Air Management on the Fireground:  
the Need, the Mandate, the Solution

by Captain Mike Gagliano, Battalion Chief Phil Jose,  
Captain Casey Phillips, and Lieutenant Steve Bernocco

The modern fireground is one of the deadliest environments in the world. It is a combination of forces and factors that can kill, cripple, or maim in a matter of seconds. A “routine” house fire can produce any of the following within seconds of ignition: extreme temperatures/thermal insult, poisonous/asphyxiating atmospheres, structural collapse, explosions, entrapment and electrical shock.

Firefighters around the world fight fires in this deadly arena on a daily basis, armed with only the basic tools of water, protective clothing, and air. These tools are extremely important and the job of fighting fires could not be done without them. It is air, however, carried on the back of a firefighter in a Self-Contained Breathing Apparatus (SCBA) that makes it possible to safely enter a burning building and get the job done. It is also air, or the lack thereof, that is the primary cause of non-cardiac related death on the fireground.

Air Management
The principle of air management involves the discipline of knowing how much air a firefighter has in their SCBA, monitoring the air level, and ensuring it is being utilized to safely and effectively accomplish the task at hand.

Unfortunately, the fire service developed some bad habits when the SCBA was first introduced. These bad habits have carried over to poor air management practices. The fire service is paying a steep price for these behaviors. Numerous fireground deaths are attributed to firefighters running out of air and dying of asphyxiation.

Initially, SCBA were not worn by the majority of firefighters because they were deemed too bulky and time consuming. This was combined with tremendous peer pressure that insinuated you were a “weak” firefighter if you wasted the time it took to put on your breathing apparatus. These attitudes were demonstrated to be incorrect and unsafe, yet it is still common practice in some departments to routinely disregard wearing a self-contained breathing apparatus.

Most progressive and professional fire departments around the world are now mandating the use of SCBA. New technology continues to improve SCBA by decreasing its weight, improving reliability, and enhancing the overall effectiveness of the equipment. With the availability of better protective equipment, tactical training, and improvements in leadership, firefighter deaths rates on the fireground should be decreasing. But this is not the case. Fireground deaths hover around the same numbers despite a decrease in actual fires.

One factor stands out that needs to be addressed – firefighters that die in structures are dying in increasingly higher numbers due to asphyxiation.

Or, to put it in street terms...  
When firefighters run out of air,  
they breathe smoke; and when  
firefighters breathe smoke, they die.

The Need
The need for a progressive, comprehensive air management program is obvious for one simple reason: Firefighters are running out of air on the fireground. The consequence of firefighters running out of air vary dramatically – increased firefighter line-of-duty deaths, close calls, injuries, and increased cancer/respiratory disease rates with direct correlations to the smoke firefighters breathe when their air is depleted.

The fire service has seen dramatic changes since Benjamin Franklin began building the American fire service. But despite all the changes, deaths on the fireground not related to heart attack or vehicle accidents still occur in the same ways they have for 200 years: smoke, thermal insult, structural collapse, getting lost or separated, and running out of air. “No Air” affects all of the other categories on the list.
sequences line-of-duty deaths bring to the families and fire departments of these fallen firefighters.

The Mandate
To address the disturbing firefighter death statistics, more mandated changes have come/are coming to the American fire service that focus directly on air management. The most significant change is language in the National Fire Protection Association (NFPA) 1404 respiratory standard that took effect in 2007 and includes the following provisions:

NFPA 1404 Chapter 1: Administration

1.1* Scope. This standard shall contain minimum requirements for the training component of the Respiratory Protection Program found in NFPA 1500, Standard on Fire Department Occupational Safety and Health Program.

1.2* Purpose. The purpose of this standard shall be to specify the minimum requirements for respiratory protection training for the emergency response organization, including safety procedures for those involved in fire suppression, rescue, and related activities in a toxic, contaminated or oxygen-deficient atmosphere or environment.

NFPA 1404 5.1.4* The authority having jurisdiction shall establish and enforce written Standard Operating Procedures for training in the use of respiratory protection equipment, and that training shall include the following:

NFPA 1404 A5.1.4(2) Individual Air Management Program. This program will develop the ability of an individual to manage his or her air consumption as part of a team during a work period.... The individual air management program should include the following directives:

- Exit from an IDLH atmosphere should be before consumption of reserve air supply begins.
- Low air alarm is notification that the individual is consuming their reserve air.
- Activation of the reserve air alarm is an immediate action item for the individual and the team.

The NFPA 1404 standard outlines that fire departments must train their members to operate in accordance with the Rule of Air Management (ROAM), which states: “Know how much air is in your SCBA and manage that air so you leave the IDLH environment BEFORE your low air warning alarm activates.”

This will be a significant change for many fire departments in how fireground operations are performed. The current practice is for firefighters to operate until activation of the low-air warning alarm and then begin to exit the structure. This practice allows a firefighter to use 75 percent of the air in their SCBA for entry and work in the IDLH environment, leaving only 25 percent for exit and no margin for error.

The new language in the NFPA 1404 standard will be the measure used by the professional and legal community to determine if a fire department has taken the minimum required action necessary to protect firefighters from exposure to IDLH environments. To that end, fire departments must train firefighters to manage their air.

Will the Law be on Your Side?
This moves the discussion to the legal arena where departmental and personal liabilities are factors that will have far-reaching impact on the fire service. Many firefighters are already dealing with the fallout from the realization that “giving your all” to the citizens as a member of the fire service does not necessarily correlate into being taken care of in return.

The article included in this supplement on the harmful effects of smoke and its components highlight the toxic and carcinogenic nature of the modern fire environment. Every firefighter is subjected to products of combustion as a normal course of doing their job. Exposure to products of combustion is causing cancer in firefighters at levels far above those found in the general population. It might be assumed that the willingness to take on these risks would be met with an equal responsibility of the employer to care for the individual who gets sick because of them. That assump-
tion is proving nightmarishly wrong for many firefighters.

Many states are adopting “Presumptive Legislation” that attempts to address the right of firefighters to get medical care for cancer and other diseases that are a direct result of the job. As always, the devil is in the details of just what is and is not deemed “job related”. In the state of Washington, for example, the first presumptive legislation considered the following as valid “job related” conditions that would be covered: primary brain cancer, malignant melanoma, leukemia, non-hodgkin’s lymphoma, bladder cancer, uterine cancer, and kidney cancer.

The Washington State Senate Ways and Means Committee specifically amended the original list of diseases that provided more appropriate coverage for firefighters. The original list was dramatically slashed and eliminated the following cancers from the list of presumptive cancers: breast cancer, reproductive system cancer, central nervous system cancer, skin cancer, lymphatic system cancer, digestive system cancer, hematological system cancer, urinary system cancer, skeletal system cancer, and oral system cancer.

The Washington State Senate Ways and Means Committee also included additional language that imposed limits on how long coverage would be in place. The current system allows for three months of coverage for every year of employment up to 60 months. In other words, a firefighter who has been subjected to the hazardous smoke for a career of 30 years had better test positive for cancer within five years of retirement or they are not covered – they will get zero coverage, despite the obvious links to years of service and high rates of cancer probability. There are additional variables included in the language that allow further questioning of whether the cancer is job related, such as smoking history, fitness, etc.

As a result of intensive lobbying by the Washington State Council of Firefighters and pressure from citizens, additional changes were incorporated in 2007. The following illnesses were added back into the existing presumptive legislation: prostate cancer diagnosed prior to age 50, colorectal cancer, multiple myeloma, and testicular cancer.

The gaps that remain, however, are extensive. A recent study conducted in Cincinnati highlights the extreme risks firefighters face in their efforts to protect our citizens. Those risks are not truly being acknowledged by the legislators and the current presumptive legislations. Many states, such as Florida, have no such protections for their firefighters.

There is a growing recognition that proper use of equipment and adherence to operating guidelines/policies will be more closely monitored because of personal liability. An injury or exposure will be judged based on how the firefighter operated during the emergency and if they used provided safety equipment.

In a court of law, those in charge must answer:

- Why do they allow their firefighters to enter a structure fire without breathing from an SCBA?
- Why they routinely allow firefighters to operate until their low-air warning alarm activates?
- Why aren’t they training, and operating, according to recognized minimum national standards?

The mandate for air management answers these concerns.

The Solution

The solution for the air management problem is a simple one. It does not require the purchase of expensive equipment, the addition of more personnel, or the cessation of aggressive fireground attack to implement. The Rule Of Air Management (ROAM) is the simple means by which the fireground can be made safer, exposure to toxic/carcinogenic smoke can be greatly minimized, and exposure to legal/liability issues can be significantly decreased.
The ROAM suggests you know how much air you have in your SCBA, and manage that air so you leave the hazardous environment before your low-air warning alarm activates.¹

**In simple firefighter language:**
- Know what you’ve got
- Manage it as you go
- Leave before your bell hits

While this seems a simple solution, it is a radical change in behavior for the fire service. Most firefighters have never checked their air before entry or during operations at structure fires. Up until now, the standard indication for “time to exit” is when the low air warning alarm activates. The problem with this approach is that it allows for no margin of error. The ROAM changes all that.

By checking your air before entry, there is verification that nothing has gone wrong with the breathing apparatus pack prior to interior smoke exposure. A full bottle gives a baseline from which the firefighter can build a good approach to managing the air they have. A READY-Check² (Fire Engineering magazine) is recommended prior to entry and was developed to eliminate some of the key problems that are killing and/or injuring firefighters.

A routine check of the air status by the individual and team leader during the operation is the second critical component of the ROAM. While this seems like an obvious thing to do, most firefighters have never done it. This check serves two purposes. The first is an obvious reminder of where the crew stands as far as air level is concerned and gives a good indicator of when to make the “time to exit” decision. The second is an increase in situational awareness that keeps the team from getting tunnel vision while performing their task. The air gauge check provides a brief break in the action that allows the team leader not only to monitor air, but also check condition changes and status of crew members.

Finally, the ROAM requires the team to exit the structure before the low air warning alarm activates. The final 25 percent of the bottle is the emergency reserve air and should only be used when something has gone wrong for the firefighter or the crew. Unfortunately, firefighters routinely use this “emergency reserve” for the incident itself. This has caused numerous firefighters to run out of air and suffer exposures to products of combustion. By exiting the structure with the emergency reserve intact, firefighters allow themselves a margin of error for an unexpected collapse, disorientation, or other problem. It also gives the Rapid Intervention Team time to make entry and affect rescue if necessary. This is the model used by SCUBA divers who regard their emergency air as sacred. Just as our lungs were not designed to breathe water, neither were they meant to inhale smoke.

Firefighters who stay in the hazardous environment until their low air warning alarm activates are betting their life that nothing will go wrong on the way out.

This is a gamble that firefighters can no longer afford to take.

The ROAM is the future of the fire service. It can be combined with any technological or personnel advance, but it does not rely on them. Technology can be relied on only so far, as it is always subject to failure. Shrinking staffing levels and human error make air management at the strategic level a secondary option at best.

The simple reality of the fireground is that an individual firefighter’s air is their responsibility to manage. The ROAM ensures that this happens and will save the lives of firefighters who use it.  

**References:**