16 nasal cannulas? Maybe those nasal prongs are being utilized for the sole purpose of keeping the patient's nares pulled back in order to keep the head securely upright, but otherwise, there's just so much PSI my portable O_2 bottles can sustain.

During one shift in which I was attempting to unclutter a heavily fortified ambulance I was encased in, a medic noticing my futile effort asked, "But what if the big one happens?"

"Hey," I replied, hidden behind 17 stacked C-collars. "I'm already attending to an MCI (Massive Clutter Infiltration)." As I removed two of the three-ring cutters kept in the rig, taking the chance I would be woefully unprepared to eradicate a catastrophic phalangeal "bling" insurrection, I added, "Besides, I frequently can't find the stuff I may need, because it's concealed and surrounded by all the other stuff."

"That's just because neatly arranging minded medics are simply too lazy to look for the stuff," he countered, obviously proud of his quick wit.

"Or maybe," I retorted back, "we hoard EMS stuff in our rigs in the hope that the sum total of all our life-saving supplies would suggest a profession larger than the one actually lived." A pondering awkward silence fell between us until he threw a discarded ring cutter at me, which, incidentally, cut my ring finger.

As for the EMS storage room, you can tell how old the service you work for is by the number of boxed stuff that has accumulated, one filed behind the other, each preceding row signifying a timetable of prehospital technology and history beginning with Napoleon EMS.

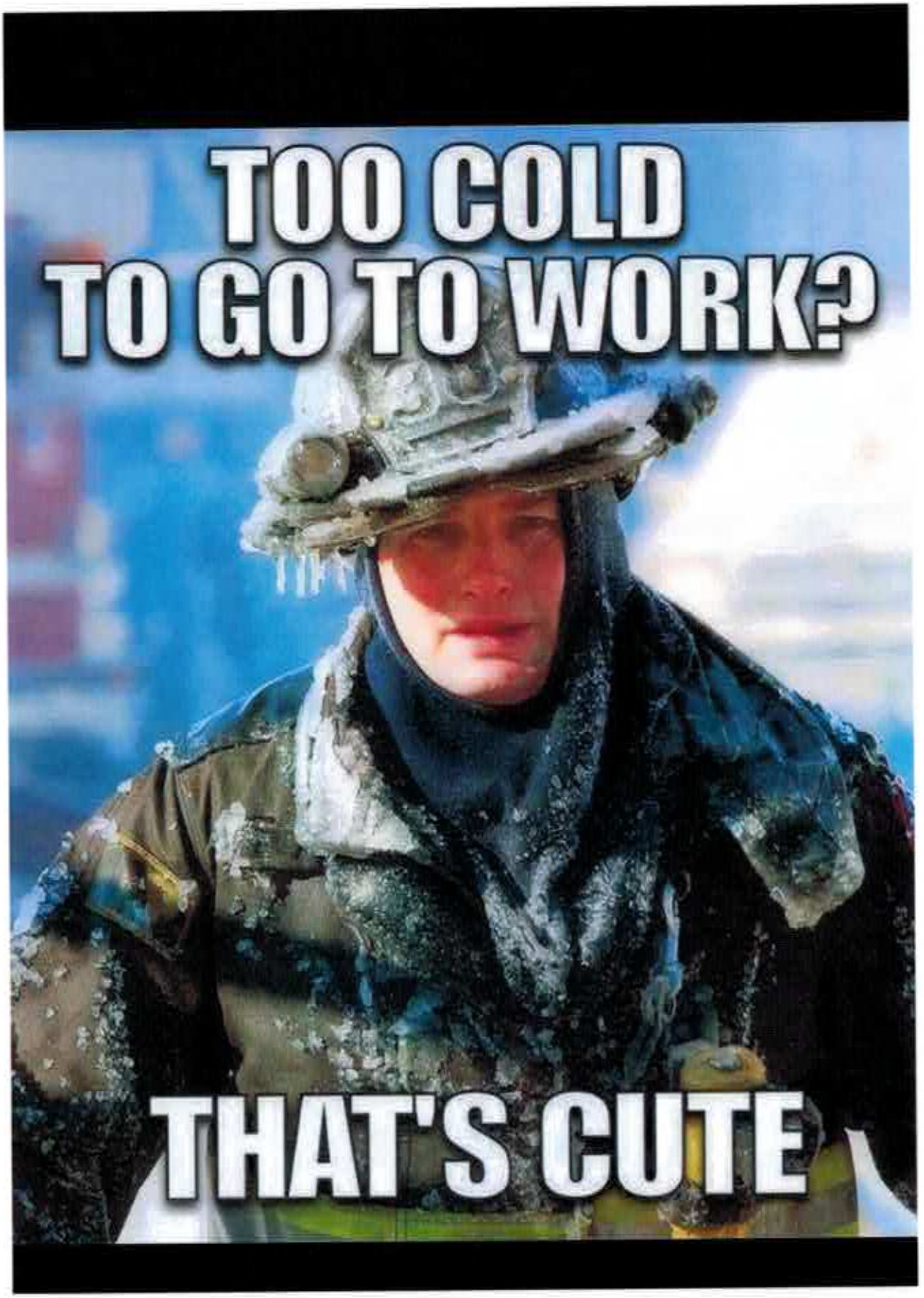
Don't be surprised as you work your way back to find a Lifepak 5 cardiac monitor, a pair of pilot blackout-reducing MAST pants, EOAs, leaking head restraint sand bags and the actual Resusci Anne who drowned in the Seine River during the late 1880s. We recently found an awesome training skeleton when we cleared out our storage room, until we realized it was one of the service's missing medics last seen in 1973 whilst hiding from his supervisor.

I myself must admit I have an OCD (Occupational Comedy Derangement) problem. Yes, I hoard EMS humor. I can't help it. At the end of every shift I find myself accumulating more and more EMS comical absurdity. In my attempt to mix it up a little I've decided to change the title of my column (as you may have already noticed) into Berry Musing. Some of my articles you read in the future may have intended humor while others may take on a more serious tone, but all in all I hope you will find them worth keeping. JEMS

Steve Berry is an active paramedic with Southwest Teller County EMS in Colorado. He's the author of the cartoon book series *I'm Not An Ambulance Driver*. Visit his website at www.iamnotanambulancedriver.com to purchase his books or CDs.

EMS TODAY

Learn more from Steve Berry at the EMS Today Conference & Expo, Feb. 5–8 in Washington, D.C., EMSToday.com


TOO COLD
TO GO TO WORK?
THAT'S CUTE

Glass Dust Confusion: How the Rescue Community Has Been Left in a Cloud

For related video, visit http://bcove.me/ox2zx2m6

By Al Vangura Jr.

Since I introduced a new rescue tool to cut glass to the first responder community about a year ago, one of the top questions that inevitably I have been asked regardless of the country I am in is, "What about the glass dust?" Many take the strong position that glass dust will cause silicosis and lung cancer and that a respirator mask must be donned anytime glass is cut during extrication procedures. With extensive background as a forensic investigator and biomechanical engineer, I decided to investigate this issue in more detail to determine the validity of the claims against glass dust. What my research uncovered will likely be hard for many to wrap their heads around considering years of training to the contrary. This article is intended to explain the results of that research effort in sufficient detail to convince many who will be skeptical. In the end, the rescue and extrication community, including fire, emergency medical service (EMS), and police, must come to terms with the fact that glass dust is not dangerous and way too much time has been wasted for a hazard that does not pose an unreasonable risk.

Background

Let's start with the basics. Glass is a hard, brittle substance, typically transparent or translucent, made by mixing and heating sand or silica with soda, lime, and other ingredients. The molten mixture is rapidly cooled using controlled processes to make windows, drinking containers, vases, and other products.

Glass classified as safety glass has been toughened to provide increased resistance to impact or shattering into large, dangerous shards, which can injure nearby persons. Safety glass comes in two basic types: tempered and laminated.

Tempered glass is subjected to rapid, controlled cooling during manufacturing to produce high, compressively stressed surface layers, which increases its strength compared with normal glass. Tempering creates balanced internal stresses, which cause the glass to crumble into small granular chunks when shattered instead of splintering into long, jagged shards. The granular chunks are less likely to cause injury.

(1) Tempered glass is subjected to rapid, controlled cooling during manufacturing to produce high, compressively stressed surface layers, which increases its strength compared with normal glass. Tempering creates balanced internal stresses, which cause the glass to crumble into small granular chunks when shattered instead of splintering into long, jagged shard. (Photos from Shutterstock unless otherwise noted)

Laminated glass is a type of safety glass that is assembled using two or more glass sheets bonded together with an interlayer to form a clear, see-through barrier with enhanced impact and shatter resistance. Polyvinyl butyral (PVB) plastic is commonly used as the interlayer, which further enhances the glass by increasing sound insulation, minimizing vandalism, permitting tinting, and blocking nearly 99 percent of ultraviolet radiation. With sufficient impact force, the glass layers will shatter into the characteristic "spider web" cracking pattern, creating granular glass fragments. The PVB interlayer functions to hold the glass fragments together, minimizing the risk of flying glass impacting people.

Almost all modern motor vehicles around the world are required to have some form of safety glass for windows. In the United States, laminated glass has been standard in automobile windshields since the 1920s. However in March 2011, the United States Code of Federal Regulations was amended to mandate all United States motor vehicles after air bag and side window design to minimize the risk of occupant ejection by September 2017. Until this recent change, tempered glass has generally been used for side and rear vehicle windows.

During rescue operations, motor vehicle glass must be forcibly removed to gain access to injured occupants or for further extrication procedures. The use of these glass-cutting hand tools generates glass debris, which can range in size from powder to pea size particles. This debris may be small enough to become airborne and may be respired or breathed into the lungs of rescue workers. It is widely believed in the extrication community that this airborne glass dust is very dangerous and causes silicosis, lung cancer, and other respiratory disorders.

(2) Laminated glass is a type of safety glass that is assembled using two or more glass sheets bonded together with an interlayer to form a clear, see-through barrier with enhanced impact and shatter resistance. With sufficient impact force, the glass layers will shatter into the characteristic "spider web" cracking pattern, creating granular glass fragments.

Issue Timeline

To determine when the issue of breathing glass dust began to creep into the extrication discussion, a review of extrication manuals, textbooks, journal articles, and magazine articles dating back to 1969 was undertaken. Although some cursory discussion of glass dust began in the early 2000s, and *Vehicle Rescue and Extrication*—2nd Ed. states that some "progressive" extricators are required by their fire departments to wear dust masks, a 2009 article titled "Extrication Tips: Raising the Roof—Laminated glass removal poses significant danger" appears to be one of the first to extrication literature to address and evaluate glass dust with its chemical name silica. The author, Randy Schmitz, reported on an observation he made while serving as a Transportation Emergency Rescue Committee (TERC) judge at a competition where the windshield was cut during a scenario and he observed that "... Everywhere I looked, for at least a 15-square-meter radius, were fine particles of glass dust that would not dissipate." Schmitz then reports the results of his research into glass dust, which included a material safety data sheet (MSDS) for respirable crystalline silica, which is classified as hazardous to humans. Unfortunately, Schmitz's research failed to discover that although glass dust is silica, it is not crystalline silica.

Forms of Silica

Glass is manufactured using sand, otherwise known by its chemical name "silica dioxide." Silica dioxide has two forms: crystalline and amorphous. It turns out that crystalline silica dioxide is hazardous to breathe and is well documented to cause silicosis and myriad respiratory disorders. Glass dust, however, is not crystalline silica dioxide but amorphous silica dioxide. As with many situations, the devil is in the details. Here's a closer look.

A crystal is a solid material that occurs naturally during cooling from its melting point where its molecules align in a very regular and organized manner. The resulting solid is a homogeneous solid with geometrically arranged plane faces. Respirable crystalline silica dioxide is most frequently found in metal, nonmetal, and coal mines and mills; in granite quarrying and processing, crushed stone, and related industries; in foundries; in the ceramics industry; in construction; and in sandblasting operations.

An amorphous solid material occurs

(3) During rescue operations, motor vehicle glass must be forcibly removed to gain access to injured occupants or for further extrication procedures. Current glass cutting tools, clockwise from top left, include powered reciprocating saws, powered glass shears, fire axes, manual reciprocating saws, and spring-loaded center punches. (Photos from Shutterstock and by author.)

(A) A crystal is a solid material that occurs naturally during cooling from its melting point where its molecules align in a very regular and organized manner. The resulting solid is a homogeneous solid with geometrically arranged plane faces.

(B) An amorphous solid material occurs during the cooling process from its melting point. However, the rate of cooling process is greatly sped up. This causes the molecules of the material to become irregular and will have no alignment or arrangement.

during the cooling process from its melting point. However, the rate of cooling process is greatly sped up. This causes the molecules of the material to become irregular and will have no alignment or arrangement. This difference in basic structure drastically reduces its toxicity in animals and humans—so much so that the United States Food and Drug Administration has approved it for use as an anticaking material for keeping foods like shredded cheese from sticking together. Large quantities of synthetic amorphous silica are used, notably, for reinforcing elastomers; for thickening resins, paints, and toothpaste; and as free-flow additives.

Cancerous?

The World Health Organization's International Agency for Research on Cancer published a review article in 1997 titled "Monographs on the Evaluation of Carcinogenic Risks to Humans." The committee conducted an extensive review of all epidemiological research studies regarding crystalline and amorphous silica dioxide and concluded that crystalline silica inhaled is carcinogenic to humans and that amorphous silica is not classifiable as to its carcinogenicity to humans.

In 2011, a second committee published a similar review article on crystalline silica titled "Food applications and the toxicological and nutritional implications of amorphous silicon dioxide." It states, "Through extensive review of the published literature, two independent expert panels convened by the International Agency for Research on Cancer (IARC) Monographs Programme have classified crystalline silica as carcinogenic to humans while amorphous silica was not classifiable as to its carcinogenicity in humans. The panel remarked that 'crystalline silica in the form of quartz or cristobalite dust causes lung cancer in humans.'"

Another extensive review article published in 2012 titled, "The toxicological mode of action and the safety of synthetic amorphous silica—A nanostructured material," states that "... amorphous silicas...have widely been used in topical and oral medicines, food, and cosmetics for decades without evidence of adverse human health effects." And, "In contrast to crystalline silica, SAS [synthetic amorphous silicas] slowly dissolves in aqueous environments and body fluids. None of the SAS types was shown to bioaccumulate and all disappear within a few weeks from living organisms by physiological excretion mechanisms."

Bioengineers and doctors have recently been working together to develop effective drug delivery methods using amorphous silica nanoparticles. These studies include respiratory and direct implant studies.

The Bottom Line

Currently, there is a huge disconnect between the extrication and rescue community and other industries like the medical devices, drug delivery, and food and cosmetics and the Occupational Safety and Health Administration (OSHA) when it comes to silica dust. While rescue workers potentially lose valuable seconds dealing with a nuisance like glass dust, medical device firms and food and cosmetic manufacturers intentionally use glass dust particles to make their products—some with respirable applications!

After delving into the extrication literature, observing rescue challenges competitions, and speaking at length with many extrication experts and first responders including fire, EMS and police, it is clear that extrication procedures have been altered to accommodate this overemphasized hazard. One could easily envision that if this issue was to quickly become a nuisance, each individual extrication would become a little less complicated and a little more straightforward. One thing is certain, with the recent changes in United States motor vehicle glass standards by late 2017, extrication procedures will have to change to meet the new challenges for patient access with laminated glass in all portals. It is my hope that this information will be used to begin the process for positive change for every future crash. FEA

AL VANGURA JR. is a degreed bioengineer with extensive work experience in medical devices, military helicopters, International Space Station, and sporting equipment and is often called to testify as an expert witness to determine the cause of injury in situations like vehicle crashes and product failures.

Instructions to use ALIVE training portal

Step 1: Go to www.poly.edu/fire.

Step 2: Select your department from the drop down list located in the bottom right corner and click "GO."

Step 3: Read the instructions on the department's ALIVE training portal carefully.

Step 4: Notice the links for two ALIVE training modules

a) Fires in Modern Residential Lightweight Construction

b) Wind-Driven High-Rise Fires

Step 5: You can either download and install ALIVE modules on your machine, or access the ALIVE training using any web-browser (Google Chrome is recommended).

Please note that use of LAN (wired internet) is always preferred for web-based applications. If you have low internet speed or a slow machine, you may face difficulty in buffering and watching the videos. We request that you download and install the ALIVE application. Installing the application on your local machine will allow you to run the application without any difficulty. If you encounter any technical difficulties, please email: fire@poly.edu.

Step 6: You will be asked to provide certain information (rank, assignment, years of service) that will be used for research purposes. Use your badge ID / employee ID / payroll Number or any other appropriate attribute as the "Unique Identifier" to login.

If you have not provided the list of unique identifiers (badge ID / employee ID / payroll Number or any other appropriate attribute) or if there are any changes, please email the spreadsheet with the unique identifiers of all users within your department. This will make the database queries faster and more accurate.

For testing, use following credentials:

Unique ID: PP

Rank: Firefighter

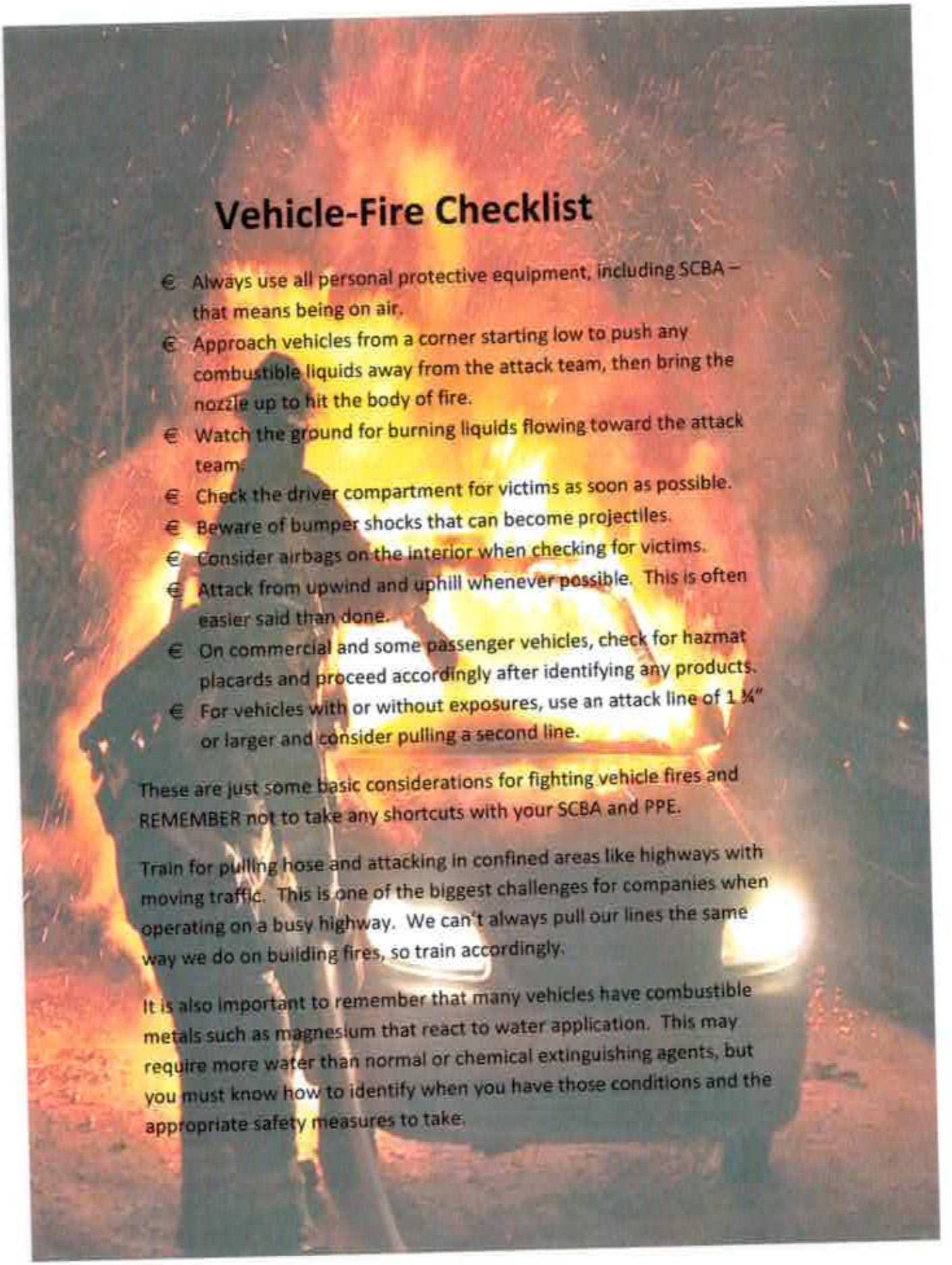
Assignment: Engine

Years of Service: 99999

Department: Your Department

Email: fire@poly.edu

Value of a Retiree



Vehicle-Fire Checklist

- € Always use all personal protective equipment, including SCBA – that means being on air.
- € Approach vehicles from a corner starting low to push any combustible liquids away from the attack team, then bring the nozzle up to hit the body of fire.
- € Watch the ground for burning liquids flowing toward the attack team.
- € Check the driver compartment for victims as soon as possible.
- € Beware of bumper shocks that can become projectiles.
- € Consider airbags on the interior when checking for victims.
- € Attack from upwind and uphill whenever possible. This is often easier said than done.
- € On commercial and some passenger vehicles, check for hazmat placards and proceed accordingly after identifying any products.
- € For vehicles with or without exposures, use an attack line of 1 ¾" or larger and consider pulling a second line.

These are just some basic considerations for fighting vehicle fires and REMEMBER not to take any shortcuts with your SCBA and PPE.

Train for pulling hose and attacking in confined areas like highways with moving traffic. This is one of the biggest challenges for companies when operating on a busy highway. We can't always pull our lines the same way we do on building fires, so train accordingly.

It is also important to remember that many vehicles have combustible metals such as magnesium that react to water application. This may require more water than normal or chemical extinguishing agents, but you must know how to identify when you have those conditions and the appropriate safety measures to take.

Blue Card Vocab Primer

Definitive answers to your Blue Card terminology questions.

BY NICK BRUNACINI

One of the recurring Blue Card requests we receive is for a Rosetta Stone of sorts, something that translates and describes the Blue Card deployment terminology. Real-world tactical scenarios provide the most basic and fundamental example of these terms. To this end, we will use a different scenarios to demonstrate the nuts and bolts of a Blue Card firefight.

Level 1 Staging

Structure fires require multiple units to complete the tactical priorities for the incident and to maintain a safe tactical reserve. While staffing and resource levels vary by department, Blue Card recommends the following resource levels:

In the residential example shown below, Engine 1 was the first company to the scene of a house fire. When E1's officer took command of the incident, it automatically activated Level 1 staging procedures. Level 1 staging SOPs have the initial-arriving engine and ladder companies responding directly to the scene, along with the initial-arriving battalion chief. All other responding units must stage short of the scene to await an assignment from the incident commander (IC) prior to going to work.

At this point in our scenario, Engine 1 and Ladder 1 are operating at the scene. Engine 2 is staged at the west end of the block. Engine 3 is staged northeast of the incident scene. The initial-arriving battalion chief has not arrived yet.

When Level 1 staging, engine companies should not pass their last water option, and ladder companies should not pass their last point of access to the structure. The intent of Level 1 staging procedures is to prevent later-arriving units from committing themselves to the incident operation outside of the IC's incident action plan (IAP). The only way the strategic level of the incident organization can manage the accountability for these later-arriving units is by purposefully assigning each unit to the incident operation.

Companies stage in their direction in relation to the incident scene. For example, consider this radio report for Level 1 staging units: "Engine 2 is staged west." The IC should acknowledge staging reports in the following fashion: "Command copies. Engine 2 is staged west." There is no need for the Dispatch to parrot back Level 1 staging reports.

On Deck

There are major challenges associated with managing attack positions. These include air management, the standard company work cycle, sustaining the attack and maintaining a tactical reserve. The on-deck piece of the three-deep deployment model has a positive effect on all of these attack position management requirements.

Let's use the diner fire at right as an example. The initial attack position was established in Alpha. Engine 1 has advanced an attack line to the seat of the diner fire. Ladder 1 was the initial-arriving ladder company. They are checking the roof over the restaurant for fire extension and securing the utilities. The second-arriving engine company established the second attack position on the Charlie Side of the structure. Engine 2 advanced an attack line into the Delta exposure, the dry cleaner, to initiate a primary search

and to open up the ceiling to stop horizontal fire spread through the attic. Engine 3 advanced an attack line from the Charlie attack position into the Bravo Side exposure, the beauty salon, to initiate a primary search and to open up the ceiling to stop horizontal fire spread through the attic. At this point in the operation, all key tactical areas are covered.

The IC has assigned Engine 4 to assume "on deck" in Alpha. E4 will use E1 as their accountability location. The crew of E4 will stage on the Alpha Side of the building. The crew reports to the on-deck assignment ready to work. E4's crew should bring their own hand tools (axes, pikes, irons, etc.). Any required attack lines will be secured from E1. On-deck units can be used in four different ways (in no particular order):

1. **To relieve existing crews**—In our example, E1 was the first unit committed to an interior position, and they will need to be relieved first. They are also operating in the area with the most active hazards. Using an on-deck deployment model allows exiting crews to have a face-to-face with their relief company. It also takes full advantage of face-to-face communications within the attack position.
2. **To serve as a rapid intervention crew (RIC)**—Rapid intervention is a capability. We run into serious operational problems when we try to make it a separate piece of the incident operation. The vast majority of firefighter maydays are resolved by crews who were assigned and in position prior to the mayday. Using on-deck crews to serve as a RIC allows us to use the existing incident organization and communications system. It also places rapid intervention capability anywhere the IC assigns on-deck crews.
3. **To reinforce existing positions within the attack position**—In our example, we have crews operating in three occupancies within the structure (Alpha, Bravo and Delta). Placing E4 on deck in Alpha positions them where they can quickly reinforce any of these three positions.
4. **To cover another position within the attack position**—Using our example, if the IC receives reports that the fire has extended beyond the Bravo position (E3's assigned area) or the Delta position (E2's assigned area), E4 can quickly be assigned to cover critical cutoff points/positions.

The IC's on-deck assignment should go as follows:

"Command to Engine 4. Spot your apparatus on E2's hydrant and have your crew go on deck in Alpha. E1 will be your accountability location."

"E4 copies. Spot on E2's hydrant and go on deck in Alpha. E1 is my accountability location."

Because on-deck companies provide rapid intervention/tactical reserve for each attack position, they should bring the RIC bag/tools with them to the on-deck location. It is critical to note that in the event of a firefighter mayday, on-deck crews do not automatically deploy into the hazard zone. The IC must order them

to take action. In many instances, working crews may solve the mayday emergency. Flooding the area with additional crews may actually fragment and compromise the rescue effort.

On-deck crews should position themselves in the "warm zone" of their assigned area. This places a ready-to-work tactical reserve in the attack position. When a crew is assigned to an on-deck position, only the IC or their warm-zone tactical boss can order them to go to work. If on-deck crews must take immediate action (due to a known rescue or an urgent safety situation), they must notify the IC or be ordered into action by the warm zone tactical boss.

Level 2 Staging

Level 2 staging is used for resources dispatched beyond the first-alarm assignment. These later-arriving resources should respond to a centralized staging location that is close enough to the incident to allow quick response, yet not so close that they inhibit access to the scene. Additional alarms should be dispatched on a logistics radio channel to reduce radio traffic on the tactical channel.

When requesting additional alarms, the IC should identify the location of the Level 2 staging area. The officer of the first unit to arrive at Level 2 staging should assume staging officer responsibility. The staging officer should maintain an inventory of all Level 2 Staging resources. Command should assign all units in Level 1 Staging prior to assigning units from Level 2 Staging unless a specific resource in Level 2 Staging is required.

Command should provide the staging officer with a minimum number of resources to maintain in Level 2 staging. When resources reduce to this minimum, the staging officer should notify command so they can decide if more resources are necessary.

In our example pictured at right, three engines and two ladder companies are standing by in Level 2 staging (to the right of the incident scene).

Assignment by the IC

The IC bases assignments on the IAP. The IAP is developed after a size-up of the critical factors (conducted after arriving to the scene). In the case of structure fires, the initial size-up includes:

1. Type of occupancy;
2. Size and shape of the structure; and
3. Obvious conditions

Assignment Example 1 of 3—House fire. Initial IC sees/sizes up & reports:

"Engine 1 is on the scene of a small, single-level house with a working fire showing from the Bravo Side. 360 shows the house is one level. I am advancing an attack line through the Alpha Side for search, rescue and fire control. E1 is Alpha side accountability. We will be operating in the offensive strategy.Engin1 1 will be Main Street Command."

The initial size-up indicates a small, single-story house with a working fire. Because the IC took a few seconds to actually conduct a size-up, they were able to formulate the following incident action plan:

E1—Advance attack line through Alpha for search, rescue and fire control;

L1—Control utilities, horizontal ventilation;

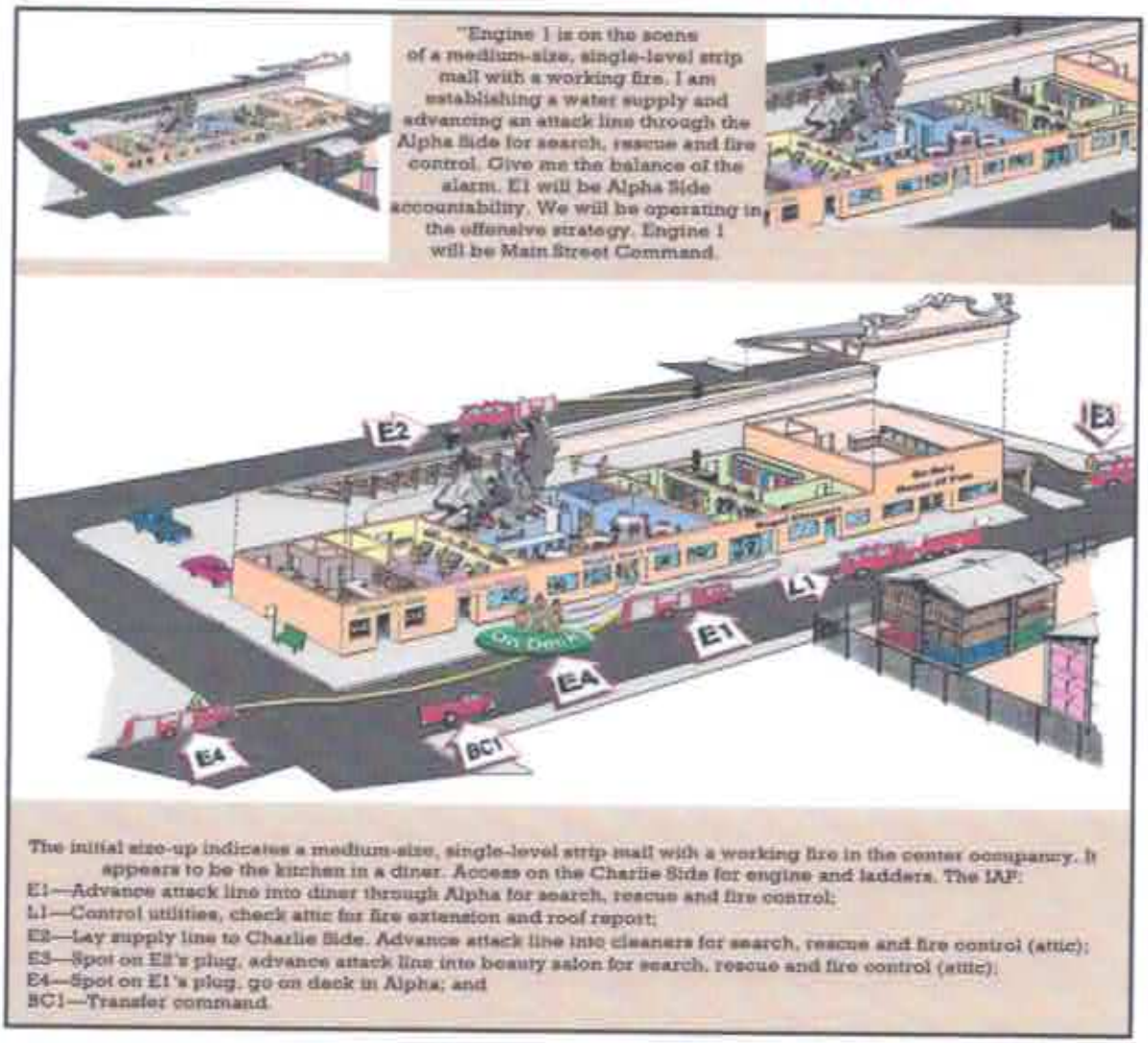
E2—Assist E1 with establishing water supply and search remainder of house; and

E3—On deck in Alpha.

Because E2 and E3 Level 1 staged, the IC can assign them according to the plan (as opposed to having them self-deploy/freelance and disrupt the plan).

Command Training continued on pg. 43

Assignment Example 2 of 3—Fire in a strip mall. Initial IC sees/sizes up & Reports:



Warm-Zone Tactical Bosses

We use the term warm-zone tactical boss to describe officers who manage the tactical level of the incident organization. While these warm-zone supervisors can briefly size up interior conditions, they do not manage from the inside of the building. In larger fire departments, warm-zone bosses are typically later-arriving chiefs or safety officers. Rank and terminology (e.g. sectors, divisions or groups—referred to as SDGs in the Blue Card online program) are secondary to the tactical boss's ability to control and manage the task-level companies assigned to them.

The tactical boss is responsible for managing the ongoing operation in their assigned area (Charlie, in our example). This requires matching the tactics to the level of risk. In this example, large, exterior master-stream application (greater than 500 gpm) is the proper tactic for the defensive strategy. The tactical boss is also responsible for cycling task-level companies in a manner that sustains the operation all the way to the end. "Charlie" must connect the IC's IAP with the completion of the tactical priorities for the Charlie attack position. Connecting the proper actions to the current and forecasted conditions paves the way for safe task-level working conditions. Accountability hardware is a tactical-level tool. In this example, the battalion chief's partner assumes safety-officer responsibility for the Charlie attack position. This responsibility is focused on managing entry control, the work-rest cycles of assigned companies and tactical-level air management.

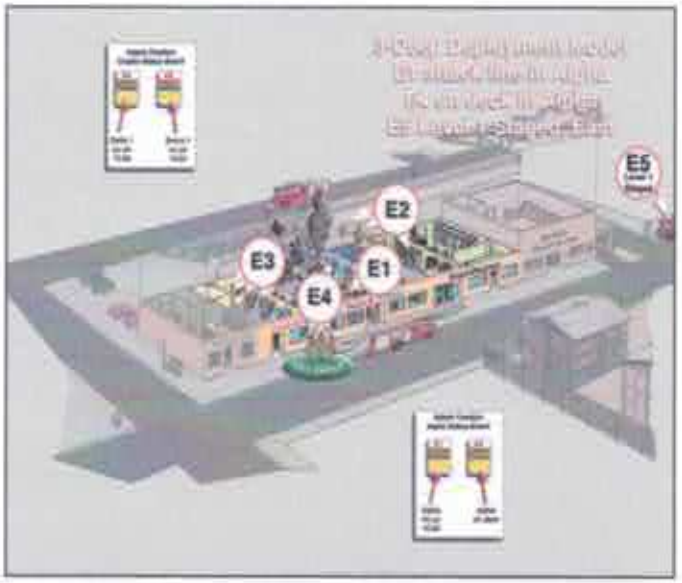
Assignment Example 3 of 3—Fire in a commercial structure. Initial IC sees/sizes up & Reports:

"Engine 1 is on the scene of a large, three-story commercial building with working fire on the third floor. I am establishing a water supply and advancing an attack line through Alpha to the third floor for search, rescue and fire control. Give me the balance of the alarm. E1 will be Alpha Side accountability. We will be operating in the offensive strategy. Engine 1 will be Main Street Command.

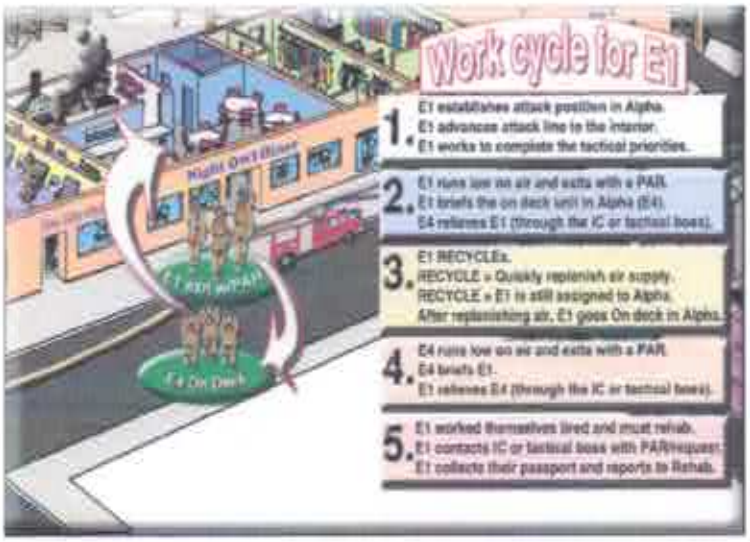
The initial size-up indicates a large, three-story commercial building with a working fire on the third floor. Bravo and Charlie are immediately adjoining, separated by masonry walls. Third floor is partial. IAP:
E1—Advance attack line through Alpha to front stairs. Work your way to the third floor;
L1—Bucket up, report on conditions, second-floor roof and access to third floor;
E2—Lay to Charlie Side, advance attack line to rear stairs. Work way to third floor;
E3—Supply line to L1. Crew goes on deck Alpha;
E4—Spot on E2's plug. Go on deck in Charlie; and
BC1—Transfer command.

Three-Deep Deployment Model

The three-deep deployment model provides command with a staffing solution that allows for an uninterrupted work cycle within each attack position. This deployment model fits, supports and reinforces both the incident organization and hazard-zone communications. In the pictured example, 1) E1 is conducting an interior attack while 2) E4 is standing by in an on-deck position in Alpha's warm zone. E5 in Level 1 Staging 3) represents the third level of the three-deep model.



Command Training continued on pg. 45



Standard Company Work Cycle

Companies have very predicable work cycles. The standard company work cycle is directly tied to the amount of time an SCBA air cylinder will last (typically 14–15 minutes). Using a three-deep deployment model allows the IC to place on-deck companies in all the key positions quickly. This puts ready-to-go resources in the right places before they are actually needed. Staffing attack positions in this manner facilitates safe and effective air management and supports a round-trip-ticket for those on the task level. BS

Click here! Start or join a discussion about this article at B SHIFTER's new forums.

Nick Brunacini joined the Phoenix Fire Department (PFD) in 1980. He served seven years as a firefighter before promoting to captain and working nine years on a ladder company. Nick served as a battalion chief for five years and in 2001, he was promoted to shift commander. He then spent the next five years developing and teaching the Blue Card curriculum at the PFD's Command Training Center. His last assignment with the PFD was South Shift commander; he retired from the department in 2009. Nick is the author of "B-Shifter—A Firefighter's Memoir." He is also the co-author of "Command Safety."

Fireman Up

TWERKING:

THE MOVEMENT YOU MAKE TO KEEP YOUR SCBA'S PASS ALARM FROM GOING OFF WHILE STANDING STILL!

F2008 01

NIOSH Fire Fighter Fatality Investigation and Prevention Program

Death in the line of duty...

A summary of a NIOSH fire fighter fatality investigation March 11, 2009

Career Fire Captain Electrocuted After Contacting Overhead Powerline From the Platform of an Elevating Platform Fire Apparatus – Pennsylvania

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SUMMARY

On January 6, 2008, a 40-year-old male career Fire Captain (the victim) was electrocuted after coming into contact with a 12,400-volt overhead powerline. The victim and a fire fighter had been assigned to ventilate the roof of an apartment building and were using an elevating platform fire apparatus to gain access to the roof. The victim was in the process of maneuvering the platform beneath a three-phase overhead powerline when he contacted one of the powerlines with his neck and back. The other fire fighter located on the platform had crouched down just before the contact. After realizing what had occurred, a fire fighter located on the turntable of the apparatus lowered the platform containing the victim and the fire fighter to the ground. The victim and fire fighter were removed from the platform and transported to a local hospital. The victim was pronounced dead on arrival at the hospital. The fire fighter received medical treatment and was later released. Two occupants of the apartment building died as a result of the fire. The following factors were identified as contributing to the incident: fire fighter proximity to energized powerlines; suboptimal incident command; an absence of relevant standard operating procedures; absence of specific periodic training; heightened sense of urgency given civilian occupants; and a lack of verification of the powerline energy state.

NIOSH investigators concluded that, to minimize the risk of similar occurrences, fire departments should:

- ***develop, implement, and enforce written standard operating guidelines (SOGs) or standard operating procedures (SOPs) for all aspects of fire fighting operations, including procedures for working in proximity to overhead powerlines***
- ***ensure that a distance of at least 10 feet (3 m) is maintained between aerial devices and overhead powerlines***
- ***ensure that a separate Incident Safety Officer, independent from the Incident Commander, is appointed and utilized when incidents escalate in size and complexity***
- ***ensure that fire fighters receive periodic safety training specific to all tasks they are expected to perform***
- ***use proximity warning devices to detect electrical current when working near exposed potentially energized parts (e.g. overhead powerlines) as a secondary/ redundant means of protection***
- ***follow apparatus manufacturer's safety warnings.***

Additionally, NIOSH recommends that as an added safety precaution, fire fighters should always

- ***consider powerlines as energized and operate accordingly.***

Also, the National Fire Protection Association should consider:

- ***developing safety standards that address work conducted in proximity to overhead powerlines.***

INTRODUCTION

On January 6, 2008, a 40-year-old male career Fire Captain died after he contacted a 12,400-volt overhead powerline. On January 8, 2008, the Fire Commissioner from the State of Pennsylvania notified the National Institute for Occupational Safety and Health (NIOSH) of this incident, and requested an investigation of the incident. On January 22-23, 2008, a safety consultant under contract with NIOSH traveled to the fire department and held a meeting with the Fire Chief, Deputy Fire Chief, Captain of Administration, local union president of the International Association of Fire Fighters, and the Director of Public Safety for the city. Interviews were conducted with the local coroner and with the incident commander (IC) and other fire fighters who were at the incident scene. The victim's and IC's training records, photographs of the elevating platform fire apparatus and personal protective equipment, and a video of the fire were reviewed. The fire structure, the victim's personal protective equipment and the elevating platform fire apparatus were examined and photographed by NIOSH.

FIRE DEPARTMENT

This career department consists of 150 fire fighters operating from 8 stations and serving a population of about 75,000 in a geographic area of approximately 26 square miles.

TRAINING AND EXPERIENCE

The department requires new fire fighters to attend an area community college for a 7 week fire fighting course. Employment in the department is contingent upon completing the course and attaining certification as a Fire Fighter Level I from the college. The 7 week course is designed to teach the skills and knowledge needed to qualify as a Fire Fighter Level I based on the requirements in NFPA 1001, *Standard for Fire Fighter Professional Qualifications*.

The Captain (victim) had about 24 years of fire fighting experience. He had completed the following training: Fundamentals of Fire Fighting, Pennsylvania Department of Labor Apprentice Program (Equivalency Journeyperson firefighter); Hazardous Materials Incidents; Railroad Hazardous Materials; Aeromedical Safety; Vehicle Rescue; Fire Rescue 2; Pump Operations II; Electrical Emergencies; Rope/High Angle Rescue; Foam Firefighting Technician; Arson Awareness/Emergencies; High Rise Firefighting; Natural Gas/Propane Safety; General Fire Service Rescue; Engine Company Operations; Structural Fire Rescue; and Truck Company Operations II (TCO II).

The Incident Commander (IC) had more than 23 years of fire fighting experience. He completed the following training: Urban Search and Rescue (USR) Weapons of Mass Destruction Enhanced Operations; USR Response System Orientation; National Incident Management System; Incident Command System; First Responder Operations Awareness; Propane Gas Practical Exercise; Self Contained Breathing Apparatus Technician; Trench Rescue Operations II; Confined Space Rescue; Fire Rescue 3; Water Rescue; Technical Rope Rescue; Basic Vehicle Rescue Technician; Structural Collapse Technician I, II, and III; Emergency Medical Technician; Emergency Control of Natural Gas; Recognizing and Identifying Hazardous Materials; Railroad Hazardous Materials; Pennsylvania Fire Service Professional Qualifications Board Fire Fighter I and II; Developing Instructional Techniques; Fundamentals of Fire Fighting; National Foams Technician; and Rapid Intervention Team Municipal Departments.

STRUCTURE

The fire building was a three-story residential house of wood frame construction that had been converted into three individual dwelling units, and was built sometime in the 1940's. The exterior consisted of aluminum siding, and asphalt shingles covered the roof. A three-phase 12,400-volt overhead powerline was located about 35-feet from the A-side of the structure and approximately 25-feet above ground level (see Photos 1 and 2).

EQUIPMENT, PERSONNEL, AND ON-SCENE ARRIVAL TIMES (FIRST ALARM)

Dispatch - 0713 hours
Rescue 1: Officer, chauffer, and one fire fighter-0714 hours
Car 21: Assistant Chief (Incident Commander [IC]) and chauffer-0715 hours
Engine 4: Officer, chauffer, and one fire fighter-0715 hours
Truck 2: Officer (victim), chauffer, and one fire fighter (injured)-0716 hours
Engine 15: Officer, chauffer, and one fire fighter-0716 hours

The apparatus involved in the incident (Truck 2) was a 2002 model, 85-foot mid-mount, elevating platform. Four warning signs were present on Truck 2. A sign was located on the turntable operator's controls cover and a similar sign was located on the back side of the platform. The signs stated – *Danger -Electrocution Hazard - This machine is not insulated against electrical shock! Keep this apparatus a safe distance from power lines. Allowances must be made for sway, rock or sag of power lines and this machine. Contact with or inadequate clearance from power lines can result in serious injury or death. Also, a sign was located on the pump panel on both sides of the apparatus. The sign stated – Danger - Electrocution Hazard - Keep Clear – Death or serious injury can result from contact with this equipment or vehicle if it should be electrically charged.* (See Photos 3 and 4).

WEATHER

The conditions were overcast with 10-mile visibility. The temperature was around 38 degrees Fahrenheit, and the wind was calm. There was no precipitation at the time of the incident. The weather did not appear to be a factor in this incident.

INVESTIGATION

On January 6, 2008, at approximately 0713 hours, the fire department was dispatched to a possible working structure fire with potential entrapment. Engine 15 (E15), Engine 4 (E4), Rescue 1 (R1), Truck 2 (T2), and the Incident Commander (IC) responded. All units arrived on scene between 0714 and 0716 hours.

R1's crew, being one of the first units to arrive on scene at about 0714 hours, gave a size-up of a three-story apartment building with heavy smoke showing (see Photo 1). Incident Command was established at the A-B corner of the fire structure, 1 ¾-inch attack hoselines were laid to the A-side of the structure, supply lines were stretched to the engines, and a water supply established. Forcible entry was made into the structure, and fire fighting and primary search activities commenced. Soon thereafter, fire fighters located an unconscious occupant inside the building on the second floor. The occupant was removed to the outside after the incident, and later pronounced dead at the scene by the local coroner. *Note: Sometime later in the incident, another occupant of the building was found on the second floor and also pronounced dead at the scene by the local coroner.*

At 0720 hours, a second alarm was struck, and the electric utility company was notified and requested to come to the fire scene. During this time the victim and a fire fighter had made entry into the structure and were searching rooms in the basement. The victim's low air alarm went off and the crew exited to the outside.

At 0728 hours, E4 requested the roof to be opened, and other crews operating on the 2nd and 3rd floors requested additional hose lines. The electric utility representative arrived on scene and the IC, through face-to-face communication and hand gestures, requested the overhead powerlines be de-energized on both streets. Sometime later the utility representative returned to the IC and told him that the power was cut. *Note: Although the power was cut to the apartment building from a secondary powerline on the B-side of the apartment, the primary overhead powerline on the A-side of the apartment remained energized.*

Shortly thereafter, in another face-to-face communication, the IC told the victim that electrical power had been cut and that he wanted the roof ventilated. The IC made a decision to provide vertical

ventilation through the roof to aid in the search activities still in progress for other occupants. He had determined that ground ladders could not be utilized to access the roof because of the angles and height of the roof. He assigned the victim to ventilate by using the elevating platform on T2 to gain access to the roof. *Note: At this time, fire department personnel were still operating in a heightened state of urgency due to the continued search for possible civilian entrapment victims.*

The victim instructed the fire fighter that they were going up in the platform. The victim retrieved a chain saw and he and the fire fighter climbed onto the platform of the elevating platform. Using the controls in the platform, the victim swung the platform out of its bed and toward the fire structure, and started extending the boom (see Photo 2). As the platform approached the overhead electrical wires, the fire fighter crouched down onto the platform and then heard an electrical arching (crackling) noise. The fire fighter looked up and saw a wire on the victim's back (see Photos 5 and 6). The arching stopped as the victim slumped down over the controls and fell back onto the platform.

At this time, a fire fighter who was on the ground retrieving an air bottle from a compartment of T2 and another fire fighter who was located on the turntable of T2 looked up and saw smoke coming from the platform. They informed a nearby officer who then helped direct the movement of the elevating platform while the fire fighter on the turntable lowered the elevating platform. The victim was removed from the platform and carried to the advanced life support vehicle where he was checked for vital signs. No vital signs were detected and he was transported to the local hospital where he was pronounced dead. The fire fighter was also transported to the hospital, evaluated, and later released. At 0828 hours, it was reported that one fire fighter and two civilians were deceased.

CAUSE OF DEATH

The coroner listed the cause of death as electrocution.

CONTRIBUTING FACTORS

The following factors contributed to the incident:

- fire fighter proximity to energized powerlines
- suboptimal incident command
- absence of relevant standard operating procedures
- absence of specific periodic training
- heightened sense of urgency given civilian occupants
- lack of verification of the powerline energy state.

RECOMMENDATIONS

Recommendation #1: Fire departments should develop, implement, and enforce written standard operating guidelines (SOGs) or standard operating procedures (SOPs) for all aspects of fire fighting operations, including procedures for working in proximity to overhead powerlines.

Discussion: Written standard operating guidelines (SOGs) or standard operating procedures (SOPs) enable individual fire department members an opportunity to read and maintain a level of assumed understanding of operational procedures. Fire departments can suffer when there is an absence of well

developed SOGs or SOPs. The NIOSH Alert: "Preventing Injuries and Deaths of Fire Fighters" identifies the need to establish and follow fire fighting policies and procedures.[1] Guidelines and procedures should be developed, fully implemented, and enforced to be effective. Periodic refresher training should be provided to assist fire fighters in remembering and understanding departmental guidelines and procedures. These SOGs or SOPs should include hazardous energy control procedures. The use of alternating current detectors to verify that powerlines are de-energized should be included in any hazardous energy control procedures developed by fire departments. *Note: Alternating current (AC) detectors can detect unshielded AC through snow, ice, and many solid objects. These battery-operated devices are handheld wands similar in size and shape to a police officer's baton. In the presence of an AC, they emit an intermittent beep. The more rapid the beep, the closer the source is. The detection range (distance from the source at which the wand detects the current) varies with the situation. In general, the higher the voltage, the greater the ranges will be*[2] *(see Photo 7).*

Energized overhead powerlines are present at many fire scenes. Accordingly, when fire operations are conducted in proximity to energized overhead powerlines it is of paramount importance that the powerlines be de-energized and that the de-energized status be verified by both the utility company and responsible fire department personnel. In this incident, the fire department did not have any SOGs or SOPs for working safely in proximity to overhead powerlines and mutual verification did not occur. The utility company reported that the powerlines were de-energized, but the fire department did not verify which lines had been de-energized.

Recommendation #2: Fire departments should ensure that a distance of at least 10 feet (3 m) is maintained between aerial devices and overhead powerlines.

Discussion: Aerial device drivers/operators must continually be aware of overhead powerlines. When parking the aerial apparatus, it is just as important to look up as it is to look at the ground. If possible, the driver/operator should spot the apparatus in a position that will require minimum or no maneuvering of the aerial apparatus around obstructions. The goal is always to maintain a distance of at least 10 feet (3 m) between the aerial device and overhead electric lines.[3] Additionally, aerial device drivers/operators should be, at a minimum, trained to maintain a 10 foot distance from overhead powerlines; verify that powerlines have been de-energized; recognize hazards associated with operating an aerial device in proximity to overhead powerlines; and understand procedures for emergency situations (e.g. in the event an aerial device contacts an electrical powerline, fire fighters on the ground should never make contact with the aerial device or allow anyone else to contact it).

In this incident, a decision was made to ventilate the apartment building by using the elevating platform on T2 to gain access to the roof. T2 had been spotted in a position that required the aerial device to be maneuvered around a 12,400 volt powerline. Believing the powerlines had been de-energized the victim raised the elevating platform and extended it between the powerlines and communication lines. During this process, his neck and back came into contact with the energized powerline.

Recommendation #3: Fire departments should ensure that a separate Incident Safety Officer, independent from the Incident Commander, is appointed and utilized when incidents escalate in size and complexity.

Discussion: According to NFPA 1561 *Standard on Emergency Services Incident Management System, 2008 Edition*, "The incident commander shall have overall authority for management of the incident. The incident commander shall ensure that adequate safety measures are in place (5.3.1 and 5.3.2)." This shall include overall responsibility for the safety and health of all personnel and for other persons operating within the incident management system. While the Incident Commander (IC) is in overall command at the scene, certain functions must be delegated to ensure adequate scene management is accomplished.[4] According to *NFPA 1500 Standard on Fire Department Occupational Safety and Health Program, 2007 Edition*, "as incidents escalate in size and complexity, the incident commander shall divide the incident into tactical-level management units and assign an incident safety officer (ISO) to assess the incident scene for hazards or potential hazards (8.1.6)."[5] These standards indicate that the IC is in overall command at the scene, but acknowledge that oversight of all operations is difficult. On-scene fire fighter health and safety is best preserved by delegating the function of safety and health oversight to the ISO. Additionally, the IC relies upon fire fighters and the ISO to relay feedback on fireground conditions in order to make timely, informed decisions regarding risk versus gain and offensive versus defensive operations. The safety of all personnel on the fireground is directly impacted by clear, concise, and timely communications among mutual aid fire departments, sector command, the ISO, utility companies and other support groups, and the IC.

Chapter 6 of NFPA 1521, *Standard for Fire Department Safety Officer*, defines the role of the ISO at an incident scene and identifies duties such as recon of the fire ground and reporting pertinent information back to the Incident Commander; ensuring the department's accountability system is in place and operational; monitoring radio transmissions and identifying barriers to effective communications; and ensuring established safety zones, collapse zones, hot zones, and other designated hazard areas are communicated to all members on scene.[6] The ISO adds a higher level of attention and expertise to help the fire officers and fire fighters. The ISO must have particular expertise in analyzing safety hazards and must know the particular uses and limitations of protective equipment.[7] The IC can be assisted in managing on-scene fire fighter health and safety by delegating the function of safety and health oversight to the ISO.

It is of paramount importance that clear communication between the fire department and any electrical utility be established and a set of procedures adhered to before any work is attempted in proximity to an electrical source. Any deviation from the procedures or miscommunication can and has resulted in injury and death. In this incident, when the decision was made to use the elevating platform apparatus to access the roof, the IC could have assigned an ISO the responsibility of assuring that the overhead powerlines were de-energized before the elevating platform was raised. The ISO could have accompanied the utility representative and assured that correct powerlines were de-energized.

Recommendation #4: Fire departments should ensure that fire fighters receive periodic safety training specific to all tasks they are expected to perform.

Discussion: Fire fighters should receive periodic safety training that is specific to the tasks they are expected to perform, such as working in proximity to overhead powerlines. Safety training courses dealing with electrical hazards and measures they should take to avoid the hazards should be completed by fire fighters before they are assigned tasks that may place them near overhead powerlines. This training should be conducted upon initial hire, and periodically thereafter. Applicable safety training should be taught, and the training repeated if necessary, until understood by all members. These safety rules and procedures should be continually enforced by on-scene officers.[8] In this case the victim completed numerous safety training courses including Electrical Emergencies.

The Electrical Emergencies course was provided by the utility company and included overhead powerline safety. However, the victim completed this course in 1993 and had not taken any further courses dealing with overhead powerline safety.

Recommendation #5: Fire departments should use proximity warning devices to detect electrical current when working near exposed potentially energized parts (e.g. overhead powerlines) as a secondary/redundant means of protection.

Discussion: Proximity warning devices are used to detect the electrostatic field of any alternating current (AC) power line. They provide both audible and visual warning signals to alert the operator and attendant or ground personnel when the boom comes within the proximity of an energized high-voltage power line.[9] These devices can help verify that lines are de-energized (see Photos 8, and 9). However, they should not be relied upon as the sole or primary means of verifying whether powerlines are de-energized.

Recommendation #6: Fire departments should follow apparatus manufacturers' safety warnings.

Discussion: The following safety warning was printed in the manufacturer's "Trained Engineer's Manual" for operation of the elevating platform apparatus used at this incident: "Safety Warning! Avoid overhead electrical power lines! The aerial ladder is not insulated. If the ladder comes into close proximity/and or contacts any electrical power source, severe injury or death may occur to the Ladder Engineer, Ladder occupants, and possibly persons in close proximity to any part of the apparatus. Remember, the only safe power line is NO power line."[10] In this incident, the fire department did not verify the utility company's report that the powerlines had been de-energized. Manufacturers' warnings for safe operation of equipment should always be followed.

Recommendation #7: Fire fighters should always consider powerlines as energized and operate accordingly.

Discussion: Powerlines can be re-energized or "back fed" by the utility grid system or other means such as portable electric generators. Many powerlines have a recloser (an automatic switch or circuit breaker that reestablishes an electrical circuit after an interruption of service). Therefore, since overhead powerlines can become inadvertently energized, fire fighters should always be operating as if the powerlines were energized (live/hot), and take the necessary precautions such as maintaining a minimum distance of 10 feet.

Recommendation #8: The National Fire Protection Association (NFPA) should consider developing safety standards that address work conducted in proximity to overhead powerlines.

Discussion: The mission of the international nonprofit NFPA, established in 1896, is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education. The world's leading advocate of fire prevention and an authoritative source on public safety, NFPA develops, publishes, and disseminates more than 300 consensus codes and standards intended to minimize the possibility and effects of fire and other risks.[11] Accordingly, the NFPA should consider developing safety standards that address work conducted in proximity to overhead powerlines. At this time, the NFPA does not have safety standards that are relevant to work conducted near overhead powerlines. The U. S. Department of Labor, Occupational Safety and Health Administration, has promulgated work standards that address

work from aerial devices in relation to overhead powerlines; however, they do not apply to fire fighting equipment. Examples include: 1910.67(a)(1), "*Aerial device. Any vehicle-mounted device, telescoping or articulating, or both, which is used to position personnel*"; 1910.333(c)(3)(i)(A) When an unqualified person is working in an elevated position near overhead lines, the location shall be such that the person and the longest conductive object he or she may contact cannot come closer to any unguarded, energized overhead line than the following distances; 1910.333(c)(3)(i)(A)(1) For voltages to ground 50kV or below - 10 feet (305 cm). Also note, 1910.67(b)(3) The requirements of this section do not apply to firefighting equipment or to the vehicles upon which aerial devices are mounted, except with respect to the requirement that a vehicle be a stable support for the aerial device.[12]

REFERENCES

1. NIOSH [1994]. NIOSH alert: preventing injuries and deaths of fire fighters. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 94-125.

2. IFSTA [2002]. Fireground support operations, First Edition. Stillwater, OK: Fire Protection Publications, Oklahoma State University: International Fire Service Training Association, p230.

3. IFSTA [2000]. Aerial Apparatus Driver/Operator Handbook, First Edition. Stillwater, OK: Fire Protection Publications, Oklahoma State University: International Fire Service Training Association.

4. NFPA [2008]. NFPA 1561: Standard on emergency services incident management system. 2008 edition. Quincy, MA: National Fire Protection Association.

5. NFPA [2007]. NFPA 1500: Fire department occupational safety and health program. 2007 edition. Quincy, MA: National Fire Protection Association.

6. NFPA [2008]. NFPA 1521: Standard for fire department safety officer. 2008 edition. Quincy, MA: National Fire Protection Association.

7. International Fire Service Training Association [2002]. Fireground support operations. 1st ed. Stillwater, OK: Oklahoma State University (chapter 10).

8. Brunacini [1985]. Fire Command. Quincy, MA: National Fire Protection Association.

9. SkyAzul Equipment Solutions, Sigalarm™ – High Voltage Power Line Proximity Warning System, http://www.skyazul.com/english/products/proximity_warning_systems.html

10. Apparatus Manufacturer [2002]. Trained Engineer's Manual, p 36.

11. National Fire Protection Association (NFPA), About US, http://www.nfpa.org/about%20nfpa.aspx *(Link updated 8/13/2013)*

12. OSHA [2008]. Vehicle-mounted elevating and rotating work platforms, and Selection and use of work practices 29 CFR Part 1910.

INVESTIGATOR INFORMATION

This incident was investigated and the report written by Richard Braddee, safety consultant under contract to the National Institute for Occupational Safety and Health. An expert technical review of the report was provided by Carl E. Peterson, Director, Public Fire Protection Division, National Fire Protection Association, Quincy, MA. http://www.nfpa.org

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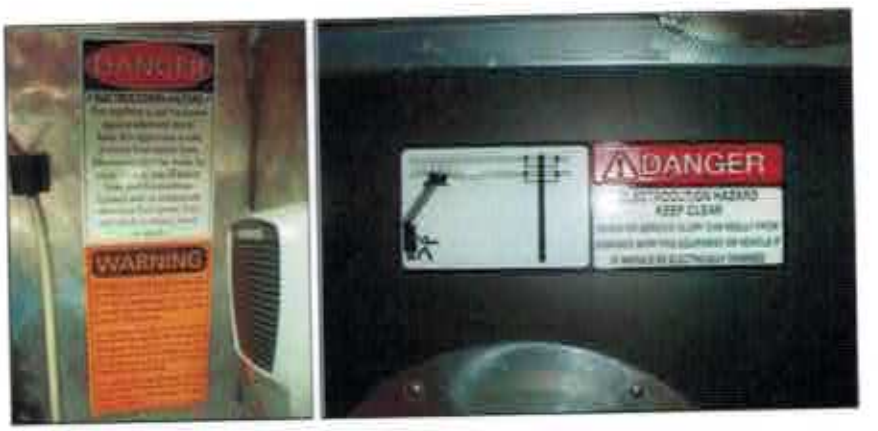
PHOTOS

Photo 1. Side-A of three story apartment building (incident scene).
(NIOSH photograph.)

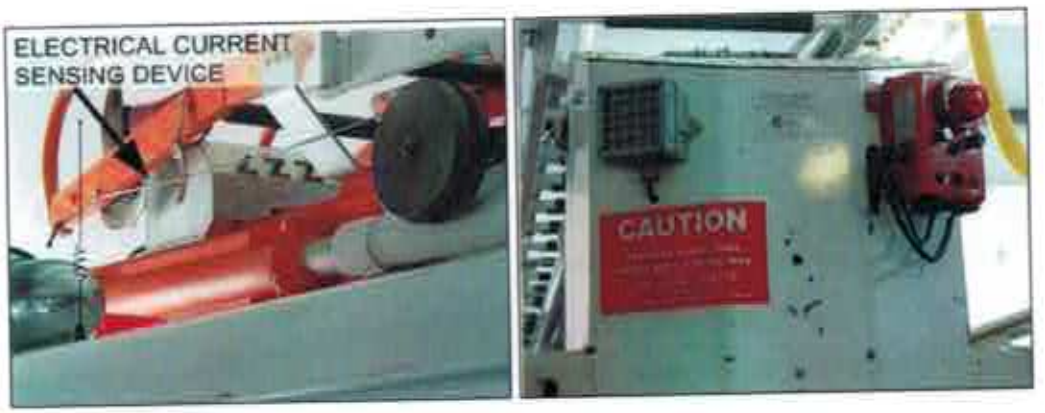
Photo 2. Truck 02 - 2002 model, 85-foot mid-mount, elevating platform.
(Photograph taken shortly after the incident occurred by off duty fire fighter Bill Boock.)



Photos 3 and 4. Shown here are two of the four warning signs affixed to Truck 2.

Photos 5 and 6. Victim's T-shirt and bunker jacket with burn marks on the neck and back area from contact with the energized electrical powerline. ***(NIOSH photographs.)***

Photo 7. Alternating current detector.
(Photograph courtesy of the International Fire Service Training Association.)



Photos 8 and 9. Example of proximity warning device used on aerial ladder truck at neighboring fire department. Photos left to right – electrical current sensing device, and alarm and control box.
(Photographs courtesy of neighboring fire department.)

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