AFD

REPORT ON RAPID INTERVENTION OPERATIONS ANALYSIS

2015

THIS PROCESS WOULD NOT HAVE BEEN POSSIBLE WITHOUT THE HARD WORK AND SUPPORT OF THE FOLLOWING PERSONS AND ENTITIES:

THE MEN AND WOMEN OF THE ASHEVILLE FIRE DEPARTMENT

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Executive Summary

To ensure credible data for Rapid Intervention Operations, and to identify best practices for Rapid Intervention Team (RIT) staffing, training, and deployment, the Asheville Fire Department conducted a Critical Task Analysis for Rapid Intervention Operations. This was performed by measuring 16 fire companies across three shifts with an overall participation of 48 companies and 196 active participants. The conclusions from the compiled data resulted in two key findings. Those two key findings are:

- **The crucial need for staffing**
- **The significance of training**

The data significantly demonstrated that technician level training is essential, along with proper staffing, in order to successfully mitigate a complex RIT deployment. Five Critical Tasks were evaluated for each scenario: Locate, Extricate, Air, Package, and Removal. The cumulative average completion time from mayday called to removal of a viable firefighter for the analysis was 37:40. The internal findings are described in detail within the report.

It has been determined by this analysis that an average of 15 firefighters, 4 from a RIT Company trained to technician level, are needed to remove a single compromised firefighter from a complex rapid intervention situation.

It has also been determined that a technician level trained RIT Company is able to deploy, locate, extricate, provide supplemental air, package and remove a compromised firefighter much quicker than an operations level trained or untrained rescuer and that a technician level trained RIT Company declares less personal emergencies during a rescue. Any reduction in staffing or of properly trained RIT personnel shows dramatic reduction in performance. A RIT Company must be personally familiar with their equipment and proficient in utilization of that equipment. This can only be accomplished through technician level training and proper staffing of all RIT Companies.

The Asheville Fire Department has determined that RIT is an essential program for their department. To support this program based on the RIT Operations Analysis, AFD is committed to sending a RIT Company to every dispatched fire. Once a structure fire is confirmed, an additional two engines and one ladder company is also dispatched to perform as a RIT Group, ensuring the full staff of 15 personnel are on scene to successfully rescue a possible compromised firefighter.

THE PROCESS

INTRODUCTION

Rapid intervention is the act of mitigating life-threatening emergencies and removing compromised firefighters from an Immediately Dangerous to Life and Health (IDLH) environment. Situations in which firefighters operating in an IDLH may require rapid intervention include, but are not limited to: hostile fire events, equipment failure, low air emergency with greater than 60 second exit time, PASS activation, fall through, entrapment, entanglement, disorientation, collapse, medical emergency, and loss of accountability. Some firefighter emergencies may be mitigated by the compromised firefighter and/or their company resulting in self-rescue. However, a majority of the potential emergencies will require rapid intervention.

BACKGROUND

Over the last 2 ½ years the Asheville Fire Department (AFD) has focused on preparing our companies for mitigating Mayday situations to include firefighter self-survival and rapid intervention team response. As a result of this focus, AFD has certified all online personnel in Rapid Intervention Team Operations per NFPA 1407 (Operations level) and has stood up three dedicated RIT Companies trained through the AFD RIT Company Academy (Technician level). The City of Asheville and the Asheville Fire Department, dedicating significant logistical and financial resources, have demonstrated through their commitment that rapid intervention is a critical task for AFD.

By recognizing that AFD treats rapid intervention as a critical task, it became necessary to analyze it as such. Upon research, it was determined that the benchmark analysis of rapid

intervention was conducted by the Phoenix Fire Department in 2002. That study's findings are nationally accepted as the data by which the average expectations of rapid intervention teams can be quantified.

The Phoenix tests were conducted in large square footage (>= 5000 sq. ft.) structures. The scenario presented two firefighters requiring assistance. There was a 150 ft. hoseline into the structure that the compromised firefighters were operating. The RITs were ordered to follow that line in. One firefighter, who had been separated from the rest of his crew, was low on air, mobile, and able to talk on the radio. The second Mayday firefighter was located approximately 40 feet off of the nozzle in another room, out of air, unconscious, with PASS device activated. There were no lights on in the structure and the RIT firefighters had window tint placed in their masks to further obscure visibility. There was no heat or smoke introduced into the scenario.

A more complex RIT activation such as a structural collapse will likely require more personnel and time than the Phoenix study states. The analysis staff hypothesized that AFD's Air Management policy may also increase the personnel and time required to affect a complex RIT incident. The effectiveness of Asheville Fire Department's RIT deployment model was measured against the following RIT critical tasks:

- Locate the compromised firefighter.
- Assess the compromised firefighter and provide supplemental air if required.
- Extricate the compromised firefighter from any entanglement and/or entrapment.
- Package the compromised firefighter for transport.
- Remove the compromised firefighter from the IDLH.

Throughout June 2014 AFD conducted hands-on, live fire analysis, utilizing a complex RIT scenario to ensure the credibility of Asheville Fire Department's RIT deployment model; and determine the time, manpower, and breathing air requirements of such an incident. This testing analyzed AFD's ability to mitigate a complex RIT incident; ensuring we are providing the most survivable fireground possible.

ASHEVILLE FIRE DEPARTMENT

The Asheville Fire Department is a CFAI Accredited Agency covering 60.39 square miles. AFD protects a resident population of 86,205 and a daytime population of approximately 200,000 with 12 fire stations and 17 fire companies. The department employees 258 uniformed personnel and responded to 16,143 incidents in 2013. The following daily minimum staffing is utilized:

- 1 Division Chief
- 3 Battalion Chiefs
- 2 Safety and Training Officers
- 8 Engine Companies plus 1 Day-time Engine Company
    - 6 Engines staffed with 4 personnel
    - 2 Engines staffed with 3 personnel
- 3 Ladder Companies
    - Staffed with 3 personnel
- 2 Quint Companies
    - Staffed with 4 personnel
- 1 Rescue Company
    - Staffed with 4 personnel
- 1 Squad Company
    - Staffed with 4 personnel
- 1 Tanker Company
    - Staffed with 2 personnel

MOTIVATION

The trajectory of the Asheville Fire Department was dramatically changed on July 28, 2011 when the department lost Captain Jeffrey S. Bowen of Rescue Company 3 during a firefight in a high-rise medical office building. Captain Bowen was operating with his company on the fire floor when he and other members of his company became disoriented while attempting to exit the structure. Captain Bowen and one of his firefighters both ran out of air on the fire floor in heavy smoke conditions. He was removed from the fire floor into a stairway by his firefighter where they were both later located by another group of firefighters and removed from the structure. Captain Bowen was later pronounced dead at the hospital. His firefighter made a complete recovery.

At the time of that fire AFD had a rapid intervention SOG, but it did not specify who was responsible for that role *(Appendix A)*. Further, there were no training requirements contained in the guideline. There were three "RIT Bags" in the inventory, two of those three were assigned to Battalion Chief vehicles, and the third was on Rescue 3. Thermal imaging cameras were scarcely distributed throughout the city. The performance of the AFD RIT guideline employed on July 28, 2011 demonstrated the need for a complete overhaul of our rapid intervention system.

That incident changed the way the department operates in several meaningful ways. During the internal post-incident analysis (PIA) of the fire at 445 Biltmore Avenue, 17 focus groups were created to assess the department's current status and make recommendations for the future in each of their respective areas. Three of the 17 focus groups (Rapid Intervention, Mayday, and Air Management) made recommendations which set the impetus for this testing to

be conducted. Captain Bowen had tremendous influence on the Asheville Fire Department during his 13 years of service and his sacrifice continues to improve AFD and the fire service for the future.

AFD RIT GUIDELINES

Currently, Asheville Fire Department staffs 3 dedicated Rapid Intervention Companies. This staffing and deployment model is a direct result of the Rapid Intervention Post Incident Analysis from 445 Biltmore Avenue *(Appendix B)*. In reviewing RIT at the time of that fire the PIA Committee determined that:

> Until recently, the assignment of RIT has been untimely and understaffed with untrained and inadequately equipped personnel. A stop gap measure was put in place that auto assigned the third due engine to RIT. This is an improvement from past practices however it still charges untrained, understaffed, and underequipped companies with RIT responsibilities.

As a fix action to the identified RIT deficiencies the RIT PIA Committee recommended that:

> The Asheville Fire Department will be best served by three designated RIT trucks that are highly trained, well-staffed, and properly equipped. The practice of leaving RIT responsibilities unknown has created a culture of avoidance and complacency. It is of the mind that a responsibility given to everyone is owned by no one. This has been true of the RIT practices of our departmental past. Through creating designated RIT companies we will enhance a culture of ownership and pride in the Asheville Fire Department.

Their recommendation reached full implementation in May 2014 when 3 engine companies (1 in each battalion) were properly staffed (4 personnel), equipped, and trained in accordance with these recommendations and the Rapid Intervention Team Standard Operating Guideline was approved *(Appendix C).*

TRAINING

All Asheville firefighters are required to complete the North Carolina Rapid Intervention Team Certification (NFPA 1407), but AFD considers this certification to be operations level training. To gain/retain assignment on a RIT company, the firefighter must also complete technician level RIT training, NC Thermal Imaging School, and NC Technical Rescuer certifications.

AFD recognizes North Carolina Breathing Equipment and Firefighter Survival School (NCBES) and the AFD RIT Company Academy as technician level RIT training. NCBES is recognized as one of the paramount rapid intervention and firefighter survival schools in the nation. Hosted at Gaston College in Dallas, North Carolina the school trains 120-180 firefighters per year utilizing outstanding facilities, world-class instructors, and a high stress / high tempo environment that is also conducive to effective learning.

The AFD RIT Company Academy was directly modeled off of the North Carolina Breathing Equipment and Firefighter Survival School utilizing the same curriculum, instructors, and facilities as the State sanctioned school.

CURRENT DEPLOYMENT

On all reported structure fires, one RIT company (technician level) is automatically deployed. Upon confirmation of a working fire, to further bolster RIT response, Asheville Fire Department also dispatches 2 additional engines and 1 additional ladder to serve as a RIT group (operations level). This testing has confirmed that the complete RIT group (4 company) deployment is required to successfully mitigate a complex RIT deployment.

THE SCENARIO

DEVELOPMENT

During the planning process, the analysis staff set out to design a scenario that met several core requirements. The first requirement was live fire training. Live fire is essential to a realistic training environment. Understanding that RIT deployments are both physically and psychologically stressful it is important to build as much stress into the scenario as possible. For the purposes of this test external stress was applied through the use of heat and smoke.

The second requirement was a team oriented scenario. It was decided that the scenario would be modeled utilizing elements of the "Pittsburgh Drill" due to its nature as a drill that requires a high degree of teamwork for successful completion. The analysis staff wanted to ensure that not only individual skills were tested but also team dynamics.

The third requirement was for the scenario to be labor intensive. This requirement was put in place for two reasons. First, it is important to require hard work for completion to add further stress (internal and external) to our firefighters so we can better replicate the stress encountered during an actual deployment. The second reason for a labor intensive scenario was to provide a sufficient distribution of labor to thoroughly test AFD's multi-company "RIT Group" deployment model. To appropriately meet all the aforementioned requirements the following scenario was developed.

Figure 1: Wall Breach Prop

SCENARIO

A live fire training scenario was conducted in the 3200 square foot Class A Burn Building at the Buncombe County Emergency Services Training Center *(Appendix D)*. The scenario presented a sudden building collapse during initial fire attack in which a single member of an attack team is missing post-collapse. A RIT Company was staged outside the structure standing by for activation. The balance of the RIT Group was placed in Level 2 staging approximately 500 yards from the scene. A Mayday was issued stating the member is trapped by collapse and low on air. The RIT was deployed into the Delta side of Division 1, following the attack line in to locate the compromised firefighter who was on Division 2. This was a "one way in, one way out" scenario, meaning the RIT had to remove the compromised firefighter via the same route they entered. During their deployment the RIT(s) encountered the following obstacles:

- Division 1
  - Hose loop
  - 16" on center wall breach prop *(Figure 1)*
  - Ascend stairs
- Division 2
  - A-Frame "up and over" prop *(Figure 2)*
  - Hose loop

Figure 2: A-Frame prop

- Wired entanglement box *(Figure 3)*
- Compromised firefighter (Vibralert and PASS active) was beneath over 500 cumulative pounds of debris which could be moved by hand *(Figures 4 & 5)*

CONTROLS

To ensure consistency of the scenario, and thereby continuity of data collection several controls were put in place. Among the items controlled were fuel package, burn time, control staff, air management, and prop placement. During the in-brief for all participating crews the following 10 "Rules of Engagement" were covered in detail:

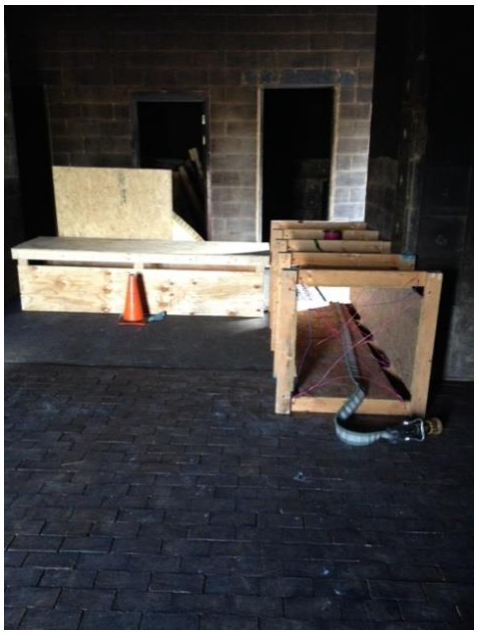


Figure 3: Entanglement box

1. One way in – One way out
2. Follow hoseline in – Follow search rope out
3. No more than 2 RITs in the building at any given time.

4. Complete every obstacle.
5. Operate in accordance to Air Management SOG.
6. RIT Company stages on Alpha side
7. RIT Group stages at classroom building (approximately 500 yards away)
8. No "bumping" with the RIT pack.
9. Don't put out the fire.*
10. Don't ventilate the building.*

Figure 4: Compromised firefighter under debris

These Rules of Engagement were all put in place to ensure as close to an identical scenario for each group as possible. **We recognize and support that putting the fire out and ventilating the structure are two of the primary interventions needed to improve conditions and in turn, aid in the removal of the compromised firefighter. The analysis staff desired to test our personnel in the worst conditions feasible for the aforementioned reasons.*

Figure 5: Complete debris pile on top of compromised firefighter

For the live fire element of the scenario there was one fire burning on Division 2, Room 201, 18 feet from the location of the compromised firefighter. There was also a Class A smoke barrel maintained on Division 1, Room 106 *(Appendix D)*. The fires were strictly managed to ensure high heat stress on the RIT firefighters, consistency through all evolutions, survivability of the atmosphere, and "well-being" of the burn building. Temperatures were monitored through the building's integrated temperature sensors. The temperatures reported and recorded were taken

from the middle heat sensor (approximately 6 feet from the floor). Every five minutes the Live Burn Officer or Assistant Live Burn Officer would check the sensor monitor in the control room and transmit the temperature on the Staff Operations Channel. This transmission of temperature was recorded for documentation purposes and also served as the cue for the other Live Burn Officer to add another pallet to the fire.

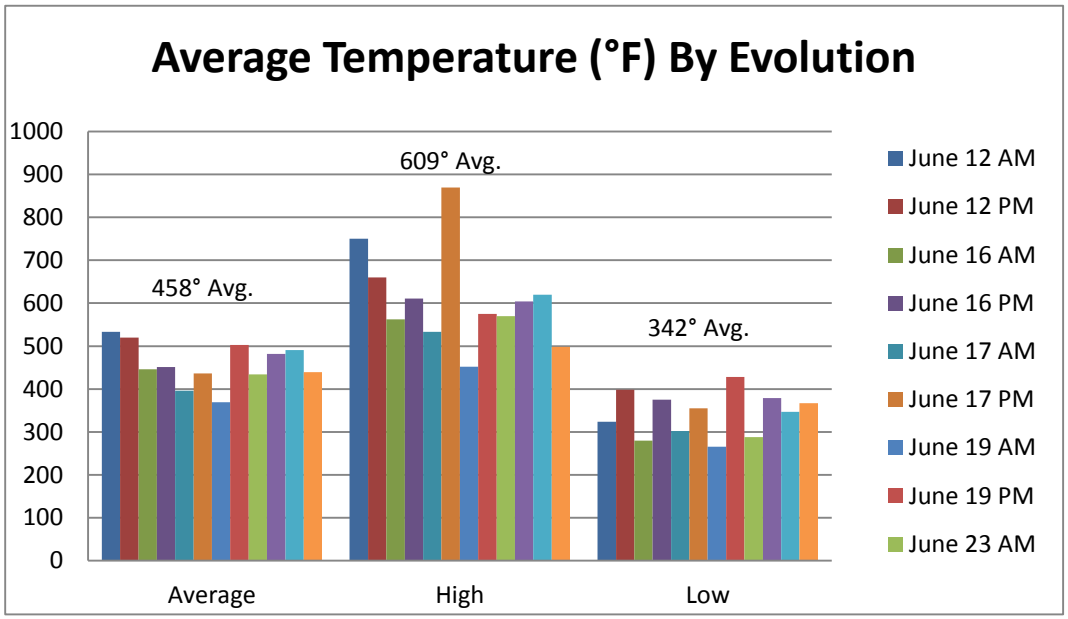


Table 1

Consistency of the fire loads were controlled through regular fuel packages. The initial fire (Room 201) consisted of 4 pallets and ½ bale of straw in a metal three-walled burn pan. After initial ignition, one pallet was added to the burn pan every five minutes. After twenty minutes of burning, the scenario was started by the transmission of a mayday by an analysis controller on the Participant's Operations Channel. The fuel packages burned resulted in consistent temperature ranges for each operation. The aggregate temperature for all operations was 458° Fahrenheit with an average high of 609° and an average low of 342° *(Table 1)*.

To further ensure consistency across the board there were other elements controlled. The key elements of the mayday's LUNAR (Location, Unit Number, Name, Assignment/Air, Resources Required) report were identical during each evolution. The compromised firefighter

advised he was on Division 2, pinned by collapse, with one green light in his heads-up display. The compromised firefighter's PASS was activated either automatically or manually upon urging of the incident commander. Furthermore, consistency in prop placement was maintained through marking the location of each prop, to include the burn pan and the victim, using tape on the floor of the burn building.

METHODOLOGY

This analysis was conducted with as much consistency as possible. The goals of the analysis were: to provide AFD companies with a great training scenario, to determine the credibility of AFD's RIT deployment strategy, and to collect useful data to drive future operations and decision-making. To pursue mission completion through meeting the aforementioned goals, the analysis staff filled three operational billets for each evolution.

Controllers: The backbone of the analysis staff, controllers were the personnel inside the structure monitoring and transmitting progress and data points. They were responsible for setup and breakdown of the scenario as needed. After setup they would mark participant SCBAs and record baseline air pressures. Once the scenario started, the controllers were assigned to a participating company, two controllers per RIT. They shadowed the RITs throughout the scenario transmitting progress reports and individual RIT member air status reports (PSI) whenever a RIT completed a critical task benchmark. Controllers were responsible for transmitting any non-training emergencies encountered by the crew and intervening in interest of participant survivability if required. After the scenario was completed the Controllers were responsible for debriefing all participants to ensure that any valuable learning points were not squandered.

Recorders: Recorders were responsible for receiving and documenting all data point transmissions from the Controllers and Live Burn Officers. All pertinent data received was recorded on spreadsheets for later synthesis. Recorders also served as the official time keepers. There were always two recorders employed, recording all data on identical spreadsheets to ensure that no data points were missed.

Live Burn Officers: Two live burn officer positions were staffed for every evolution. The Live Burn Officers were responsible for maintaining a consistent and survivable environment by adhering to the burn plan and fuel package. Live Burn Officers were also responsible for transmitting temperature data from the control room at five minute intervals.

To provide as much data as possible, each objective was measured from different "angles". Each critical task was measured from the time of the mayday, the deployment of the RIT, the entry of the RIT, and the completion of the previous critical task. Air pressures were also measured at each of these benchmarks.

SAMPLE

To ensure that credible and useful data was produced, a large sample size was required. The testing was carried out over 12 evolutions consisting of 1 RIT Company, 3 RIT Group Companies, 1 Battalion Chief, and 1 Safety and Training Officer each. All 16 AFD companies across all three shifts participated. This resulted in an overall participation of 48 fire companies, 12 Battalion Chiefs, and 12 Safety and Training Officers. There were 196 active participants, training for a combined 588 hours, creating over 3100 data points.

THE FINDINGS

CRITICAL TASK-: LOCATE

The first critical task measured was that of locating the compromised firefighter. The Locate critical task is made up of the following elements:

- RIT connects their search rope to a hard point on the exterior near their point of entry.
- RIT enters the structure performing a targeted search based on intelligence gathered from all available sources.
- RIT Leader (RITL) advises command that the compromised firefighter has been located and his precise location.
- RIT tightly secures the search rope to a hard point near the location of the compromised firefighter.

TIMES

Mayday : The clock was started when the Incident Commander acknowledged the mayday message.

Deployment : The point at which the IC ordered the RIT to enter.

Entry : The point at which the RIT entered the structure.

The time required to locate a compromised firefighter varies depending on several factors. LUNAR information, travel distance, obstacles, and training all contribute to the time required to locate. An accurate LUNAR report is one of the most important things the compromised firefighter can offer to increase his survivability. The more specific the location given, the more targeted the RIT can be in their search. For the purposes of this analysis the location report of the LUNAR advised only Division 2. Travel distance, building topography, and obstacles encountered also have an obvious effect on RIT location times. Finally, the

training of RITs factors into location time through search efficiency. A RIT that has trained together regularly, specifically, searched together regularly can dramatically effect location times through efficiency.

Table 2: Location Times for Each Evolution

Throughout the analysis, the average location time from the time of the mayday was 08:25 (minutes-:-seconds), from RIT deployment was 07:55, from RIT entry to location was 06:43 *(Tables 2 and 3)*.

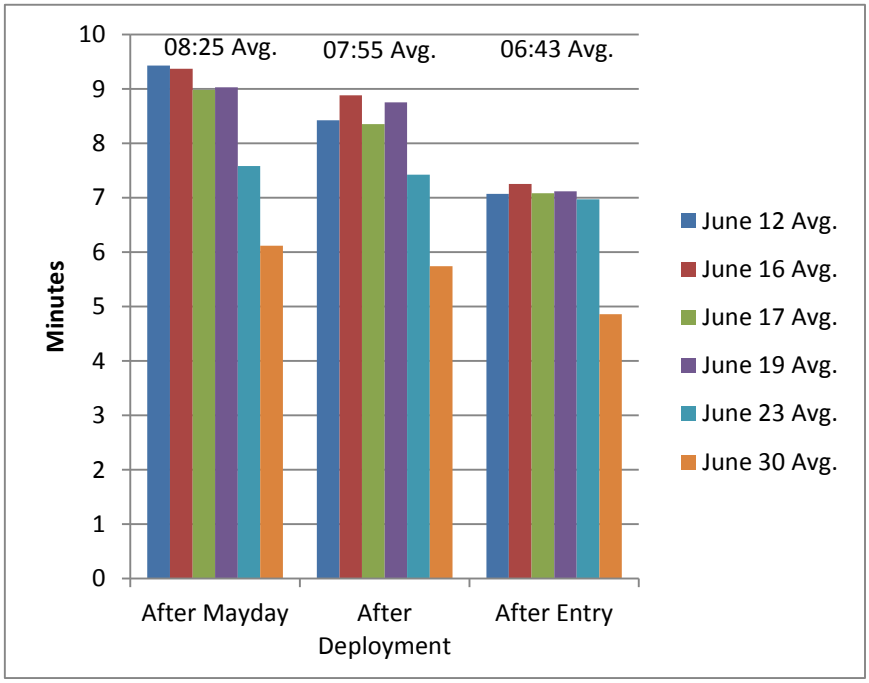


Table 3: Daily and Overall Average Locate Times

Disparities in locate time can be attributed to several factors. The first identifiable factor in slower locate times is RIT response time. RIT response time for the initial RIT Company is the time it takes from the mayday until they enter the structure. Looking at the data contained in *Table 4* the correlation between response time and locate time becomes apparent.

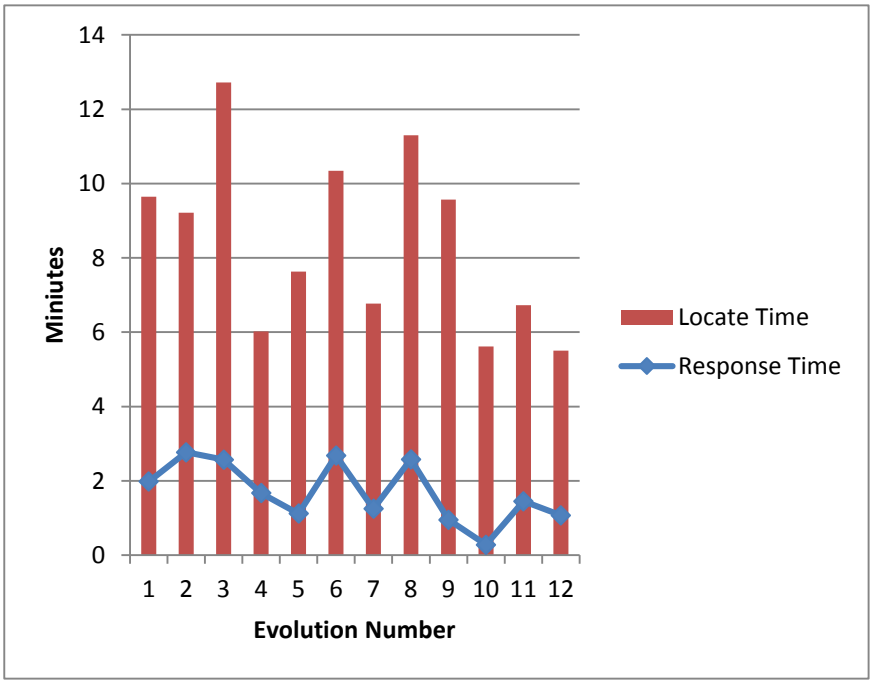


Table 4: Response Time vs. Locate Time

There are several factors, both mental and physical, which can aid in the reduction of response times. A strong RIT should possess a combat mindset. That is to say, they should be mentally prepared for a RIT activation *(Appendix E)*. The steps they take once the mayday drops should be steps that are pre-planned and well rehearsed. The second thing a RIT can do to reduce response (and thereby locate) times is to have all of their equipment easily accessible and well organized for rapid deployment. Finally, to reduce locate time through response time the RIT firefighter must have his personal protective equipment (PPE) in a state of readiness. Full PPE, with the exception of SCBA mask, should be donned at all times during standby.

The next measurable factor in increasing locate times is that of training. Companies in which 100% of members had graduated technician level RIT training were

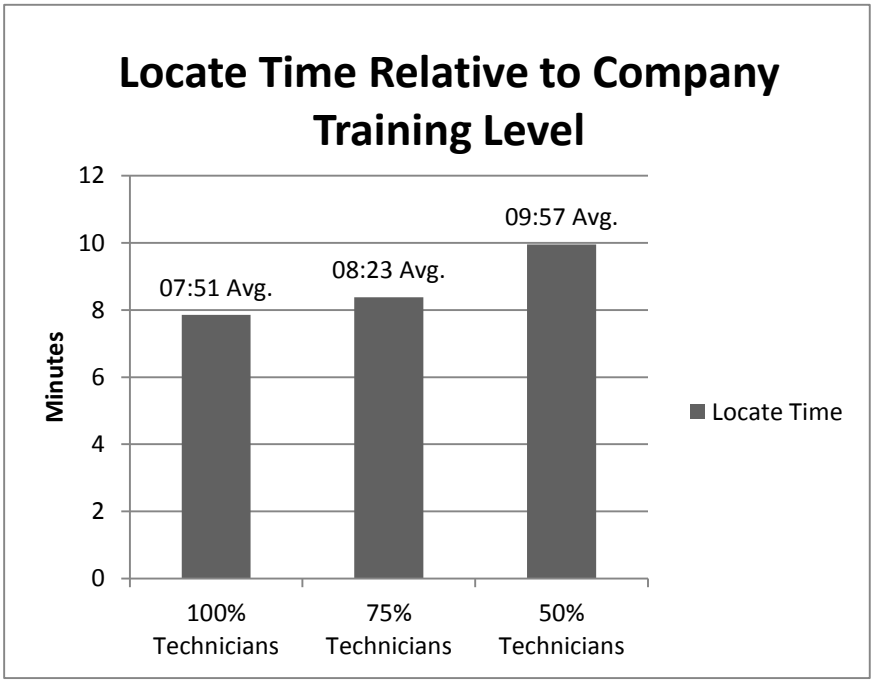


Table 5

more efficient than companies which only staffed 75% graduates. Congruently, companies staffing 50% technician level training graduates were even less effective *(Table 5)*. As a result of this analysis, it is determined that it takes an average of 08:25 to locate a compromised firefighter.

PERSONNEL

Throughout every evolution, the initial RIT (RIT Company) was able to locate the compromised firefighter after negotiating building topography and obstacles. As a result of the analysis, it is determined that it takes one RIT, consisting of 4 firefighters, to locate a compromised firefighter.

AIR CONSUMPTION

Beyond time and personnel requirements, the third element analyzed was that of air consumption. The goal of monitoring air consumption is two-fold. First, the analysis staff hoped to determine whether or not AFD's Air Consumption Policy was reconcilable with aggressive RIT operations. Second, the analysis staff hoped to determine baseline expectations for Asheville Fire Department air consumption. With those baselines numbers, it will be possible for decision makers to determine future SCBA needs for the Asheville Fire Department. Currently AFD utilizes several models of Scott Air-Paks, all are 4500 PSI, equipped with 30 minute cylinders, heads-up displays, integrated PASS, Emergency Breathing Support System (EBSS), and the Universal Air Connection (UAC).

The average entry air pressure of the RIT Companies across all evolutions was 4310 PSI. The average air pressure of the RIT Company upon locating the compromised firefighter was 2594 PSI. This means that in the process of searching for the compromised firefighter, up to the

point of locating him, RIT Companies consumed and average of 1716 PSI. This results in an Air Consumption Rate of 255.47 PSI per minute.

CRITICAL TASK-: EXTRICATE

The second critical task measured was that of extricating the compromised firefighter. The Extricate critical task is made up of the following elements:

- RITL advised command that the firefighter is trapped and requests further resources as required.
- RIT extricates the compromised firefighter from any entanglement or entrapment which may have them trapped.
- RITL notifies command that the firefighter is free.

For this analysis the compromised firefighter was trapped beneath various wooden debris~~,~~ with a combined weight of over 500 pounds.

TIMES

Locate : The point at which the RIT located the compromised firefighter.

There are several factors which will determine the time required to extricate a compromised firefighter. The obvious determining factor is the complexity of the entrapment and/or entanglement. During this analysis the nature of the entrapment required several members of the RIT to work together to move multiple heavy wooden objects from the compromised firefighter. The heaviest item weighed approximately 265 pounds. These objects were placed to simulate construction debris which had landed on the firefighter due to the partial structural collapse.

The RIT Companies had heavy lifting and moving equipment at their disposal such as high pressure lifting bags, cribbing, and prying tools, but every company decided to extricate the trapped firefighter by hand. Obviously, the complexity of the entrapment will determine the required equipment, manpower, and rescue complexity which will directly affect extrication times.

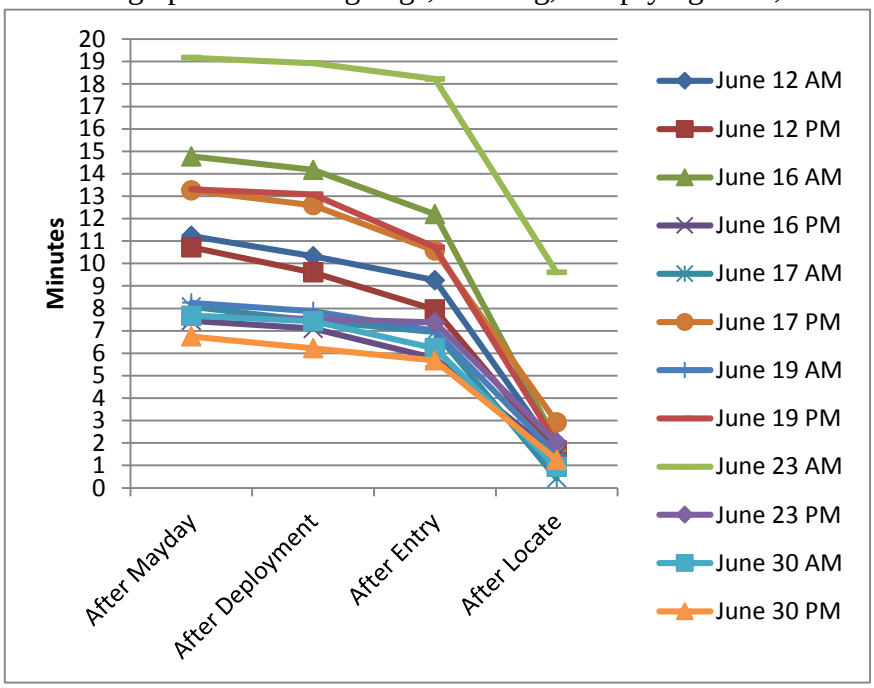


Table 6: Extrication Time for Each Evolution

Throughout the analysis, the average extrication time from the time of the mayday was 10:41, from RIT deployment was 10:12, from RIT entry 08:59, and from RIT locating was 02:16 *(Tables 6 and 7)*.

As we found with Locate times, technician level training is also a factor in extrication times.

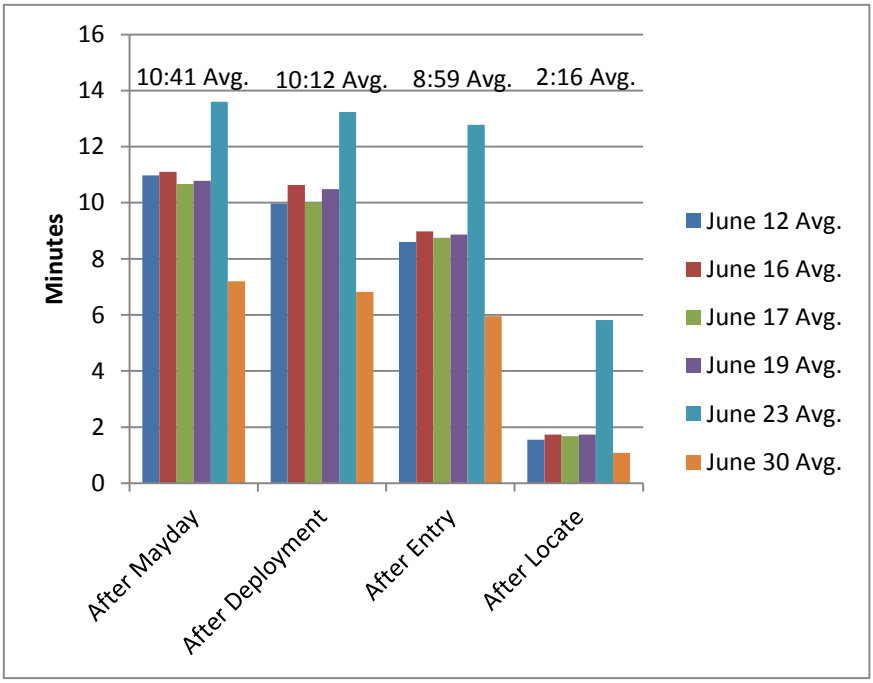


Table 7: Daily and Overall Average Extrication Times

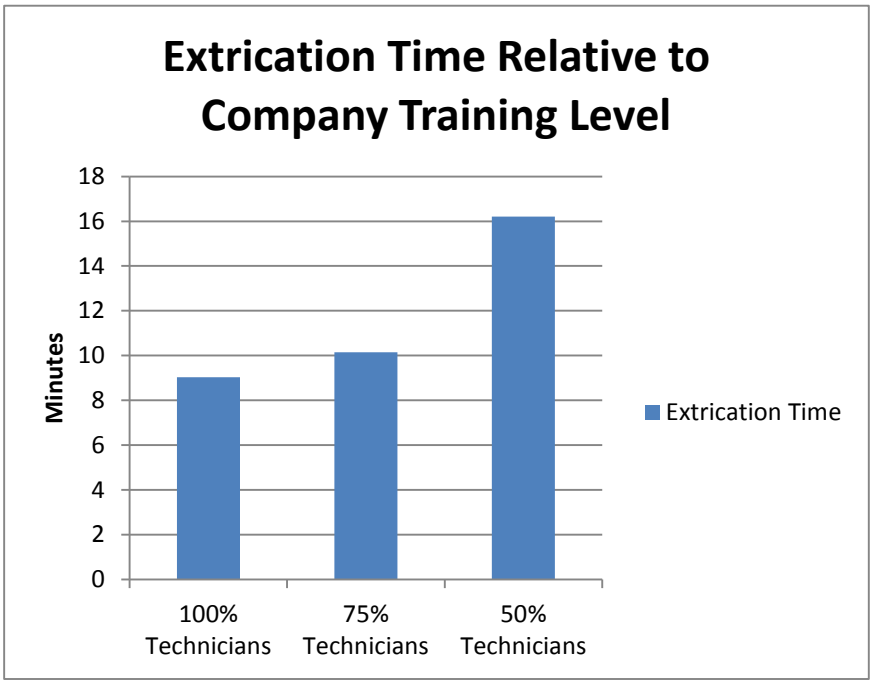


Table 8

Table 8 further demonstrates not only the need for technician level training for rapid intervention, but it also shows that a RIT Company that is not properly staffed on any given day a dramatic reduction in performance can be expected.

PERSONNEL

In every evolution except one, extrication was accomplished by one RIT Company made up of 4 firefighters. For the one exception, the compromised firefighter was partially, but not completely extricated. In that instance, two four person RITs were required for complete extrication. *Table 9* shows the relationship between RITs required to extricate and how long extrication takes.

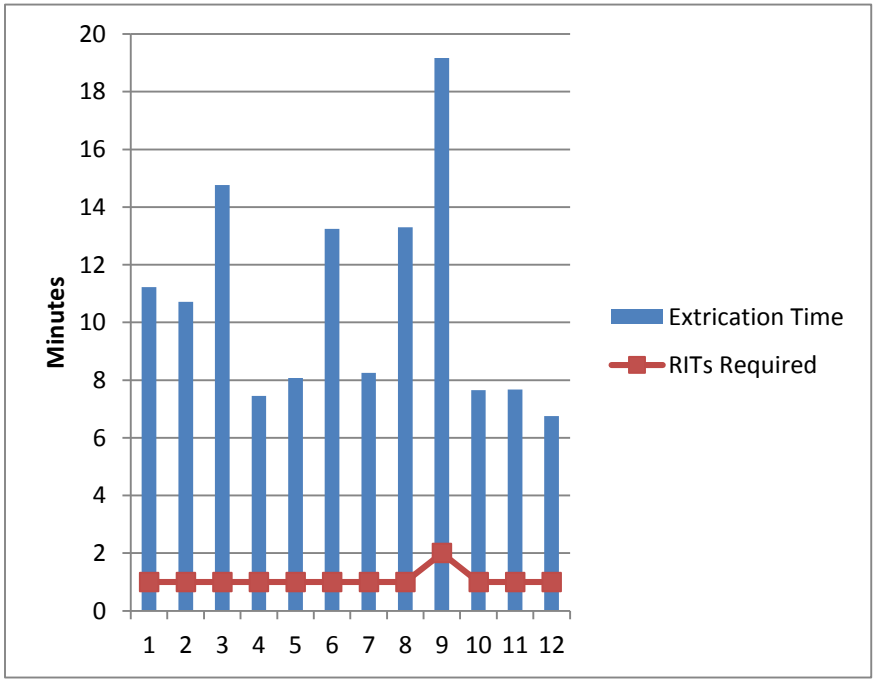


Table 9: Relationship Between Extrication Time and RITs Required to Complete

As a result of the analysis, it is determined that, on average, it takes one RIT Company consisting of 4 firefighters, to extricate a compromised firefighter.

AIR CONSUMPTION

The average air pressure of the RIT Company upon extricating the compromised firefighter was 1956 PSI. This means that in the process of searching for the compromised firefighter, up to the point he was extricated, RIT Companies consumed an average of 2354 PSI. This results in a cumulative Air Consumption Rate of 262.05 PSI per minute. The average air consumption while performing the task of extrication (from the time of location until extrication complete) was 443 PSI. This resulted in an Air Consumption Rate of 214.19 PSI per minute while performing extrication.

CRITICAL TASK-: AIR

The third critical task measured during the analysis was providing supplemental breathing air to the compromised firefighter. The Air critical task is made up of the following elements:

- The assigned "Air Firefighter" of the RIT triages the compromised firefighter SCBA system to determine the proper air connection (high pressure / low pressure).
- The assigned "Air Firefighter" connects the RIT Pack to the connection of his choosing.
- If a low pressure connection is utilized the RIT pack will then be connected to the compromised firefighter's waist strap.
- RITL notifies command that a positive air supply has been established.

TIMES

Extricate: The point at which the compromised firefighter is freed from the entrapment / entanglement.

The results of the "Air Firefighter's" SCBA triage is the primary determining factor in how much time will be required to provide the compromised firefighter supplemental breathing air. For this analysis the compromised firefighter's SCBA system was completely intact and functional with all connections available. Assuming there is not structural failure to the SCBA such as mask, hose, regulator, or cylinder failure; providing air through the EBSS or the UAC is relatively quick. The EBSS connection (low pressure) is instantaneous, however permanent. The UAC connection (high pressure) is complete in less than 60 seconds. Whereas, in cases of failure (mask, hose, regulator, cylinder, etc.) more complex operations such as regulator or mask swaps may be required. Those methods are more complex, more time consuming, and more hazardous to the already compromised firefighter.

The second variable that determines the time required to supply supplemental air is that of training *(Table 12)*. Training issues manifest themselves in several different forms for this critical task. First, familiarization with the RIT Pack is integral to success. It is recommended to have an assigned "Air Firefighter"; this assignment breeds a sense of ownership, which is valuable for mission accomplishment. The Air Firefighter must be intimately familiar with his RIT Pack to the point that fire gloves, low visibility, and high stress do not serve as encumbrances to his performance. The Air Firefighter must also be familiar with the RIT connections available to him in his department's SCBA inventory. On a NFPA 1981 (2002 ed.) Scott SCBA with all the "options" there are five RIT connections (UAC, EBSS, regulator hose,

regulator, mask). Although every department and/or every SCBA may not be equipped with all five connections it is imperative that the Air Firefighter know what connections are available to him. If he cannot know in advance due to lack of standardization, checking for available connections can be accomplished during the triage to reduce time. The final way training manifests itself in the performance, and therefore time, required to provide air is that of repetitions. 200 repetitions of a given task are required to develop automaticity (paraphrased from Christopher Brennan's "*How to Avoid training Scars").* The reps can be performed anywhere at any time; but without high repetitions an Air Firefighter cannot expect to reduce supplementation times.

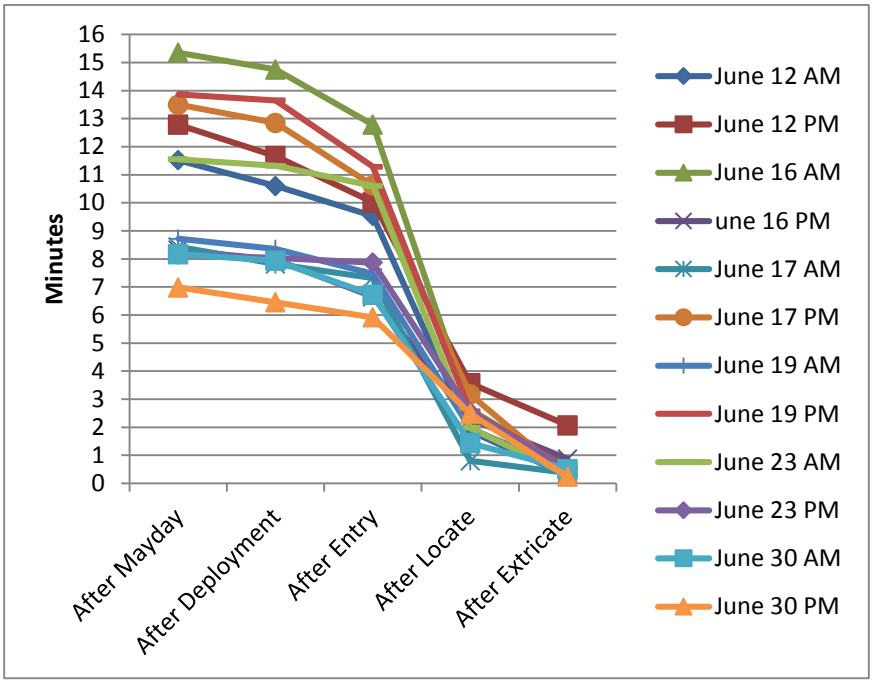


Table 10: Air Time for Each Evolution

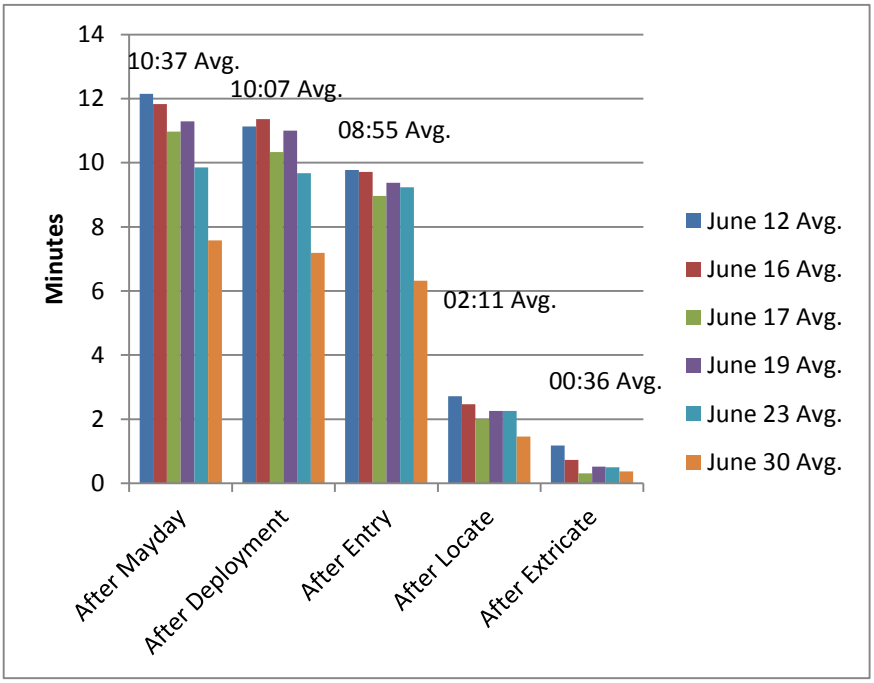


Table 11: Daily and Overall Air Averages

Throughout the analysis, the average Air time from the time of the mayday was 10:37, from RIT deployment was 10:07, from RIT entry 08:55, from RIT locating

was 02:11, and 00:36 after extrication. *(Tables 10 and 11).* One anomaly was recognized for this critical task. All of the average times for this critical task were shorter than the average times for the Extrication critical task. This anomaly was the result of every first-in RIT Company providing the supplemental air, however, one evolution required two companies to completely extricate the compromised firefighter, resulting in the time disparity.

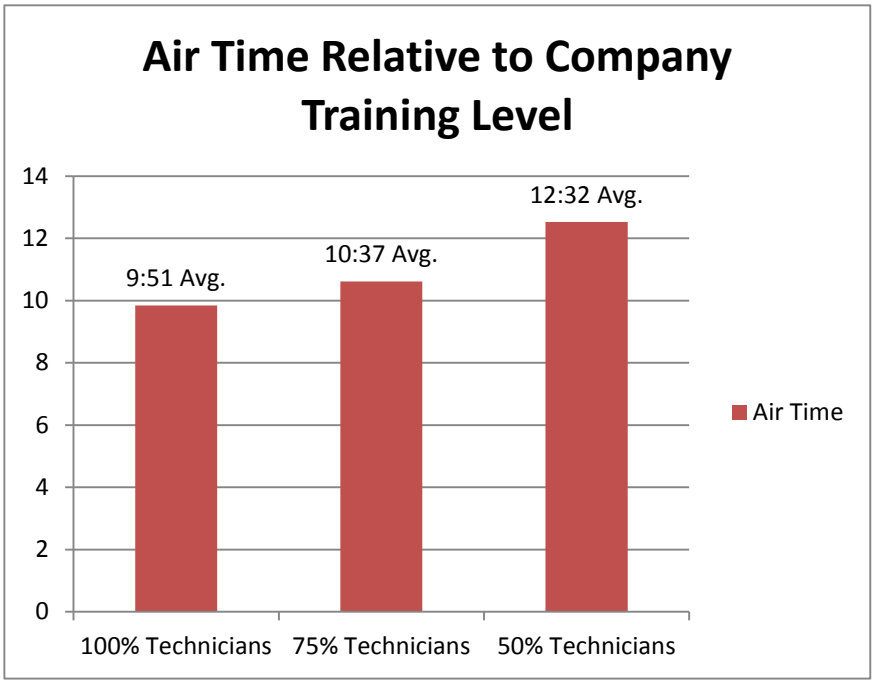


Table 12

PERSONNEL

Throughout every evolution, the RIT Company (initial RIT) was able to provide supplemental air to the compromised firefighter after he was located. As a result of the analysis, it is determined that it takes one RIT, consisting of 4 firefighters, to provide air to a compromised firefighter.

AIR CONSUMPTION

The average air pressure of the RIT Company upon providing supplemental air to the compromised firefighter was 2108 PSI. This means that in the process of searching for and extricating the compromised firefighter, up to the point he was provided supplemental breathing air, RIT Companies consumed an average of 2202 PSI. This results in a cumulative Air Consumption Rate of 246.94 PSI per minute. The average air consumption while performing the

task of air (from the time of extrication until air complete) was 247 PSI. This resulted in an Air Consumption Rate of 357.01 PSI per minute while performing air supply. This increase in ACR is likely attributable to the strenuous nature of extrication previously performed.

VIABILITY

Another factor measured by the analysis of the viability of the compromised firefighter. For the purposes of the analysis, viability was determined by the condition in which the compromised firefighter exited the structure. If the compromised firefighter was removed from the structure with a positive air supply maintained throughout the evolution, and all PPE intact, the firefighter was considered viable. Understanding viability as defined by the analysis, the primary factor in whether or not a compromised firefighter was viable when removed was the issue of continued air management.

There are several factors that make up continued air management which have a direct effect on compromised firefighter viability. The first item that must be managed by the RIT is the amount of air left in SCBA cylinders. When connected to the low pressure side (EBSS, regulator hose, regulator, mask) it is critical that the air pressure in the RIT Pack is regularly monitored. When the UAC (high pressure side) is utilized for the air supply of the compromised firefighter, it is necessary to regularly monitor the air level of the compromised firefighter. The second "air" factor related to compromised firefighter viability is that of equipment management. While removing a compromised firefighter it is important to regularly check the integrity of the firefighter's SCBA system. During the analysis, the primary cause for loss of air by the compromised firefighter was the firefighter's mask becoming dislodged resulting in a low

pressure leak. Regularly checking every element of the compromised firefighter's SCBA will significantly increase survivability.

The final air issue that directly affected firefighter viability was air management when leaving the compromised firefighter. Prior to leaving the compromised firefighter, it is imperative to hook the RIT Pack into the low pressure side of his SCBA. This connection, prior to leaving, will ensure that the compromised firefighter has as much breathing air as possible at his disposal. During this analysis several RITs "bumped" the compromised firefighter via the UAC prior to leaving, as the result of low pressure leaks, the compromised firefighter ran out of air prior to the arrival of the next RIT. It is imperative that the next arriving RIT's Air Firefighter perform a triage of the compromised firefighter's air system. First, to understand the air status of the firefighter; Second, to determine what connection is needed and which has been utilized by the previous RIT. A thorough pass down of information between RITs is also vital in ensuring viability as it applies to the air critical task.

CRITICAL TASK-: PACKAGE

The fourth critical task measured during the analysis was packaging the compromised firefighter. The Package critical task is made up of the following elements:

- The "Package Firefighter" of the RIT converts the compromised firefighter's SCBA into a drag harness by disconnecting the waist strap and reconnecting it between the compromised firefighter's legs.
- If a low pressure air connection is utilized, the RIT pack is then connected to the compromised firefighter's converted waist strap.

- RITL notifies Command that the compromised firefighter is packaged for extract.

TIMES

Air: The point in which supplemental air is provided to the compromised firefighter.

Packaging should not be a time consuming process. To package a compromised firefighter should only take a matter of seconds. It is imperative that packaging is a single person job. Multiple firefighters attempting to package the compromised firefighter is problematic, especially in low visibility situations. As with all other tasks, that firefighter should be assigned and well-practiced well before the incident. Packaging must happen either during or after the Air task is completed. The Air Firefighter always has the "right of way" to the compromised firefighter.

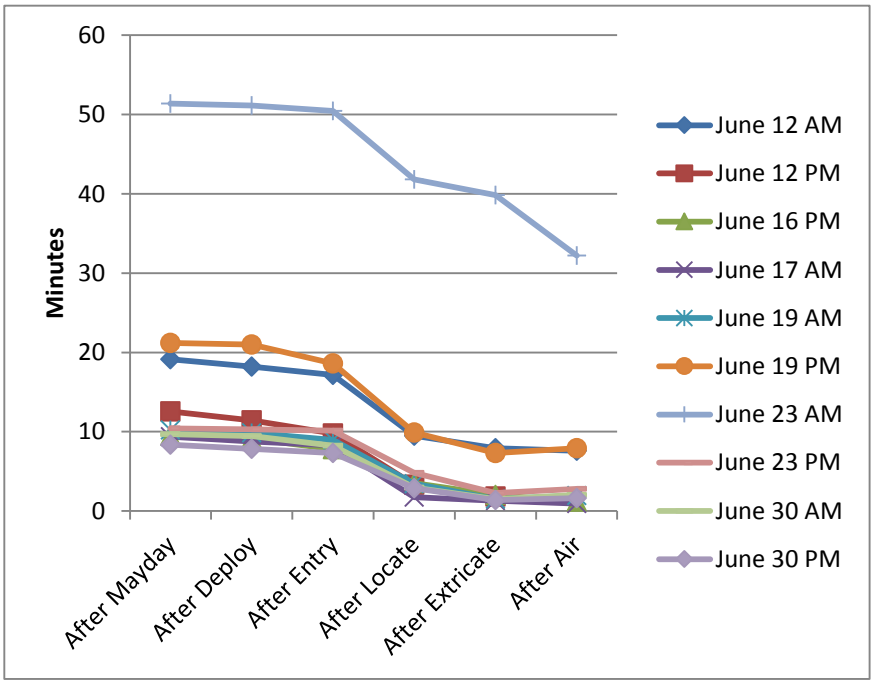


Table 13: Package Times for Each Evolution

With that understanding, if it is possible to package while the Air Firefighter is working that is an easy way to reduce time, however, air supply should under no circumstance be delayed to complete packaging first. Only 8% of the evolutions completed packaging prior to air.

The packaging times during this analysis varied greatly for several reasons. In some instances, the compromised firefighter was never packaged throughout the evolution, other times the initial RIT Company packaged the firefighter, and sometimes companies from the RIT Group completed packaging. During 58% of evolutions the compromised firefighter was packaged by the RIT Company. 25% of the evolutions saw the compromised firefighter packaged by a RIT Group Company. In 17% of the evolutions the compromised firefighter was never packaged.

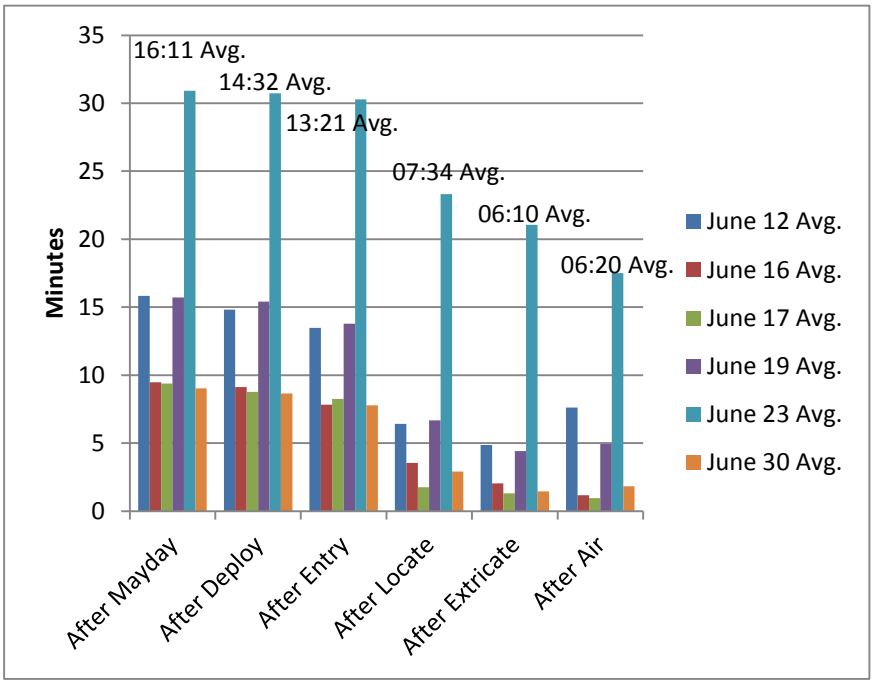


Table 14: Daily and Overall Average Package Times

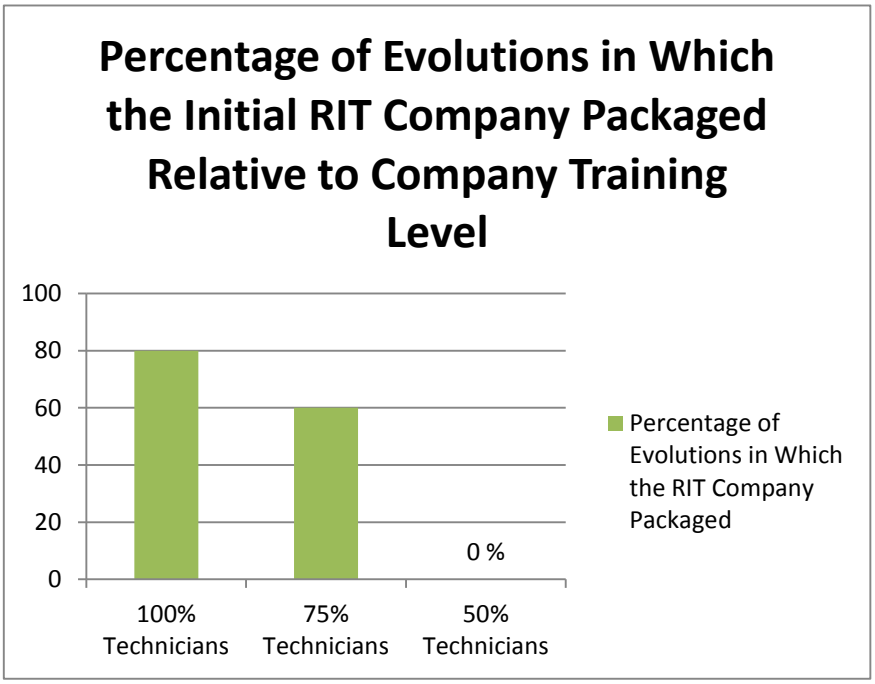


Table 15

Throughout the analysis, the average Package time from the time of the mayday was 16:11, from RIT deployment was 14:32, from RIT entry 13:21, from RIT locating was 07:34, 06:10 after extrication, and 06:20 after air. *(Tables 13 and 14).*

The primary way to reduce packaging times is to ensure it is a priority for the initial RIT Company. The high average packaging times are further representative of training issues. Every RIT Company located, extricated (at least partially), and provided air to the compromised firefighter; however, every RIT Company did not package the compromised firefighter. *Table 15* again demonstrates, that advanced training, and proper staffing of RIT Companies is paramount for efficient mission accomplishment.

In 30% of evolutions in which the compromised firefighter was packaged, companies used an alternate packaging method such as a "Mega Mover" or a webbing sling. The Webbing sling was successfully utilized as packaging once (8% success rate). The "Mega Mover" did not work in any fashion both times it was attempted (0% success rate). To that end, packaging as defined above, (SCBA waist strap conversion) is the only technique which provided consistent success (greater than 90%). For packaging purposes, success is defined as the compromised firefighter being removed from the structure with the packaging system and all PPE still intact.

PERSONNEL

The critical task of packaging, as far as distribution of labor is concerned, is a single company task. However, in 42% of the analyzed evolutions, packaging was not accomplished by the initial RIT Company. This creates a higher number of average personnel required to package. This issue can be completely corrected through training. In 58% of evolutions the initial RIT Company (4 personnel) accomplished packaging. Therefore through analysis, it can be stated that on average, it takes 6 personnel (1.5 RITs) to accomplish packaging.

AIR CONSUMPTION

The average air pressure of the companies upon packaging the compromised firefighter was 2081 PSI. Up to the point of packaging the compromised firefighter, RITs consumed an average of 2229 PSI. Accurate and meaningful air consumption rates are impossible to calculate due to packaging being completed by multiple companies with various response and travel times.

VIABILITY

The viability of the compromised firefighter is directly affected by packaging. On the surface, one would not assume packaging to be a life-saving action but our analysis proves otherwise. The act of converting a SCBA, in and of itself, is not a life and death task, however it is indicative of a well prepared RIT. When compromised firefighter is properly packaged (SCBA conversion) the likelihood of PPE removal or air supply loss is greatly reduced. Packaging also makes transporting the downed firefighter easier and more efficient, especially when you have to move up, down, over, and under obstacles and building topography *(Table 16)*. The SCBA, when properly converted, acts as an integrated drag harness for up to two firefighters and does not increase the compromised firefighter's profile. In

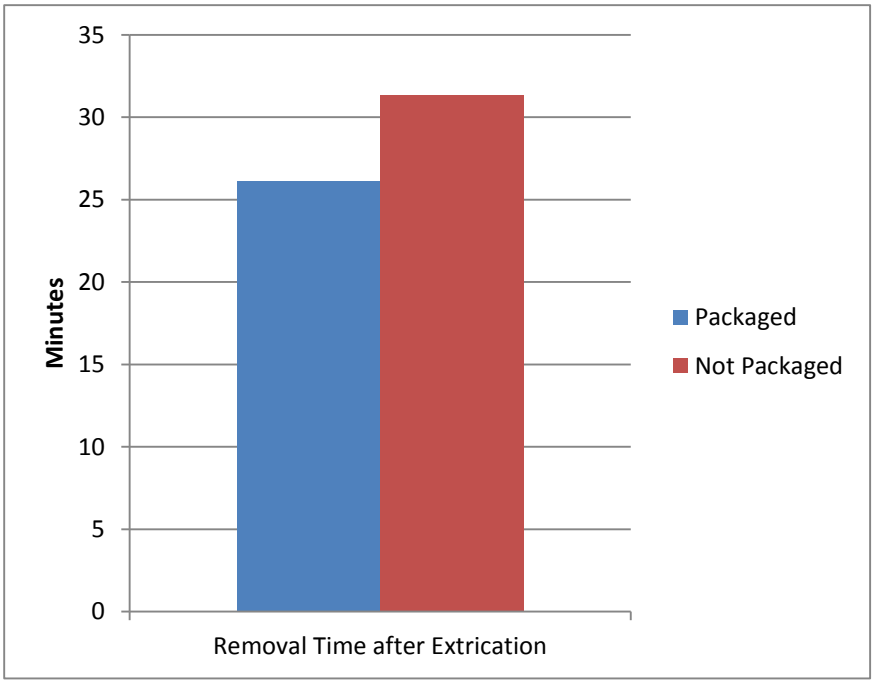


Table 16: Average Removal Time Relative to Packaging

each evolution where the compromised firefighter was not packaged (17%) the compromised firefighter was not viable when removed. There were two evolutions in which packaging was completed but the firefighter was not viable. In the first instance the SCBA conversion was disconnected by a subsequent company prior to removal. On the second occurrence, packaging didn't take place until the 51st minute, and the compromised firefighter had been allowed to run out of air well prior to packaging.

CRITICAL TASK-: REMOVAL

The final critical task measured during the analysis was removal of the compromised firefighter. The Removal critical task is made up of the following elements:

- Compromised firefighter is removed from the IDLH via the nearest feasible point of egress.
- RITL notifies Command that the downed firefighter has been removed, and the advised the location of removal.

TIMES

Removal is one of the most labor intensive and time consuming critical tasks of rapid intervention operations. Removal times, like locate times, are directly affected by travel distance, obstacles, and building topography. Other factors which can affect removal times are training, staffing, and physical fitness.

Removal times can also be reduced by utilizing the nearest egress. This was not an option during the analysis due to the staff's desire to create a scenario that was both labor and manpower intensive. Determining the nearest feasible point of egress can be done by the RIT inside, as well as personnel outside the structure. As the RITL communicates locations and progress, Command / exterior crews may be able to direct, secure, or create a nearer point of egress.

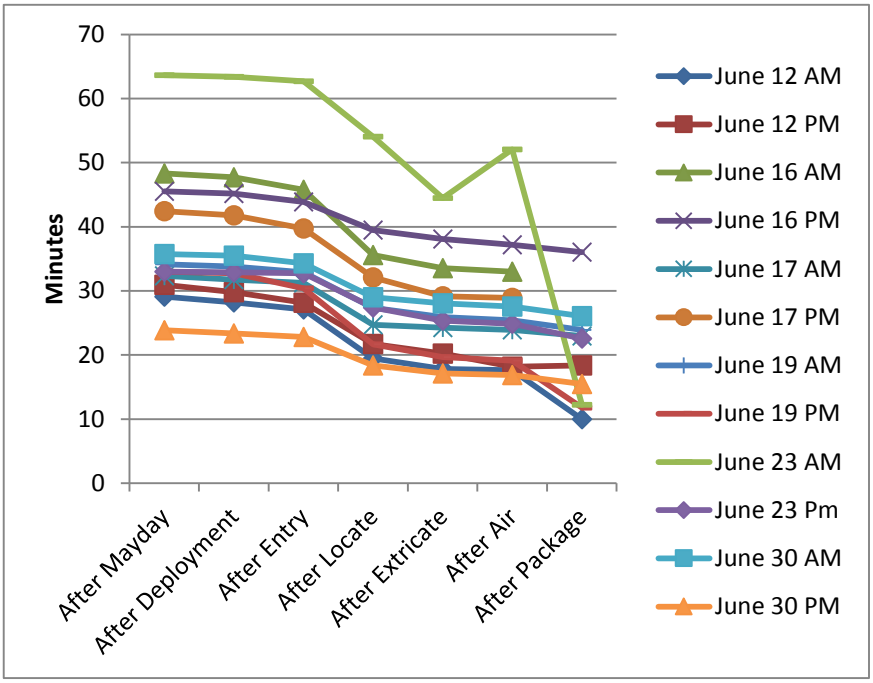


Table 17: Removal Times for Each Evolution

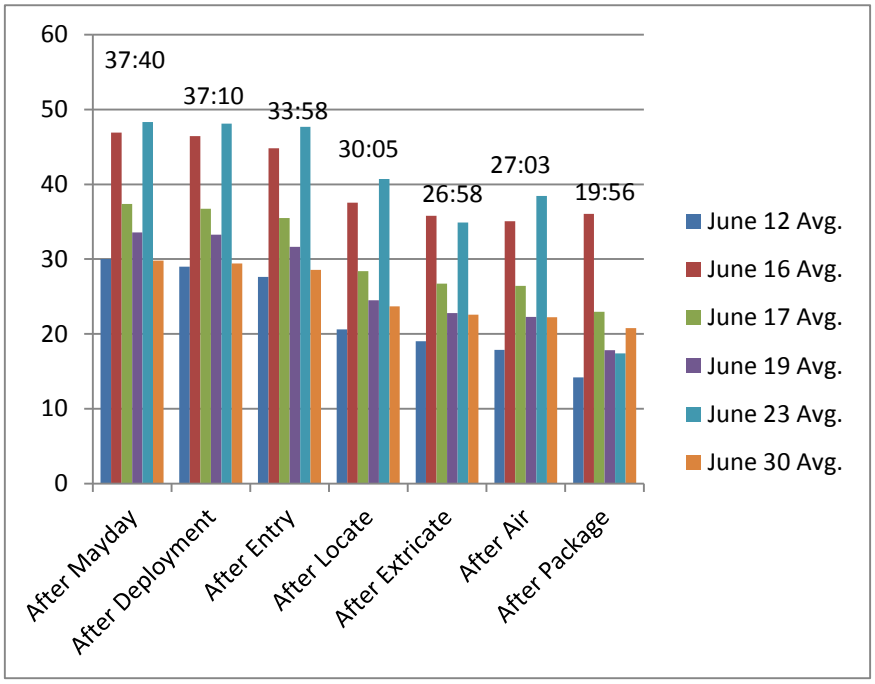


Table 18: Daily and Overall Removal Averages

Throughout the analysis, the average Removal time from the time of the mayday was 37:40, from RIT deployment was 37:10, from RIT entry 35:58, from RIT locating was 30:05, 26:58 after extrication, 27:03 after air, and 19:56 after packaging *(Tables 17 and 18)*.

The importance of technician level training and proper staffing of RIT Companies is again demonstrated in removal times. As *Table 19* shows, a RIT Company made up of at least 75% technicians performs remarkably better than a company made up of 50% or less technicians. The entire RIT Group (4 companies) have a hand in the removal time. However, the statistics gathered during this analysis clearly and repeatedly demonstrate that the famous Andy Fredericks quote could easily be paraphrased to apply to rapid intervention. As the first RIT goes, so goes the operation.

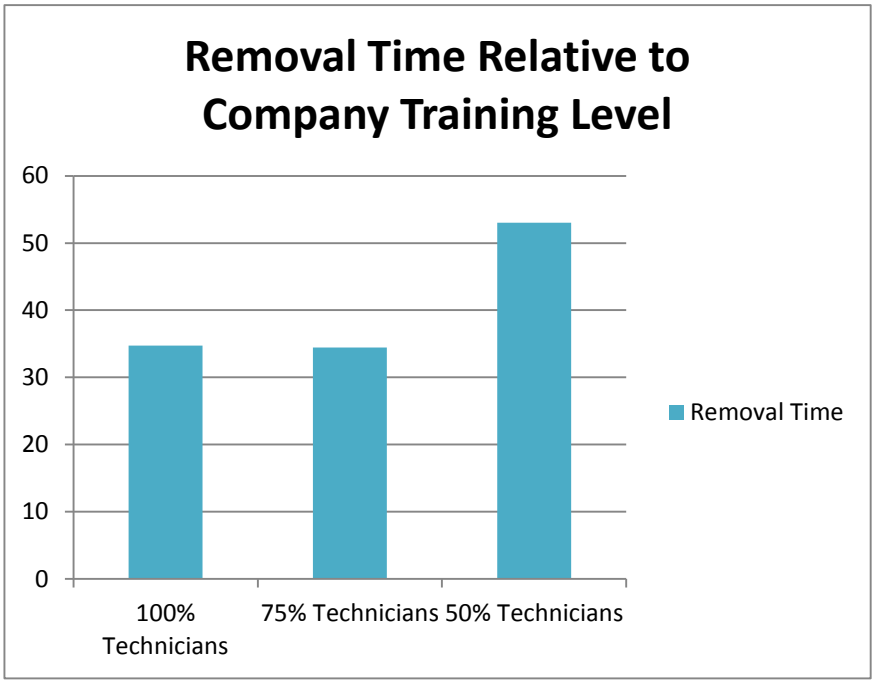


Table 19

PERSONNEL

The Removal critical task is by far the most labor intensive and personnel intensive portion of a rapid intervention operation. The analysis revealed that on average, a minimum of 15 firefighters (4 RITs) are required to remove the compromised firefighter. Removal is the critical task in which the AFD RIT Deployment model shows its true value. The AFD RIT Deployment Model of one RIT Company and three RIT Group companies (additional two engines and 1 ladder) were only able to complete the evolution with one deployment into the structure 16% of the time. Even with the relatively heavy RIT staffing 42% of evolutions

required at least one company to deploy into the structure more than once. The final 42% of the evolutions were completed by 3 companies;, however, these numbers are artificially optimistic because, in 60% of those evolutions at least one of the companies participating were operating above they're minimum staffing levels.

AIR CONSUMPTION

The average air pressure of the companies upon removing the compromised firefighter was 2926 PSI. Up to the point of packaging the compromised firefighter RITs consumed an average of 1384 PSI. Again, these numbers are artificially optimistic. Due to progress made by prior companies the company removing the compromised firefighter likely had a shorter travel distance and fewer obstacles to overcome. This is demonstrated by the average work time of a "removing company" being only 05:02.

VIABILITY

There are two factors which affect compromised firefighter viability in regards to removal. First of all is the time required to remove the firefighter, second is the "condition" in which the compromised firefighter is removed. The enemy of the compromised firefighter is time. Time manifests itself in two ways. The first is that of breathing air, if a firefighter is in a mayday situation inside an IDLH, their currency of time changes from a currency of seconds to a currency of breathing air. This means that the "clock" is running on how much clean air they have to breath versus how many minutes they can survive. Assuming no serious injuries, the only limiting factor to viable removal is that of conditions. If the RIT can provide breathing air to the compromised firefighter and other companies operating can improve conditions (fire attack, ventilation, etc.) the odds of viability are greatly increased because the currency of the

time bank (breathing air) is supplemented. If there are serious injuries, then a second clock is ticking on the compromised firefighter. As with any other patient we treat, it is imperative that we get them to advanced medical care as quickly as possible. Removal time of a severely injured firefighter relates to viability in that the quicker they are removed from the structure, the quicker they can receive treatment for their injuries.

The second factor in removal that dictates the compromised firefighter's viability is the condition in which he is removed. The condition refers to the firefighter being removed with all PPE intact and with a positive supply of breathing air. As has been discussed in the Air and Packaging portions of this report it is imperative to ensure the compromised firefighter's SCBA system stays in place during the removal process. To ensure this, it is vital to regularly check the firefighters mask to ensure a proper seal and no leaks. It is also vital to properly package the compromised firefighter, ensuring that all PPE remains in place. In 100% of evolutions in which the compromised firefighter was not viable he was allowed to run out of air due to low pressure leaks caused by removal. In 25% of the non-viable evolutions the compromised firefighter was removed, not only out of air, but also missing key elements of his PPE (SCBA, mask, coat).

TOTALS

This section will recap all of the previous data resulting in the total cumulative numbers for the analysis. The numbers here are the big picture "answers" of the analysis versus the more specific answers detailed earlier in this report.

TIMES

The first total time to be analyzed was that of response time. Response time for the initial RIT is the time from the mayday until they enter the structure. The average response time for the initial RIT Company was 01:42, for RIT Group companies was 01:15. This results in a cumulative RIT response time for 01:29. Response time is the only time which has not been previously analyzed in this report.

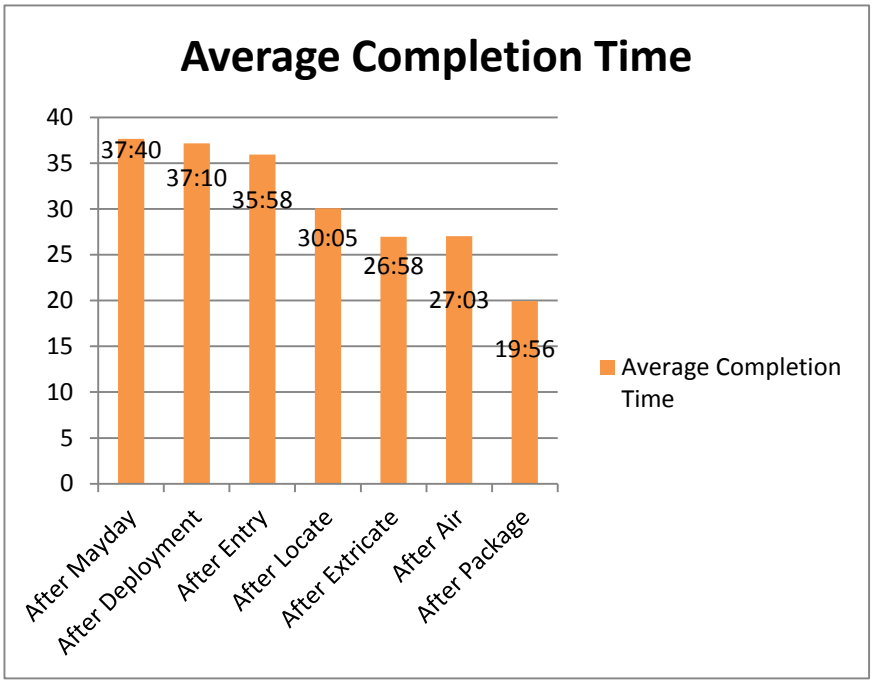


Table 20: Overall Average Completion Times from Each Critical Task

The cumulative average completion time for the analysis was 37:40. Completion time from the moment of RIT deployment was 37:10. Completion time from RIT entry was 35:58. Completion times from RIT locating was 30:05, 26:58 after extrication, 27:03 after air, and 19:56 after packaging *(Table 20)*.

PERSONNEL

The number of personnel required to complete the scenario was one of the paramount measures for this analysis. The number of personnel was important for two reasons. The most important purpose for determining personnel requirements was to determine the credibility of the Asheville Fire Departments RIT Deployment model as outlined earlier in this document. The second purpose of analyzing personnel numbers was for accreditation purposes to ensure that our response force was sufficient to mitigate a mayday situation.

Throughout the analysis, it was determined that on average 4 firefighters are required to locate a compromised firefighter, 4.33 to extricate, 4 to provide air, 6.18 to package, and 15.17 firefighters to remove the compromised firefighter. Working with the numbers above, it would appear that it requires 33.68 firefighters to complete the evolution; however that is incorrect, due to the fact that many of the personnel referenced above actually complete multiple critical tasks during a single deployment. That is to say, 4 firefighters regularly located, extricated, and supplied supplemental air to the compromised firefighter. Of the five critical tasks (Locate, Extricate, Air, Package, Remove) the initial RIT Company completed 70% of the critical tasks resulting in the RIT Group completing the remaining 30%. Overall, it has been determined that on average, it takes 15.17 (15) firefighters, 3.92 (4) RITs, to remove a single compromised firefighter from a complex rapid intervention situation.

As a result of the analysis it has been determined that the Asheville Fire Department's RIT Deployment model (1 RIT Company + 2 engines, 1 ladder RIT Group) is credible and sufficient. However, it meets the required personnel minimally. We now know that 15 firefighters are required, but how those 15 firefighters are assembled is completely dependent on staffing levels of the companies deployed as members of the RIT Group. RIT Companies are always 4 personnel; however there are several numerical options for RIT Groups due to the multiple minimum staffing levels Asheville Fire Department utilizes. A 13 person RIT deployment consists of one 4 person RIT Company, and three 3 person companies as the RIT Group. A 14 person RIT deployment consists of one 4 person RIT Company, one 4 person, and two 3 person companies as the RIT Group. A 15 person RIT deployment consists of one 4 person RIT Company, two 4 person, and one 3 person companies as the RIT Group. Finally the

least likely deployment scenario is that of a 16 person RIT deployment, one RIT Company and three 4 person companies making up the RIT Group.

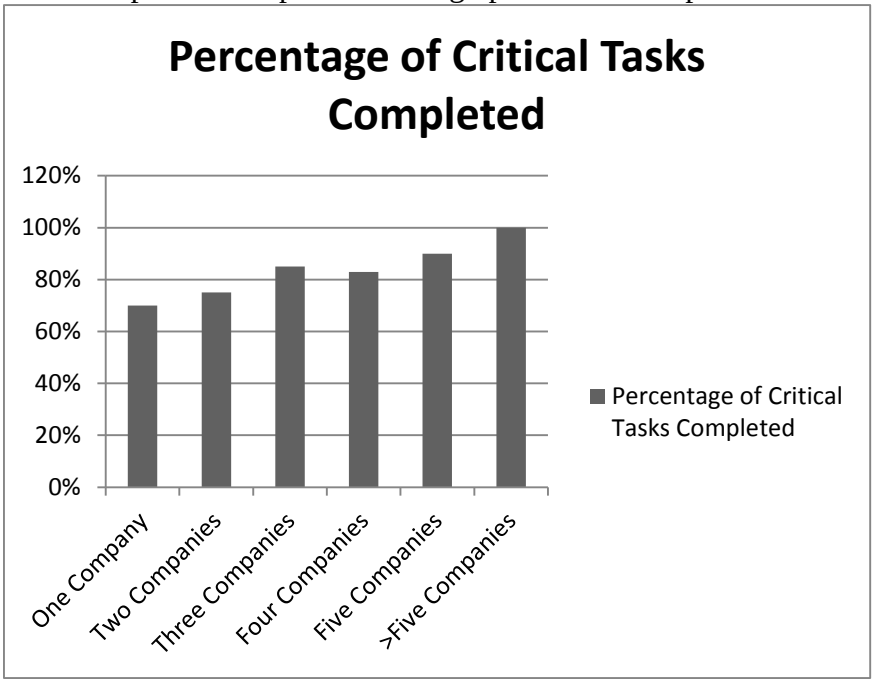


Table 21: Percentage of Critical Tasks Completed Relative to Number of Companies Required to Complete Them.

This data demonstrates that 66% of likely RIT Group numerical "make-ups" will require, at minimum, a second deployment of the Initial RIT to cover the required 15 firefighters. This second deployment is within bounds of AFD's Rehab SOG *(Appendix F)* it is not however, best practice over the long term. *Table 21* shows the percentage of critical tasks completed relative to the number of companies required to complete them. It should be noted that the totals do not all reach 100%, this is due to the groups who did not complete all 5 critical tasks (not packaging).

AIR CONSUMPTION

Air consumption was covered in detail throughout each critical task and will be looked at in further details later. The average ACR per minute of AFD RIT Companies was 233.22 PSI. The ACR / minute of RIT Group Companies was 245.91. This results in a cumulative ACR for all AFD Companies of 241.01 PSI per minute.

VIABILITY

As was documented earlier in this report, viability was determined by the condition in which the compromised firefighter exited the structure. If the compromised firefighter was removed from the structure with a positive air supply maintained throughout the evolution, and all PPE intact, the firefighter was considered viable. Throughout all evolutions, AFD's RITs removed a viable firefighter 75% of the time. In every situation in which a firefighter was not removed in a viable condition the "cause of death" was asphyxiation. This root problem, poor air management, was often the direct result of or compounded by incorrect or nonexistent packaging. As was referenced in the critical tasks sections above, this number is easily improved by training, personnel discipline, and attention to detail. Fortunately, assuming the compromised firefighter's injuries are survivable in general, AFD's survivability (viability) rate can be greatly improved through further training.

STAFFING

Over the last several years there have been several large studies conducted in reference to apparatus staffing levels. All of those studies have documented that higher company staffing levels (3 person, versus 4 person, versus 5 person) are much more effective. This study is no different in its findings. Through this analysis we can demonstrate the superiority of higher company staffing levels in three different manners: work time, air consumption rate, and emergency rate. The effects of company staffing levels will also be presented through the statistics of differently staffed RIT Groups.

The first metric to be analyzed is work time. For this analysis work time is defined as the elapsed time from when the RIT enters the structure until the RIT exits the structure. Work time relative to company staffing is important because of its correspondence to air consumption.

Smaller staffed crews have more work load per person. This additional work load increases the breathing air required and also increase fatigue. These two factors make smaller crews exit the structure earlier than well staffed crews *(Table 22)*, resulting in a shorter work time. The average work time for a three person company was 10:13, work time for a four person company was 11:11, work time for a five person company averaged 10:22. The reasons for the lower average work time of a five person company are not readily evident from the data collected. However, since Asheville Fire has no companies with five person minimum staffing all instances of five firefighter companies during the analysis were blended companies (three person company married up with two person companies). It is likely that the shorter work time for five person companies can be attributed to the lack of integrity that is inherent to blended companies. These five persons companies had rarely, if ever, trained as such and certainly had not trained as a five person company with that specific crew make-up. If five person minimum staffing ever becomes a reality for AFD it is likely that the work time of the five person crew will exceed all other due to crew integrity and distribution of labor.

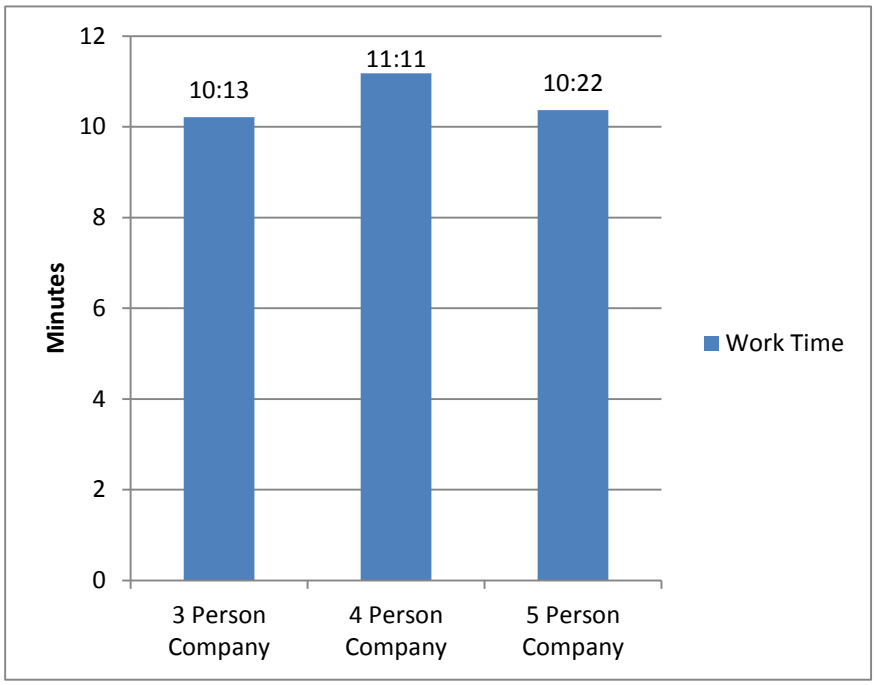


Table 22: Work Time Relative to Company Staffing Level

The second element of in which the importance of staffing levels is demonstrated is in the air consumption rate of companies. It is likely that the differences found in ACR can be attributed to the same factors that affected work time, primarily distribution of labor. As shown in *Table 23*, the ACR of a 3 person company was 251.88 PSI per minute, 232.43 for a four person company, and 232.79 for a company staffed with 5.

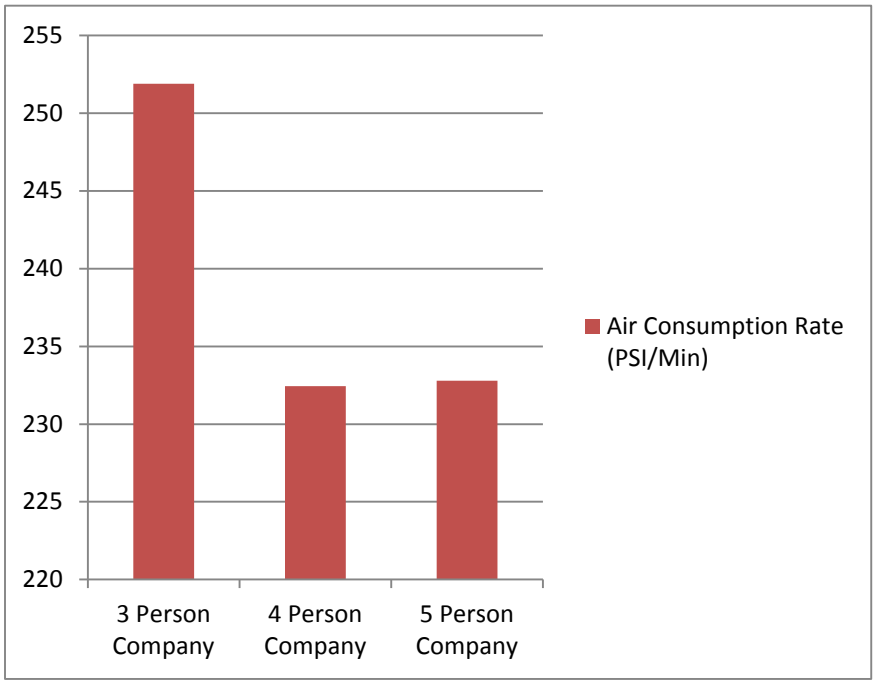


Table 23: Air Consumption Rate by Company Staffing Level

The third effect staffing levels of individual companies had during the analysis was recognized in emergency rates. We will look deeper into the emergencies encountered by the RITs later in this report. Of the three person companies which participated in the analysis, 50% encountered an emergency during their deployment. 48% of four

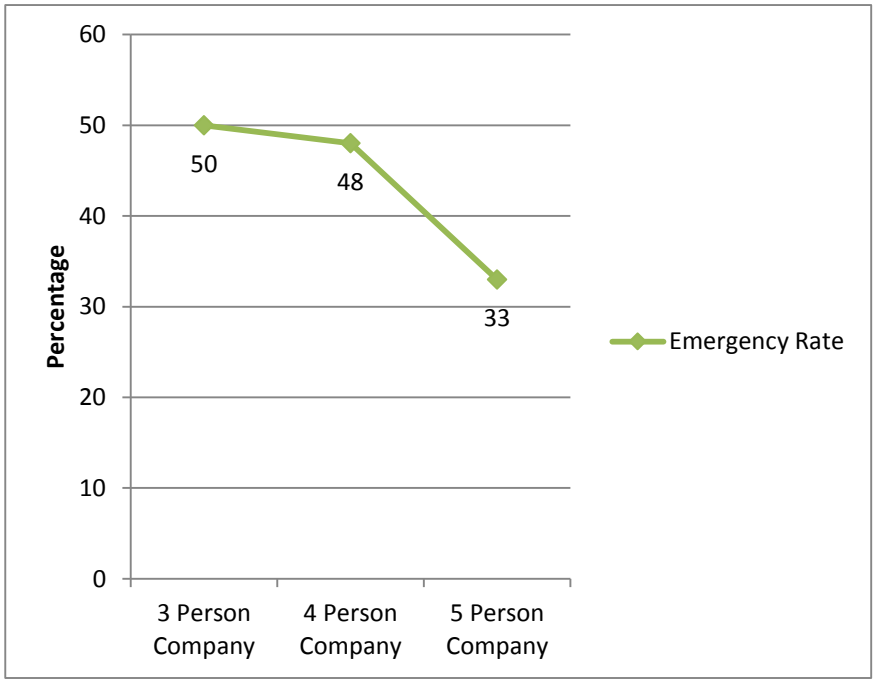


Table 24: Percentage of RITs Encountering Emergencies by Crew Size

person companies encountered emergencies. Only 33% of five person companies encountered emergencies. Of the 36 recorded emergencies 83% were low air emergencies. Staffing affected emergencies in the same ways we saw with the previous two factors, distribution of labor and air consumption rate.

EMERGENCIES

For the purposes of the analysis, emergencies were defined as any mayday parameter per AFD's Mayday SOG *(Appendix G)* and any low air emergency as defined by Asheville's Air Management SOG *(Appendix H)*. During the analysis there were 36 individual, documented emergencies. These emergencies result in an "emergency rate" of 28%. It could be said that nearly 1 out of every 3 RIT firefighters will experience an emergency while conducting operations. However, the emergency rate of 28% is an optimistic way of looking at the situation. Quoting a 28% emergency rate assumes that each emergency is an individual "issue". It can be argued that if a member of a company is in trouble, the entire company is in trouble. If you apply the same emergency rate formula on a company level a direr picture is painted. Of the 48 total fire companies who participated in the analysis, at least one emergency was encountered by 22 of them. This results in a 46% emergency rate when analyzed at the company level.

Although such a high emergency rate looks harrowing, solace can be found in the fact that the vast majority of these emergencies can be prevented through training and discipline. Of the 36 emergencies documented, 83% (30) were low air emergencies. These emergencies (30 out of 36) could be completely prevented by training, adhering to the Air Management SOG, and performing as the highly disciplined professionals we should be. If we considered all low air

emergencies as preventable and eliminated them from the equation, we could potentially forecast a 5% emergency rate going forward

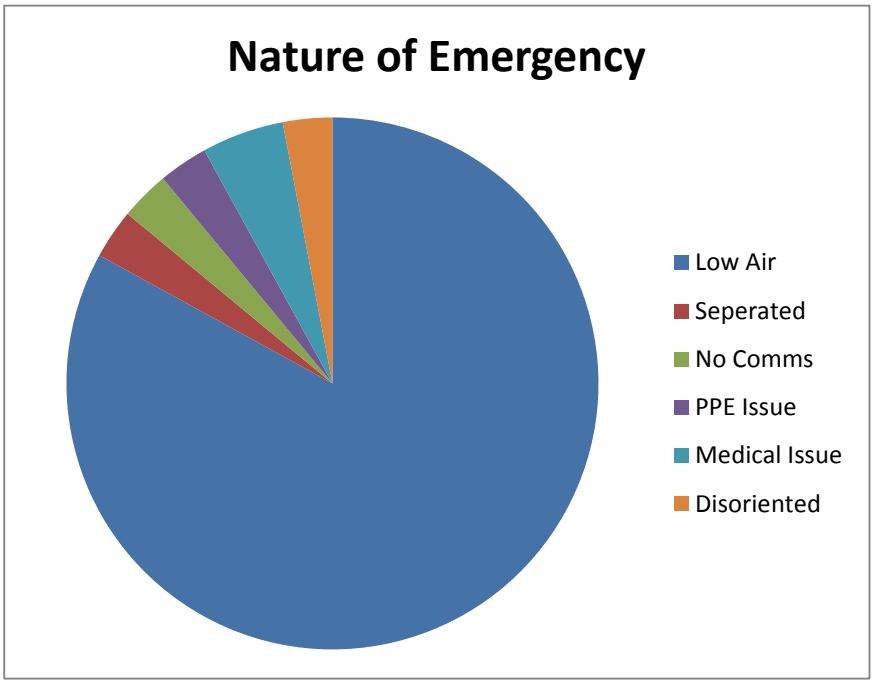


Table 25

The other 6 emergencies were situations in which actual mayday parameters were met. 3% (1) of the emergencies was a firefighter becoming separated from his crew, 3% was a mayday initiated by the IC due to no communications with the RIT operating interior, 3% (1 emergency) was a PPE issue in which a RIT firefighter lost a boot inside the structure, 3% of documented emergencies was from an entire company becoming disoriented during their egress. The final 5% of emergencies (2) was medical issues which onset in the IDLH.

Throughout this document the benefits of technician level training have been repeatedly demonstrated. Those benefits again manifest

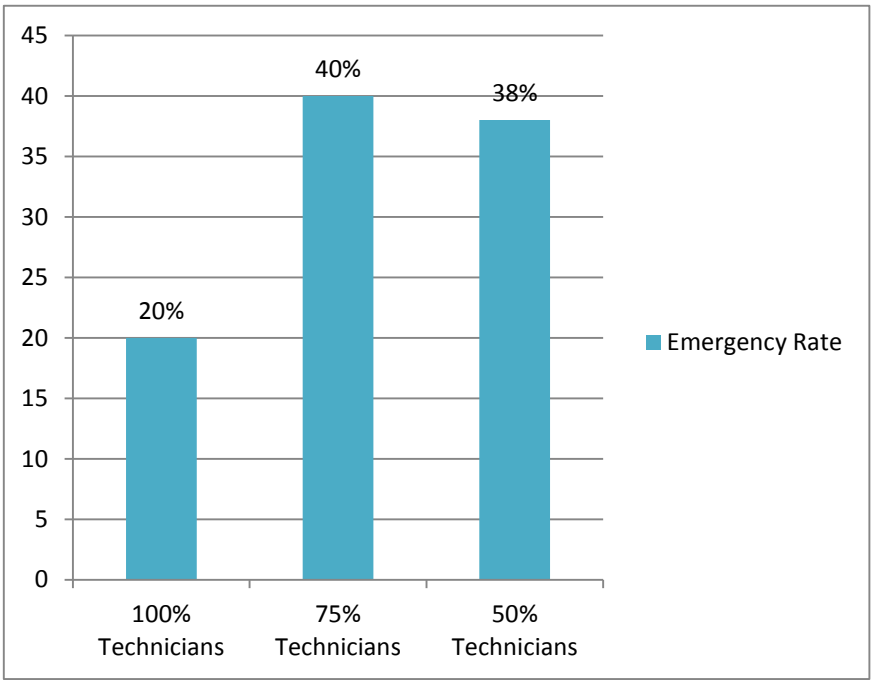


Table 26: Emergency Rate by Training Level

themselves when we look at the emergency rates of our RIT Companies. The emergency rate of RIT Companies staffed by personnel who were not technicians were double that of properly staffed RIT Companies (*Table 26*).

TRAINING

Throughout this analysis, each critical task has demonstrated the importance of training companies in the skills of rapid intervention. Not only is fundamental (operations level) training necessary, this analysis has proven that mastery (technician level) training is vital to mission accomplishment. To meet both the fundamental and advanced requirements of rapid intervention operations AFD has taken a "two-prong" approach to training its companies. The first element teaches the basics of firefighter survival and rapid intervention. The second hones those same skills in a fast paced, high stress environment.

The first step in the AFD training plan is considered operations level training. All online personnel are certified in Rapid Intervention Team Operations through NC Office of the State Fire Marshal (OSFM) in accordance with 1407. This program is made up of over 40 hours of lecture, case study, and hands on skill evolutions. The participants must pass both written and practical examinations to receive certification. This basic level training serves two purposes for AFD; first to serve as standardized baseline training for RIT Companies, and secondly to provide working operations level knowledge to all other companies who will potentially be asked to serve as members of a RIT group. The NC RIT certification allows firefighters to learn and begin to hone skills in a low-speed, low-stress learning environment. This certification is invaluable and serves as the cornerstone for Asheville's RIT Deployment Model.

Unfortunately, the NC OSFM has determined to no longer offer this program as a stand-alone certification. This is problematic for several reasons. The RIT certification, as it had previously been offered, consisted of three courses; Mayday, Survival, and Rapid Intervention. Under the new system, the mayday and survival courses have been rolled into the Firefighter certification program. However, the rapid intervention course has been completely omitted from North Carolina certification standards. This omission presents issues statewide. There is no longer a standardized training course for rapid intervention operations and there is no longer a certification attached to that training. That is important for two reasons; first, when dealing with specialized skills standardization is paramount. This standardized instruction can result in dramatically more streamlined operations across boundaries created by jurisdictions, policies, and equipment kinds. Second, there are many agencies which will not financially support their firefighters through trainings that do not result in a certification. There are many high quality, qualified instructors throughout the state who know and will continue to teach the standard. However, what will become of rapid intervention training once those instructors move on in their career?

Asheville Fire Department, as a delivery agency, and acting as the authority having jurisdiction will continue to offer and conduct operations level RIT training that meets, and in most cases, exceeds NFPA 1407. This commitment to continue that level of training, regardless of state certification status, is paramount to the foundation, operation, and potential success of the Asheville RIT Deployment Model.

The second element of AFD's RIT training is the technician level training that proved invaluable throughout the analysis. AFD recognizes two, nearly identical programs, as technician level training requisite to assignment to a RIT Company. The first program is the

North Carolina Breathing Equipment and Firefighter Survival School. NCBES is a state sanctioned "special school" conducted at Gaston College. The second program is the AFD RIT Company Academy, which is essentially NCBES, with slight differences. The differences are, days 1& 2 of the AFD RIT Academy are conducted in Asheville, and the remainder (burn days) are conducted at Gaston College. Also, the AFD RIT Academy has a slightly higher student to instructor ratio, and it is not state sanctioned. It is otherwise identical.

The elements that set these training programs above others are facilities, instructors, stress, and instructional principles. Stress is one of the most important tenets of training to become an excellent firefighter. Unfortunately, stress is often intentionally omitted from all levels of training. Performing under stress is not an innate ability, it must be trained. Stress should not be applied with learning the basics, but it is necessary for technician level training and in turn mastery level performance. Breathing Equipment School and AFD's RIT Company Academy create, by design, a significant amount of stress. The stress is both internally produced by the student and externally supplied by the conditions. It is incredibly valuable because firefighters learn not only to deal with the stress, but how to work through it and reach mission accomplishment in spite of it. In the military this is referred to as a form of stress inoculation training. Our trade is no different than combat, only the enemy and weapons change. If we want success in our form of combat, there is no question we should train our personnel using the same techniques that have proved so successful for our military. The data obtained by this analysis demonstrates undeniable benefits of in-depth, high tempo, high stress training. It is important to note that stress inoculation training is an in-depth science of its own. If not practiced and delivered properly this type of training can be highly detrimental to firefighter growth and development.

The final element of AFD's RIT training model is that of skills maintenance. The Rapid Intervention SOG specifies biannual live fire RIT training. In addition to the already specified training, it is recommended that RIT Companies have rapid intervention specific training evolutions monthly at a minimum. These training sessions do not have to be complex. They simply need to be department sanctioned opportunities for the RIT Companies to hone their craft in addition to regular shift training on firemanship and their specialty (RIT). Finally, it is recommended that the three RIT Companies are sent to Gaston College at least biennially to participate in high tempo, high stress RIT scenarios for 2 to 3 days.

RIT skills maintenance for all other companies in the City is also important due to their potential involvement at the operations level as members of the RIT Group. Skills maintenance for all other companies should consist of, at a minimum, semiannual practical RIT skills review. All other companies should also join the RIT companies at least once annually for a live fire RIT training scenario, not only to maintain skills, but also to build synergy in the RIT Deployment Model.

AIR CONSUMPTION

VALIDITY

One of the secondary goals of analysis was determine whether or not AFD's Air Management SOG *(Appendix H)* could be reconciled with aggressive RIT Company operations. As was demonstrated in the earlier sections of this report, it is feasible for a RIT to adhere to strict air management procedures, but you must have multiple relief (RIT group) companies in reserve due to the reduced work times presented by practicing the policy. Therefore, to state that

practicing air management as defined in AFD's SOG is conducive to aggressive RIT is valid, but requires "buy-in."

To ensure validity of practicing air management buy-in is equally required, both from the individual companies (RITs) and the organization. On the company level, buy-in is manifested through all members of the company recognizing that low air emergencies inside an IDLH only make an already bad situation even more volatile. Although longer work times can be accomplished through not leaving prior to an end of service time (EOST) alarm activation, those low air emergencies place the companies in unnecessary danger (due to working into their reserve / emergency air supply) and present more complications and distractions to other companies and the command staff whom are already task saturated. Firefighters are traditionally trained with a "no quit / zero failure" mindset. This mindset will likely manifest itself even more in a RIT deployment. The ability to practice air management during a RIT deployment demonstrates a "team / mission accomplishment before self" attitude indicative of buy-in.

This company level buy-in is not possible without buy-in from the organization. An organization cannot expect a RIT to not push beyond their limits if they are not deploying sufficient resources to relieve / backup the initial RIT. If a fire department is going to require RITs to practice strict air management, they must, in turn, commit appropriate resources; that is indicative of organizational buy-in. As this analysis has shown, to expect RITs to practice air management, the organization must provide a minimum of 15 personnel for the RIT group.

PREDICTING FUTURE PERFORMANCE

A tertiary goal of this analysis was to provide data to AFD's decision makers in reference to future SCBA needs. Through data collected and synthesized such as work times, cumulative

air (psi and liters) consumed, ACRs, and emergencies we can objectively predict future performance under those matrixes across multiple SCBA platforms.

Under the newest edition of NFPA 1981 the EOST alarm has changed from 25% to 33%. This increase will obviously decrease work times when practicing air management. Utilizing the average air consumption rates and work times recorded during this analysis we can forecast the following work times for new SCBA variants at the 1/3 low air alarm *(Table 27)*.

Work Times Prior to Low Air Emergency (1/3 EOST)			
SCBA	ACR in PSI / Minute	ACR in Liters / Minute	Forecasted Work Time
4500 / 30	241.01	68.206	12:27
4500 / 45			17:59
4500 / 60			24:05
5500 / 30	294.445	68.206	12:27
5500 / 45			17:59
5500 / 60			24:05
5500 / 75			30:27

Table 27

The findings of this analysis demonstrate that by simply increasing SCBA's to 45 minute cylinders all documented low air emergencies would have been theoretically eliminated. This however, is only true in a vacuum. Firefighters, even with a larger quantity of air will likely work to the point of EOST alarm activation unless trained and disciplined to perform otherwise. As with many facts in this document, the data and synthesis are solid, but the "human element" cannot be eliminated by math alone.

CONCLUSION

Saving our own is the most important mission we could ever be tasked with. From the onset of the planning phase for this analysis, it was the goal of the Asheville Fire Department to ensure we are providing as survivable a fireground as possible. The element of a survivable fireground addressed herein is that of Rapid Intervention. This analysis has determined that the AFD RIT Deployment Model: training, staffing, response, and deployment; is credible and lends itself to mission accomplishment. As was demonstrated in nearly every critical task there is still room for improvement at the organizational, company, and individual levels. With these issues now identified and quantified, the mechanism for continued improvement is firmly in place.

While it is the hope of the analysis staff that the Asheville Fire Department never deploys another Rapid Intervention Team in combat, the inherent dangers of aggressive firefighting make that goal lofty, if not unattainable. To that end, we are confident that the Asheville Fire Department is better prepared today, than ever before to successfully rescue a compromised firefighter. We are further encouraged that quantified, pursuable, improvements have been identified. Furthermore, the analysis staff hopes that other fire service organizations may be able to glean something from this document which they can in turn use to improve the survivability of their fireground.

IN HONOR AND REMEMBRANCE OF:

DRIVER HARRY WILLIAMS
ENGINE COMPANY 3
OCTOBER 20, 1944

DRIVER GRADY WILSON
ENGINE COMPANY 4
JUNE 28, 1948

DRIVER CHARLES WERHAN
ENGINE COMPANY 1
DECEMBER 9, 1963

LIEUTENANT ARTHUR DUCKETT
ENGINE COMPANY 5
MARCH 7, 1966

PRIVATE JIMMIE TRENT
NOVEMBER 13, 1975

FIREFIGHTER RAYMOND FLOWERS
ENGINE COMPANY 6
MAY 26, 1982

CAPTAIN JEFFREY BOWEN
RESCUE COMPANY 3
JULY 28, 2011

APPENDICES

APPENDIX A : 2011 RIT SOG

ASHEVILLE FIRE DEPARTMENT

A CFAI Accredited Agency

STANDARD OPERATING GUIDELINE

RAPID INTERVENTION TEAM (RIT)

CATEGORY: **Operations**

SUB CATEGORY: **Fire**

SUBJECT**: Rapid Intervention Team**

APPENDIX A : 2011 RIT SOG

Adoption Date:	**Dec. 1, 2001**
Revision Dates:	**Feb. 16, 2011**
Next Review Due Date:	**Feb. 15, 2012**
Reviewed by:	**SOG Committee**

I. PURPOSE

To provide guidelines of the objectives and responsibilities of assigned Rapid Intervention Team members.

II. SCOPE

This guideline applies to all AFD personnel.

III. COURSE OF ACTION

APPENDIX A : 2011 RIT SOG

A. Functions

1. The RIT should consist of at least one company, but 4 personnel are preferred and shall be used when possible. The RIT shall be comprised of personnel that have not previously been assigned to any firefighting task.

2. Locate and rescue lost, trapped, and/or injured firefighters on the fireground or other emergency.

3. The RIT(s) shall be fully outfitted with protective clothing and SCBA's and shall monitor all tactical radio traffic. The RIT will also respond to any unreciprocated on-scene radio traffic.

4. The RIT(s) shall be assigned as soon as possible and activated only by the Incident Commander or his/her designee (Operations Officer, Safety Officer, etc.)

5. RIT members should perform proactive tasks, provided that they are always available to perform Rapid Intervention operations should the need arise. Under no circumstances should RIT members be split or committed to any duties that would hinder or delay their immediate deployment should the need arise.

6. Any incident where geographic or other factors make a potential RIT situation ineffective for single RIT to handle, additionally assignments shall be made.

7. At multiple alarms, when one or more companies are assigned the functions of RITs, the designation of "RIT Group" may be given and a RIT Group Officer assigned.

8. The RIT may be released or reassigned once the Incident Commander determines there are no longer any life safety or IDLH issues.

APPENDIX A : 2011 RIT SOG

B. Role of the RIT Officer:

1. On being assigned, the RIT Officer should meet face to face with the Incident Commander or his/her designee and obtain the following information:

a) The type of building construction, a building preplan (if available) and its features:

(i) Lightweight construction
(ii) The presence of roof or floor trusses.
(iii) Special hazards.
(iv) Hazardous material storage.

b) The extent of the fire:

(i) Is progress being made?
(ii) Is the operation in an offensive or defensive mode?
(iii) The amount of time lapsed since the operation began.

c) The location of the RIT staging area noting that this area must be free of immediate hazards.

C. RIT Size-up

1. The RIT Officer should conduct a very thorough size-up of the overall incident, including, but not limited to:

a) 360º Walk around (if possible)

b) Building construction

(i) Exposed lower levels such as basements and cellars with means of egress,
(ii) Number of floors
(iii) Types of doors and windows,
(iv) Are any doors or windows protected by burglar bars or gates?
(v) Contents

APPENDIX A : 2011 RIT SOG

c) The location of the fire.

d) What is happening with the smoke and fire behavior?

e) Where are the means of egress for the interior operating companies?

(i) Are the doors locked or have they been forced?
(ii) Is there a second path of egress for the basement or roof division?
(iii) Are ladders in place for companies working of the floors above the fire?
(iv) Are open overhead doors secured in the open position?

f) Are there signs of collapse, and are collapse zones established and monitored?

D. Team responsibilities

1. While the RIT Officer conducts the initial evaluation and size-up, team members should assemble the necessary tools and equipment. This includes ensuring that a back-up charged hose line from another apparatus is available to protect the RIT should the need arise. RIT team member should know which unit is supplying the line.

2. The RIT Officer will meet with the team and brief them on information gathered during size-up and evaluation.

3. Perform proactive tasks, provided that they are always available to perform Rapid Intervention operations should the need arise.

E. Tools

APPENDIX A : 2011 RIT SOG

1. Each member shall have the following:

    a) SCBA
    b) Handlight

2. Each RIT company will assemble the appropriate equipment for the incident in the staging area, including but not limited to:

    a) A radio for each team member
    b) The RIT labeled tarp
    c) 200 feet of search rope
    d) Two 40-foot life safety ropes
    e) Stokes basket or other transporting device.
    f) Forcible entry tools – Halligan bar and flat head axe
    g) Thermal Imaging Camera
    h) Rabbit tool
    i) Power saws
    j) Ladders as needed for building
    k) Scott RIT Pack

3. Two kits to contain the following:

    a) Rescue knife
    b) Lineman's pliers

4. Any other equipment as deemed necessary

IV. DEFINITIONS

Rapid Intervention Team (RIT): A *dedicated* team assigned for emergency rescue of firefighters working in any IDLH area.

V. REFERENCES

NFPA 1500 – "Fire Department Occupational Safety and Health Program" OSHA

APPENDIX A : 2011 RIT SOG

1910.134 – Respiratory Standard
DOI 1000-44 “Personnel Accountability System.”
U.S. Fire Administration *USFA-TR-123/March 2003* - Rapid Intervention Teams and How to Avoid Needing Them

NFPA 1407-Standard for Training Fire Service Rapid Intervention Crews

APPENDIX B : 445 BILTMORE AVE. PIA RIT SECTION

Rapid Intervention Teams

Description

Until recently the assignment of RIT has been untimely, understaffed, with untrained and inadequately equipped personnel. A stop gap measure was put in place that auto assigned the third due engine RIT. This is an improvement from past practices however it still charges untrained, understaffed, and under equipped companies with RIT responsibilities.

Current procedures of AFD with regards to RIT procedures are acceptable for our department.

Currently we have three different RIT packs in service of varying quality as well as no set standard for set up of RIT bags or search ropes. These packs have been unavailable to the majority of the department for training and maintenance. We have a limited supply of TICs and currently do not issue them to the majority of engine companies. Every apparatus has some sort of search rope, however the placement of knots or rings to measure distance and direction is not standardized, making them confusing and challenging to use.

Appraisal

Improvement can be made with the implementation of this analysis in that it will place a dedicated team of individuals who have taken ownership of RIT assignment through the use of extended training beyond basic RIT requirements, daily maintenance/ check off of equipment and continued research and training making sure they stay updated on current RIT trends. This commitment and dedication will provide AFD with an excellent and solid base providing 3 dedicated RIT teams. The acquisition of a majority of the department obtaining the NCRIT certification will serve well, as a support to this analysis.

The RIT procedure can be improved having mandatory training/review of the SOG that is currently in place.

Without access to standardized RIT tools with which to become proficient, a RIT will under-perform. Search ropes that point in opposing directions by virtue of knot/ring configuration can cause a fire fighter to become lost and/or possible loss of life. A RIT company without a TIC will have a greatly limited chance of success and/or survival.

Plan

Immediate implementation:

APPENDIX B : 445 BILTMORE AVE. PIA RIT SECTION

The current engine company operations draft which was revised April 18, 2012 is up for review and provides a good resource usage for the assignment of a RIT company at emergency incidents when required. Due to all personnel being required to become RIT certified this gives an opportunity for RIT to be established early and with uniformity unless otherwise dictated differently by the IC.

The engine company operations draft SOG states in Section III D. 3. a).:

3. Third Due Engine Company
   a) Assume the role of RIT, if not already established.

Long Term Implementation:

The Asheville Fire Department will be best served regarding RIT by assigning three companies to be designated RIT. After careful consideration of response times, reliability study and equipment types we have found the best truck to be Rescue 3, Quint 5, and Squad 1(with 4 personnel) . These trucks will go to every working fire in the city with at least one accompany any AFD company responding to mutual aid fires. Typically, the first due of these companies will have active firefighting responsibilities while the second due assumes RIT and the third is available to the IC, with the caveat that the third in RIT will move to primary RIT if a MAYDAY call originates or the original RIT is activated. If possible the firefighting tasks of the first due RIT Company will be passed allowing them to prepare for extended RIT operations.
All three RIT companies will be assigned RIT during 3-alarm, large commercial fires. This will allow multiple staging areas for RIT stand by as well as giving the RIT group a designated aerial and engine.

Training and Staffing

- NC Breathing Equipment School, or comparable training
- NC RIT Certification
- TIC certification
- Biannual live fire training
- Haz-Mat technician
- Voluntary assignment
- Ambitious firefighters
- Strong leaders
- Effective risk managers
- Designated fifth fire fighter

An appropriate SOG has already been written for the department. The guideline needs to be reviewed and followed by all personnel within the department.

APPENDIX B : 445 BILTMORE AVE. PIA RIT SECTION

- The RIT should consist of at least one company, with four personnel. The RIT shall be comprised of personnel that are not assigned to any firefighting task.
- Locate and rescue lost, trapped, and/or injured firefighters on the fire ground or other emergency.
- The RIT(s) shall be fully outfitted with protective clothing and SCBAs and shall monitor all tactical radio traffic. The RIT will also respond to any unreciprocated on-scene radio traffic.
- The RIT(s) shall be assigned as soon as possible and activated by the Incident Commander or his/her designee (Operations Officer, Safety Officer, etc.).
- RIT members should perform proactive tasks, provided that they are always available to perform Rapid Intervention operations should the need arise. Under no circumstances should RIT members be split or committed to any duties that would hinder or delay their immediate deployment should the need arise.
- Any incident where geographic or other factors make a potential RIT situation ineffective for single RIT to handle, additionally assignments shall be made.
- At multiple alarms, when one or more companies are assigned the functions of RITs, the designation of "RIT Group" may be given and a RIT Group Officer assigned.
- The RIT may be released or reassigned once the Incident Commander determines there is no longer any life safety or IDLH issues.

The department currently has a good SOG in place for RIT operation and procedures. A hands-on training and review of this SOG is recommended for RIT companies and command staff.

Currently, Rescue 3 has the newest and best RIT bag in the department; all three designated RIT companies should have this bag, as well as both Battalion vehicles. Battalion Vehicle RIT bags should be checked off and maintained by the fire fighters at the Battalion Chief's home station. Every company in the department should have a TIC. All search ropes should be standardized through the use of a SOG, leaving no room for uncertainty on the use of the rope bag. The recommendation is to purchase 3/8 in. rope for all apparatus, with standardized indicators every 25 feet .

The Asheville Fire department will be best served by three designated RIT truck that are highly trained well-staffed and properly equipped. The practice of leaving RIT responsibilities un-known has created a culture of avoidance, and complacency. It is of the mind that a responsibility given to everyone is owned by no one. This has been true of the RIT practices of our departmental past. Through creating designated RIT companies we will enhance a culture of ownership and pride in the Asheville Fire Department.

APPENDIX C : CURRENT RIT SOG

ASHEVILLE FIRE DEPARTMENT

A CFAI Accredited Agency

STANDARD OPERATING GUIDELINE

RAPID INTERVENTION TEAM (RIT)

CATEGORY: **Operations**

SUB CATEGORY: **Fire**

SUBJECT**: Rapid Intervention Team**

APPENDIX C : CURRENT RIT SOG

Adoption Date:	**Dec. 1, 2001**
Revision Dates:	**May 21, 2014**
Last Review Due Date:	**May 21, 2014**
Next Review Due Date:	**May 20, 2015**
Reviewed by:	**SOG Committee**
Fire Chief Approval:	**Chief Scott Burnette**

I. PURPOSE

To provide guidelines of the objectives and responsibilities of assigned Rapid Intervention Team members.

II. SCOPE

This guideline applies to all AFD personnel.

III. COURSE OF ACTION

A. General

1. Designated RIT companies shall be Engine 1, Engine 6 and Engine 9. The RIT shall be a minimum of 4 personnel. A minimum of one of these companies shall be dispatched as RIT to every incident that may involve any IDLH environment within the city limits.

APPENDIX C : CURRENT RIT SOG

2. If a RIT company is dispatched to an incident in their first-due area, another RIT company will be automatically dispatched to perform RIT functions at that incident.

3. The RIT(s) shall be fully outfitted with protective clothing and SCBA's and shall monitor all tactical radio traffic.

4. The RIT(s) shall be assigned as soon as possible and activated only by the Incident Commander or his/her designee (Operations Section Chief, Safety Officer, etc.).

5. At working fires, multiple alarms, or when one or more companies are assigned the functions of RIT, the designation of "RIT Group" should be made and a RIT Group Supervisor should be assigned.

6. Upon declaration of a working fire, EOC shall dispatch a RIT Group, which consists of two engine companies and a ladder company. These companies will work under the RIT Group Supervisor.

7. At any incident where a single RIT company may be insufficient due to geographic or other factors, additional RIT assignments shall be made.

8. The RIT may be released or reassigned once the Incident Commander determines there are no longer any life safety or IDLH issues.

B. Functions

1. Locate and rescue lost, trapped, and/or injured firefighters on the fireground or other emergency.

2. The RIT Group Supervisor will address any unreciprocated urgent radio communication.

APPENDIX C : CURRENT RIT SOG

3. RIT members shall perform proactive tasks including those listed below, provided that they are always available to perform Rapid Intervention operations should the need arise.

4. Under no circumstances should RIT members be committed to any duties that would hinder or delay their immediate deployment should the need arise.

5. RIT companies must remain intact and shall not be split by Command. However, the RIT Officer or RIT Group Supervisor may temporarily allow a RIT company to be separated to perform a walk-around, size-up, or other proactive RIT task.

C. Role of the RIT Officer:

1. On being assigned, the RIT Officer should meet face to face with the Incident Commander or his/her designee and obtain the following information:

a) The type of building construction, a building preplan (if available) and its features. Special attention should be given to the following:

(i) Lightweight construction
(ii) The presence of roof or floor trusses.
(iii) Special hazards.
(iv) Hazardous material storage.

b) The extent of the fire:
(i) Is progress being made?
(ii) Is the operation in an offensive or defensive mode?
(iii) The amount of time lapsed since the operation began.

c) The location of the RIT staging area noting that this area must be free of immediate hazards.

APPENDIX C : CURRENT RIT SOG

D. RIT Size-up

1. The RIT Officer should conduct a very thorough size-up of the overall incident, including, but not limited to:

a) 360º Walk around (if possible)

b) Building construction
   (i) Exposed lower levels such as basements and cellars with means of egress,
   (ii) Number of floors
   (iii) Types of doors and windows,
   (iv) Presence of burglar bars or gates
   (v) Contents

c) The location of the fire

d) Smoke and fire behavior

e) Tasks and locations of interior companies and means of egress for these companies

   (i) Are the doors locked or have they been forced?
   (ii) Is there a second path of egress for the basement or roof division?
   (iii) Are ladders in place for companies working on the floors above the fire?
   (iv) Are open overhead doors secured in the open position?

f) Are there signs of collapse, and are collapse zones established and monitored?

E. Team responsibilities

APPENDIX C : CURRENT RIT SOG

1. While the RIT Officer conducts the initial evaluation and size-up, team members should assemble the necessary tools and equipment. This includes ensuring that a back-up charged hose line from another apparatus is available to protect the RIT should the need arise. RIT team member should know which unit is supplying the line.

2. The RIT Officer will meet with the team and brief them on information gathered during size-up and evaluation. Ideally, other members of the team should be allowed to complete their own walk-around.

3. The RIT Group Supervisor should also meet with any other RIT Officers for an incident briefing.

4. Perform proactive tasks, provided that they are always available to perform Rapid Intervention operations should the need arise.

F. Tools

1. Each member shall have the following:

a) SCBA
b) Radio
c) Handlight

2. Each RIT company or group will assemble the appropriate equipment for the incident in the staging area. Examples include but are not limited to:

a) Scott RIT Pack
b) 200 feet of search rope
c) Life safety ropes
d) Stokes basket or other transporting device.
e) Forcible entry tools – Halligan bar and flat head axe
f) Thermal Imaging Camera
g) Metal Roof hook
h) Rabbit tool

APPENDIX C : CURRENT RIT SOG

i) Power saws
j) A RIT labeled tarp
k) Ladders as needed for building
l) Wire Cutters (1 pair per company)

3. Any other equipment as deemed necessary

G. All members of RIT designated truck shall have the following qualifications and training within 1 year of assignment:

1. NC Breathing Equipment School or comparable training
2. NC RIT Certification
3. NC TIC School
4. NC Technical Rescue
5. Biannual live fire training

IV. DEFINITIONS

Rapid Intervention Team (RIT): A *dedicated* team assigned for emergency rescue of firefighters working in any IDLH area.

V. REFERENCES

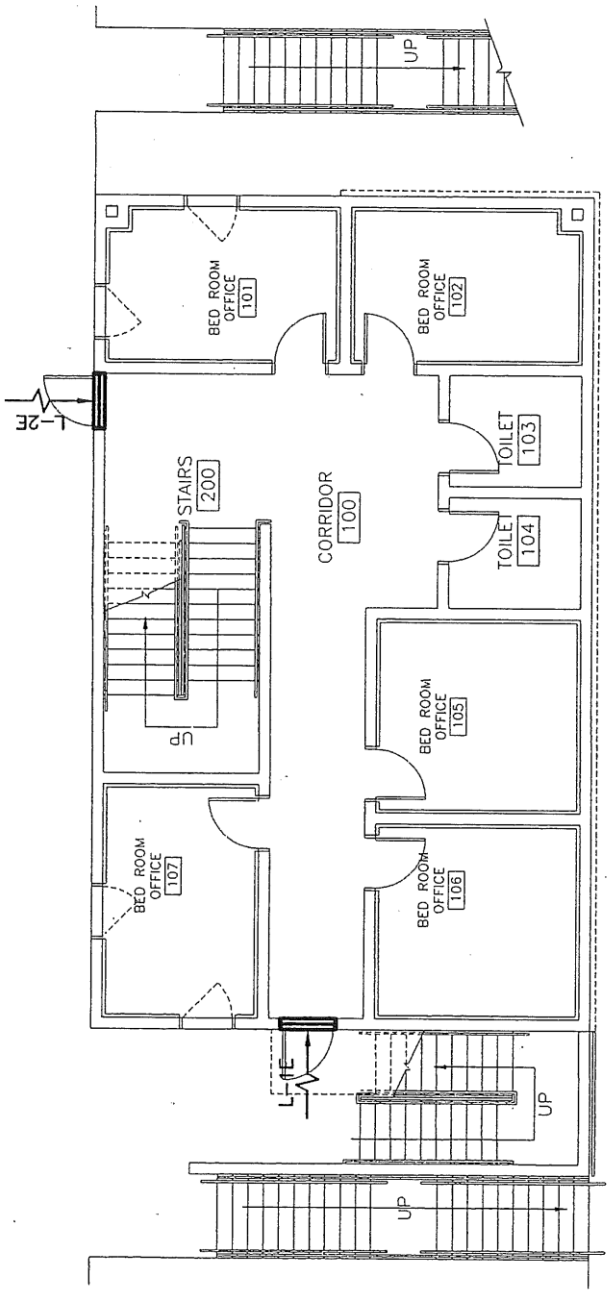
NFPA 1500 – "Fire Department Occupational Safety and Health Program"
OSHA 1910.134 – Respiratory Standard

DOI 1000-44 "Personnel Accountability System."

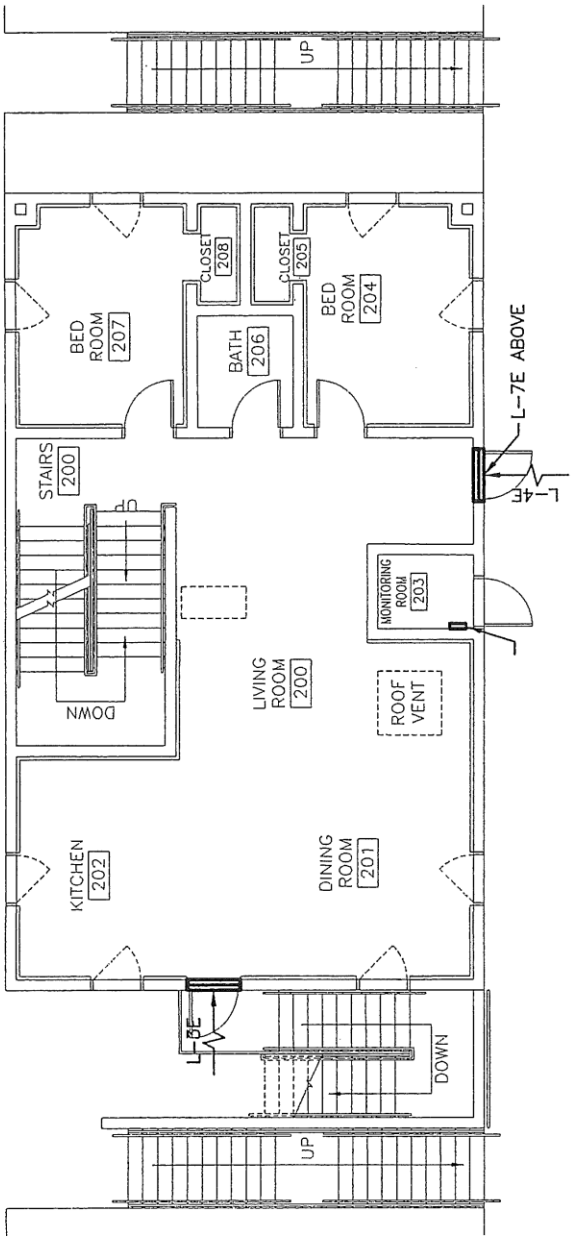
U.S. Fire Administration *USFA-TR-123/March 2003* - Rapid Intervention Teams and How to Avoid Needing Them

NFPA 1407-Standard for Training Fire Service Rapid Intervention Crews

APPENDIX D : SCENARIO BURN BUILDING LAYOUT



APPENDIX D : SCENARIO BURN BUILDING LAYOUT



APPENDIX E : COOPER COMBAT READINESS COLORS

COOPER'S COLOR CODE SYSTEM:

a. **Jeff Cooper:** He was a Marine LtCol that devised a color code system of awareness for Marines to be better prepared mentally for the combat situations. He quotes "The most important means of surviving a lethal confrontation is neither the weapon nor the martial arts skills. The primary tool is the combat mindset." In short, the Color Code helps you "think" in a fight. As the level of danger increases, your resistance to engage the enemy decreases. If you ever do go to Condition Red, the decision to use lethal force has already been made (your "mental trigger" has been tripped).

(1) Condition White: Condition White is a state of relaxation during which a person is totally vulnerable and is unaware of his surroundings. You cannot afford to be caught in this condition. It is easy to become complacent, especially when you have been in a country and on alert for months and nothing has occurred. Being caught in this mind set at the onset of an engagement will increase your chances of experiencing total panic characterized by the total inability to logically think or react. 60-80 heart rate. Example: Your convoy departs friendly lines. You fall asleep. You wake to a huge blast just before the gunfire erupts. You have no idea where the gunfire is coming from. You try to escape from the burning 7-Ton. You cannot see the enemy or locate your team. Bullets tear through your arms and neck. You lose consciousness in a puddle of your own blood.

(2) Condition Yellow: Condition Yellow is a state of nonspecific alert: This is the ideal state of awareness. You are aware of everything going on around you and should the need arise you are prepared to act. Without practice, staying in this state of alert can become fatiguing. 60-80 heart rate. Example: As your convoy departs friendly lines, you watch the surrounding area for unusual activities. You mentally review unit SOPs for

APPENDIX E : COOPER COMBAT READINESS COLORS

IEDs and ambushes. Along the way you mentally note covered positions near the road and possible enemy positions.

(3) Condition Orange: Condition Orange is a state of specific alert. You have a heightened alert/awareness due to a specific threat or situation developing. You have identified a dangerous situation and have decided that a course of action is warranted. You are mentally prepared for the specific threat. You have a plan of action. Your body will naturally want to go back to yellow once the threat has gone. Your adrenaline begins to flow. 60/80 – 115 heart rate. Example: You notice that children, normally present, are not in sight. You notice that there are several men in the windows of the surrounding buildings. One man by a corner is holding a partially exposed AK. You have identified tell-tale signs of an ambush. You begin to prepare a course of action before you are engaged. You survey the surrounding area, noting covered positions and likely enemy positions as you alert the rest of your squad to the possible threat. You decide on what target to engage first and in what order, should they become hostile.

(4) Condition Red: Condition red is the state of being decisively engaged with a specific threat. It cannot be maintained for long periods of time. You are in a fighting state of mind and a state of controlled panic while dealing with the threat and carrying out the plan you developed in condition yellow/orange. You may experience focus lock, tunnel vision, adrenal effects, etc. Training and instinct take over. 115/145 – 175 heart rate. Example: The IED blast fills your nose with acrid smoke. You can barely see as you jump off the back of the 7-Ton and seek cover behind the curb you saw just before the blast. You call out to your team-leaders, achieving accountability and assigning sectors of fire, ensuring that your back is protected. You begin firing on the RPG gunner on the second story as 40mm grenades drift through the window. You see that the corner is now unoccupied, but soon see the man with the previously

APPENDIX E : COOPER COMBAT READINESS COLORS

hidden AK running to cover. Your sights hover on his chest as you press the trigger.

(5) Black (not originally part of Cooper's colors): You experience catastrophic breakdown of mental and physical performance. Your increased heart rate becomes counterproductive; over 175 heartbeats per minute. Your brain may experience mental overload; you cannot make decisions. This can happen when going from condition white or yellow immediately to condition red or extended sustainment of condition red. You are caught by surprise and cannot react to the threat.

b. There is a direct correlation between levels of threat and the physical and mental effects you will experience. The higher the threat, the higher the level of stress you will encounter. You must be prepared to deal with any given threat. There is no requirement to go through all of the conditions; you may go straight from yellow to red.

APPENDIX F : CURRENT REHAB SOG

ASHEVILLE FIRE DEPARTMENT

A CFAI Accredited Agency

STANDARD OPERATING GUIDELINE

Rehabilitation

CATEGORY: **Operations**

SUB CATEGORY: **Other**

SUBJECT**: Rehabilitation**

APPENDIX F : CURRENT REHAB SOG

Adoption Date:	**Jan. 13, 2010**
Revision Date:	**Apr. 16, 2014**
Last Review Date:	**Apr. 16, 2014**
Next Review Date:	**Apr. 15, 2015**
Reviewed by:	**SOG Committee**
Fire Chief Approval:	**Chief Scott Burnette**

VI. PURPOSE

To provide guidelines for rehabilitation during emergency operations and training exercises.

VII. SCOPE

This guideline applies to all AFD personnel.

VIII. COURSE OF ACTION

A. Active rehabilitation will be implemented at all AFD incidents as deemed necessary by the Incident Commander. Personnel will not be permitted to return to work until they have met NFPA 1584 standards listed on the rehabilitation form located on each apparatus, which should be filled out and retained by the department. Anyone who is an EMT can perform these evaluations and will be assigned by command.

B. Rehabilitation shall conform to Buncombe County EMS Protocols 8 -Scene Rehabilitation.

APPENDIX F : CURRENT REHAB SOG

C. Members shall rest for a minimum of 20 minutes following the use of a second 30 minute cylinder, a single 45 min or 60 min cylinder or 40 minutes of intense work without SCBA.
D. Members shall replace calories and electrolytes during incidents of more than 3 hours and incidents where members are likely to be working for more than one hour.
E. Members arriving in rehabilitation shall be evaluated for symptoms suggestive of a health and/or safety concerns including:

1. Personnel complaining of chest pain, dizziness, shortness of breath, weakness, nausea or headache
2. General complains such as cramps, aches and pains.
3. Symptoms of heat or cold related stress.
4. Changes in gait, speech, or behavior.
5. Alertness and orientation to person, place, and time.
6. Vital signs considered abnormal as established by protocol.

F. Prior to their release from rehab members shall be evaluated to ensure there are no obvious indications that would prevent them from safely performing full duty activity.
G. Company officers shall assess their crews at least every 15 minutes and more frequently when working in extreme conditions to determine their needs for rehab.
H. Command staff shall determine the best location of AFD's CO Oximeters.

IX. DEFINITIONS

Rehabilitation Form

X. REFERENCES

NFPA 1584

Buncombe County EMS Protocols

APPENDIX G : CURRENT MAYDAY SOG

ASHEVILLE FIRE DEPARTMENT

A CFAI Accredited Agency

STANDARD OPERATING GUIDELINE

Mayday

CATEGORY: **Operations**

SUB CATEGORY: **Fire**

SUBJECT**: Mayday**

APPENDIX G : CURRENT MAYDAY SOG

Adoption Date:	**Dec. 1, 2001**
Revision Dates:	**July 20, 2014**
Last Review Date:	**July 20, 2014**
Next Review Date:	**May 20, 2015**
Reviewed by:	**SOG Committee**
Fire Chief Approval:	**Chief Scott Burnette**

XI. PURPOSE

The provide guidelines for declaring a Mayday.

XII. SCOPE

This guideline applies to all AFD personnel.

XIII. COURSE OF ACTION

A. The following procedure shall apply to the **transmission** of a MAYDAY:

1. A MAYDAY may be declared by anyone at anytime. MAYDAY parameters include:

a) **H**ostile Fire Event
b) **E**quipment failure
c) **L**ow Air Emergency (if member has not exited with 60 seconds of low air notification)
d) **P**ASS Activation

APPENDIX G : CURRENT MAYDAY SOG

e) **F**all Through
f) **E**ntrapment
g) **E**ntanglement
h) **D**isorientation
i) **C**ollapse
j) **M**edical Emergency

If you are in trouble, call a MAYDAY immediately.

2. An officer should declare a MAYDAY immediately upon realizing they no longer have PAR.

3. A MAYDAY shall be communicated verbally via radio transmission. This radio transmission shall continue in a steady cycle that is repeated every 3-5 seconds until acknowledged and shall follow the triple-callout format that is illustrated by the following example.

Example: MAYDAY–MAYDAY–MAYDAY; Division 2; This is Quint 503; Firefighter Smith; Assigned to Search; 2500 psi left; I am entangled and need help.

4. A MAYDAY transmission shall continue unabated until Incident Command acknowledges the MAYDAY. This acknowledgement from IC shall be made via radio and shall be immediate.

5. This radio transmission shall be initially transmitted on the radio channel that was originally assigned to the incident

6. Personnel that transmit a MAYDAY should provide pertinent information concerning the status of the emergency as quickly as possible. This information should include:

a) **L**ocation – division, sector, etc.
b) **U**nit – number, company
c) **N**ame – names

APPENDIX G : CURRENT MAYDAY SOG

d) **A**ir level and assignment (interior, ventilation, etc)
e) **R**esources/equipment needed, etc.

7. Personnel in a MAYDAY situation should activate their PASS alarm after they have called their MAYDAY and initiate all necessary self-rescue procedures possible in order to assist the rescue operation.

8. The IC should consult with the RIT/Rescue Officer(s) on Search/Rescue Operational strategies and tactics in order to implement a MAYDAY Search/Rescue Operation. Once established, RIT should always be in place, therefore a second RIT shall be established immediately to replace the active RIT.

9. After Incident Command receives the MAYDAY and assigns a fire channel for Operations, all Company, Group, and/or Division Officers in an IDLH environment shall provide a Personnel Accountability Report (PAR) to Incident Command as soon as requested.

10. All other Incident Strategic and Tactical Operations shall be designed to support and reinforce the MAYDAY Search/Rescue Operation,

11. Upon hearing a MAYDAY transmission, the EOC Dispatcher shall monitor for acknowledgement of the MAYDAY by IC. Then advise all nonessential radio traffic to stand down and all radio traffic to stay clear of the channel on which the MAYDAY was transmitted if requested.

12. After transmission of a MAYDAY, EOC shall immediately and automatically initiate additional resources including

a) A paramedic level ALS unit
b) An additional alarm assignment
c) An additional air unit
d) An additional telecommunicator

13. EOC shall then confirm the additional Fire Channel that is dedicated to continued incident strategic and tactical operations while the MAYDAY incident remains on the original channel.

B. The following procedure shall apply to the **cancellation** of a MAYDAY:

1. A MAYDAY may be downgraded with an update by the member who has declared the MAYDAY. The member declaring MAYDAY may only downgrade if they have exited the IDLH, relocates crew, or becomes disentangled. The member shall provide pertinent information concerning their current status. This information shall follow the LUNAR format.

2. A MAYDAY may only be cancelled by the RIT once the member who has declared the MAYDAY has been removed from the IDLH and is accounted for by IC.

3. The member who has declared the MAYDAY must be evaluated based upon the Rehabilitation SOG.

XIV. DEFINITIONS

Downgrade – RIT operation continues until RIT makes contact with firefighter calling Mayday and assesses situation.

XV. REFERENCES

APPENDIX H : CURRENT AIR MANAGEMENT SOG

ASHEVILLE FIRE DEPARTMENT

A CFAI Accredited Agency

STANDARD OPERATING GUIDELINE

Air Management

CATEGORY: **Operations**

SUB CATEGORY: **Fire**

SUBJECT**: Air Management**

APPENDIX H : CURRENT AIR MANAGEMENT SOG

Adoption Date:	**Dec. 21, 2011**
Revision Dates:	**May 21, 2014**
Last Review Due Date:	**May 21, 2014**
Next Review Due Date:	**May 20, 2015**
Reviewed by:	**SOG Committee**
Fire Chief Approval:	**Chief Scott Burnette**

XVI. PURPOSE

To provide guidelines for the exiting of environments that may be Immediately Dangerous to Life and Health (IDLH) prior to the activation of the Self-Contained Breathing Apparatus (SCBA) low air alarm.

XVII. SCOPE

This guideline applies to all AFD personnel.

XVIII. COURSE OF ACTION

A. General

1. All personnel are responsible for managing their own air and not allowing their low air alarm to be activated.

2. All bottles should be kept filled to the full mark (4500 psi) which is the effective operational level.

APPENDIX H : CURRENT AIR MANAGEMENT SOG

3. The initial 75% of the air supply is the "working and exiting air". This includes air utilized for gaining access, working toward the tactical objectives, and exiting the hazard zone. The remaining 25% of the air supply is the emergency reserve used only in the event an emergency occurs while exiting such as becoming lost, trapped, or entangled upon exiting the hazard zone.

B. Operations

1. Be clear of the IDLH before any company member has a low air alarm activation and HUD displays blinking Red/1000psi *(10 on the gauge).*

2. Any low air alarm activation shall be considered a low air emergency

3. Air utilized for gaining access, working toward the tactical objectives will be when the HUD displays Green.

4. Report to the fire officer when you have an HUD Amber Display/2000psi *(20 on the gauge).*

5. Plan for exit from the IDLH when any company member has an HUD Amber Display/2000psi *(20 on the gauge)*.

6. In order for these guidelines to work, all personnel shall perform a visual inspection and functional test of their SCBA at the beginning of their duty period.

7. Continually monitor air consumption and pressure as an individual and/or team. Below are some examples:

a) Regular time intervals (approximately every five minutes)

b) 10 minute EOC safety time notification from dispatch

APPENDIX H : CURRENT AIR MANAGEMENT SOG

c) During par checks, notify command of lowest level of air remaining.

d) Change of work area (floor level change, area searched)

e) Passing of major landmarks within the structure

f) Completion of assignment and prior to accepting another assignment

g) As situation dictates

C. Low Air Alarm Activation

1. If a low air alarm activates in the IDLH environment, it calls for an immediate radio transmission to Command specifying **whose** alarm is activated, **where** you are and **what** your status is.

2. A low air alarm should be considered a precursor to a Mayday call.

3. Command shall confirm that the RIT Officer has received the message of status, possible location and egress path for the member with the low air level.

4. The RIT Officer shall then track the member's remaining time in the IDLH area and notify Command if the member has not exited within one minute of low air notification.

5. Command shall evaluate the need for an immediate RIT response.

6. The company shall constantly monitor the member in low air alarm. In situations of low visibility the member in low air alarm shall be in physical contact with at least one other member at all times. Companies of three or more members, the member in low air alarm should be moved to the second position from the front and remain in physical contact at all times.

APPENDIX H : CURRENT AIR MANAGEMENT SOG

7. The company shall notify Command immediately upon exit from building.

8. Low air alarm activation without a notification to Command shall produce a call to Command from any company or member in close proximity of the alarm to report the low air alarm activation and the possible location.

XIX. DEFINITIONS

XX. REFERENCES

NFPA 1404

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