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Executive Development

Firefighter Proficiency Evaluation for Self Contained Breathing Apparatus Use in the Seminole County Fire Department

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

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Abstract

Competency in the use of the self contained breathing apparatus is considered a fundamental skill in firefighting. Firefighters must train regularly in using this tool in order to maintain proficiency. With the implementation of respiratory protection standards, firefighters should be assessed annually by their employers to ensure proficiency of these skills. The problem is the Seminole County Fire Department does not have a method to adequately evaluate a firefighter's ability to perform fire ground tasks while using self-contained breathing apparatus in simulated firefighting conditions.

During an evaluation phase of a rapid intervention team and firefighter survival training course, a personal observation revealed significant firefighter deficiencies in the use of the self contained breathing apparatus. The purpose of this research was to develop a means by which each firefighter could be evaluated to ensure competency in the use of the self contained breathing apparatus. While using descriptive methodology the following questions were answered: What process should be used to determine if each member of the Seminole County Fire Department is capable of performing fire ground tasks in simulated immediately dangerous to life and health conditions using full personal protective equipment including the self contained breathing apparatus? What are the causes or conditions contributing to those members who are not able to successfully complete the evaluation? How often is a self contained breathing apparatus competency evaluation necessary? What will the competency evaluation consist of? What methods will be used to remediate/rehabilitate members with deficiencies?

A literature review as well as a personal observation was conducted. The information gathered from the results assisted in the creation of a department training standard.

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Introduction

The problem is the Seminole County Fire Department (SCFD) does not have a method to adequately evaluate a firefighter's ability to perform fire ground tasks in immediately dangerous to life and health (IDLH) environments while using self-contained breathing apparatus (SCBA). A lack of proficiency in the use of SCBA could lead to injury or death of firefighters and/or civilians.

The purpose of this research is to develop a means by which each firefighter can be evaluated annually to determine whether or not they could perform the fire ground duties that would be expected of them and to define methods to deal with those firefighters who could not perform satisfactorily by using descriptive methodology to answer the following questions. What process should be used to determine if each member of the Seminole County Fire Department is capable of performing fire ground task in simulated IDLH conditions using full personal protective equipment (PPE) including the SCBA? What are the causes and/or conditions contributing to those members who are not able to successfully complete the evaluation? How often is the SCBA competency evaluation necessary? What will the competency evaluation consist of? What methods will be used to remediate or rehabilitate the members who are not able to successfully complete the evaluation?

Background and Significance

SCFD is a career department providing fire suppression, rescue response and emergency medical services to the citizens of Seminole County, Florida. SCFD has over 300 combat personnel divided among three shifts and provides service to an area which is 344 square miles.

The Department's training staff consists of three Lieutenants, under the direction of the Division Chief of Professional Standards. The training staff each work a 40 work week, Monday through Friday. The SCFD has been recognized nationwide as one of the leaders in firefighting innovation and has taken a proactive approach to training and operations in order to provide firefighter safety and deliver quality service to its citizens. Tremendous efforts have been made to conduct the most realistic and relevant training to the Seminole County firefighters as well as the firefighters of neighboring departments.

After the implementation of the Occupational Safety and Health Administration standard 29 CFR 1910.134 on respiratory protection, SCFD created a Department respiratory protection standard. A great deal of emphasis was placed on two controversial components of the standard. These two components were the "two in/two out" rule and mandatory annual fit testing. The "two in/two out" rule states that a team of at least two personnel must be organized and standing by, outside of the IDLH atmosphere, to back up the entry team in the event they require rapid rescue. This back up crew should be in place prior to anyone entering an IDLH atmosphere (Occupational Safety & Health Administration [OSHA], 1998). With this rule came much debate over existing staffing levels and the potential fiscal impact on agencies nationwide to insure that an adequate number of firefighters would be on emergency scenes to properly implement the rule. The implementation of mandatory annual fit testing was also a subject of concern due to the logistics of the actual testing as well as the added record keeping. Because of these two high profile issues, concerns of compliance with annual training in regard to firefighter competency in the use of SCBA did not receive much attention.

Over the following years, a new concept of utilizing Rapid Intervention Teams (RIT) became the hot topic for firefighter training. A RIT is a group of firefighters solely designated to

rescue firefighters in the event they become lost or trapped (Thomas Delmar Learning, 2004). SCFD and neighboring fire departments took a proactive approach to implementing this training to all firefighters whose departments worked within the Seminole County Joint Response System. This training took place over a three year period in which the first year was to educate, the second to train, and the third to evaluate. The education phase consisted of an eight hour classroom lecture on firefighter injury and death statistics, building construction, firefighter survival techniques and RIT functions and responsibilities. This training was followed up with an eight hour didactic session which consisted of several hands-on skill stations and a final multi-company evolution involving the deployment of several RIT teams. The training was mandatory for all SCFD firefighters and took place in an acquired two-story commercial structure. During these practical training sessions a significant number of personnel exhibited various difficulties or lacked proficiency in the operation of their SCBA. These individuals were dealt with on a case by case basis, remediated by members of the Training Staff and/or their immediate supervisors and returned to duty.

The following year Phase 2, or the training phase, was conducted using the same company based format as the previous year. The training phase consisted of a review of the tools and equipment carried in the RIT bag, as well as a review of the roles and responsibilities of the RIT. A multi-company evolution was conducted consisting of a firefighter down situation, with the subsequent deployment of several RIT's until the downed firefighter was rescued. This fireground simulation was performed in an acquired two-story commercial structure. Again, a significant number of firefighters were observed to have a lack of proficiency in the use of their SCBA. Just as was done the previous year, these individuals were dealt with on a case by case basis by SCFD training staff and the firefighter's immediate supervisor. Again, the firefighters

were encouraged to review and practice the skills they had learned during the RIT training in an effort to improve proficiency in this vital area of fireground operations.

On the third year an evaluation phase was conducted. This was to be accomplished by bringing the firefighters in with their respective companies to receive a review of RIT operations and complete a firefighter survival egress course. This session began with a brief review of the tools and equipment carried in the RIT bag followed by a RIT evolution and the firefighter survival egress course. The sessions were held in the large commercial structure that had been recently purchased to develop into the SCFD's Fire Training Center. The firefighter survival evaluation consisted of individual companies going through an emergency evacuation egress course. Using full structural firefighting PPE and a Scott 4.5 SCBA with a full 45 minute air cylinder, crews were placed on a hose line and told to evacuate the structure. The objective was to utilize the skills they had learned over the previous two years to negotiate obstacles they could encounter in a structural collapse during an emergency evacuation and exit the structure without running out of air. Participation in the evaluation phase by each firefighter was mandated by the department. After the first day of this training it was recognized by the training staff as well as the chief officers that observed the evaluations, that several of the firefighters lacked proficiency in the use of their SCBA. The evaluation phase continued for two months and it was documented that many of the firefighters lacked the necessary competence required to safely and efficiently carry out basic fire ground tasks, let alone perform as part of a RIT. This lack of proficiency proposed a serious safety issue as it could lead to injury or death of not only our firefighters, but the citizens we serve. A list of SCBA deficiencies was kept on all firefighters. Most of the deficiencies were minor in nature, but showed there to be a lack of proficiency in the use of a basic piece of firefighting equipment. However, some individuals displayed significant

deficiencies, such as regulator disconnection, facepiece removal, disorientation and hyperventilation. Personnel exhibiting significant deficiencies were reassigned to the training staff for immediate remedial training. The training was non-punitive and once the firefighter could successfully complete the firefighter survival hose crawl they were reassigned back to their stations and shifts. This was a significant change to the way the SCFD had dealt with training deficiencies. Since the evaluation phase of the RIT and Firefighter Survival training, SCBA deficiencies have been exhibited during other training exercises. One such example was during Mayday Training. A mayday is an emergency situation in which a firefighter is in danger and in need of immediate assistance (Thomas Delmar Learning, 2004). Because the focus was on completion of training on a relatively new topic, the SCBA deficiency problems were not addressed with the same urgency as during the evaluation phase of the Firefighter Survival exercise. All firefighter deficiencies were documented, but not corrected through the SCFD Training Section.

Literature Review

Firefighters have a unique career in which multiple disciplines must be learned. Competency in these disciplines are required to ensure personal, crew, and citizen safety. For the firefighter, competency is the ability to perform a specific fire ground task proficiently as a result of knowledge, skills, and attitudes utilized for performance (Urdang, 1995). That performance should have measurable standards in regards to training. An editorial reviewed poses the question, “Does the fire service conduct enough training for its personnel?”(Jones, 2005, ¶1) Jones explains that even though the Insurance Services Office (ISO) requires 240 hours of training per year that may not be enough to maintain competency in all the firefighting disciplines. Jones uses the example of professional or college sports by saying teams practice

daily and sometimes twice a day before their season starts. They constantly study and practice their skills in an effort to win the game. As for the firefighter, their season is year round and their competition comes in a variety of emergency calls. With an average of 20 training hours per month and a list of disciplines that must be delivered it is becoming more difficult for firefighter to find time to train, let alone stay proficient at what they already know (2005).

Articles have been written concerning how today's smoke environment has changed from the earlier years. SCBA training should include an air management program. Articles discussing the importance of air management training are becoming more frequent in fire related magazines. These articles stress the use of Rule of Air Management (ROAM) which includes firefighter's knowing how much air they use while inside a structure and exiting before the low pressure air warning is activated. Gagliano states, "Firefighters must be trained to know their SCBAs as well as, or better than, any other piece of equipment on the rig (Coleman et al., 2006, p. 38). Firefighter proficiency in the use of SCBAs is crucial. In order to maintain proficiency firefighters must have an understanding of how it works and what to do when something goes wrong. An article by Gagliano states,

> The time to practice switching over to the emergency bypass should not come in a zero visibility cloud of toxic smoke when the regulator has frozen and the mask is sucked to your face. Actions like bypass operations, gauge reading, and emergency transfills should be practiced to perfection before the REAL emergency hits (Gagliano et al., 2006, p. 80).

Several national standards were reviewed for this research project. The implementation of the Respiratory Protection Standard 29 CFR 1910.134 by OSHA defines what needs to be a part of a respiratory protection program. The standard provides direction for employers who

require their employees to use a respirator. It states, "The training must be comprehensive, understandable, and recur annually, and more often if necessary" (1998, p. 21). OSHA also states that training must include information on why the respirator is needed for employment and how to properly use and maintain it as well as the respirators limitations. The training must be delivered in an understandable manner and should be conducted at least annually unless other situations occur. These situations include changes in the workplace, inadequacies in the employee's knowledge, or any situation where retraining is necessary. Another standard was also reviewed for this research and contained information similar to the OSHA Respiratory Protection Standard. The National Fire Protection Association (NFPA) also recommends that fire departments implement an individual air management program and that activations of a low air alarm be treated as an item requiring immediate action, similar to a mayday (NFPA, 2006). Mario (2006) explains that an individual's level of fitness, experience and workload being performed are several of the factors that directly effect air consumption rates. It is also known that no two firefighters have exactly the same air consumption rate. The low air alarm indicates that the firefighter is running out of air, and it should not be their first indication to exit the hazard area.

Sendelbach (2006) describes the SCBA as a "basic firefighting tool" (Sendelbach, p. 45). His article addressed certain sections of the Respiratory Protection Standard 29 CFR 1910.134 as it pertains to SCBA training and offers suggestions in competency and confidence based skills for firefighters. Sendelbach (2006) describes many equipment failure situations and offers solutions for firefighters to follow when these emergency situations arise. These situations included face piece removal, decreased or depleted air, and damaged mask or hose. Sendelbach also discusses the psychological and physiological problems that many firefighters experience

while utilizing their SCBA. Though many firefighters will not openly discuss such issues, they still exist. "In order to become and/or maintain proficiency in the use of an S.C.B.A., a firefighter must overcome any psychological or physiological barriers associated with the operation and use of an S.C.B.A" (p. 45). He identifies these barriers as hyperventilation, claustrophobia, and disorientation which can lead to inefficiencies on the fireground and attributed the barriers to a lack of or improper training which requires remediation. "S.C.B.A. confidence training takes time and each individual must be allowed to progress at an acceptable pace to ensure these barriers are identified and overcome successfully" (p. 45). Salka found similar findings indicating that nationwide, firefighters need to be taught to increase their confidence in themselves and with their ability to properly function under stress when operating with their SCBA (1993).

An additional article by Sendelbach covers firefighter endurance for fireground survival as they must know their limitations with the use of SCBA. He outlines an endurance course consisting of eight stations simulating either a fireground task or a way to evaluate firefighter fatigue. Sendelbach outlines the course with specifics as to required equipment, what each station is simulated to, how to evaluate the participants, and a recommended procedure (2007).

An article obtained in the With New York Firefighters training publication explains the firefighter's reaction in response to fear. Jankowski explains that training with the SCBA is crucial for firefighter survival. When firefighters respond to stressful situations they begin in a normal psychological and physical state. As the stress increases the firefighter's normal psychological and physical state is altered which can lead to diminished decision making skills. He further explains when placed in a dangerous situation, humans have the fight or flight response. Though a human response, it hampers the judgment of firefighters in emergency

situations. Jankowski refers to this response as rescuer panic and fear (RPF) and is described as, "…a negative physiological reaction ensues, based on the psychological thoughts and perceptions of the rescuer" (2005, p. 19). Jankowski breaks it down into three stages. The initial stage is uneasiness and is referred to as, "The firefighters earliest premonitions of danger…free from feelings of anxiety" (p. 19). According to Jankowski firefighters in the initial stage of RPF are cautious. As the danger increases the symptoms of RPF begin with an increased heart rate and abnormal breathing. If the situation is not managed the firefighter will move into the transitional stage. As the anxiety increases, the firefighter's behavior changes with a further increase in heart and respiratory rate. At this point, the firefighter must rely on his/her training in an attempt to control their mental and physical response. If not controlled, the firefighter's actions will become erratic causing poor judgment and an increasing perception of danger. "When panic begins to reign, the conscious state resembles a nightmare, consisting of hallucinations, heightened imagination, tension, insecurity, uncertainty, nervousness and loss of faith in training, equipment and leaders" (2005, p. 20).

Common practice within the SCFD has been for firefighters to continue working in an IDLH atmosphere until their low pressure air alarm begins to activate. Once activated, they begin to exit the structure as a crew. An article on air management by Coleman was comparable to the situation SCFD encounter while conducting RIT training. Coleman explained while performing RIT training, his department noted several SCBA performance deficiencies which included training with cylinders low on air, running out of air during the evolution, and removing SCBA face pieces. Coleman stated, "Most of the members who went through the training did very well as it related to air management and SCBA work. However, there is still work to do" (Coleman et al., 2006, p. 38).

Numerous articles have been written concerning the need for SCBA training. Air management continues to be a training topic in the fire service. Division Chief Christopher Weir stated the following:

> It is paramount that we train and maintain a cutting edge when we manage our air as our personnel enter uncontrolled and unpredictable adverse environments. The best way to maintain cutting edge air management is to train, train, evaluate, implement, and train again until we are assured all personnel can manage and maintain good air management in adverse emergency conditions. (Coleman et al., 2006, p. 40)

In addition to the above listed literature, an Internet Search was performed for the purpose of researching competency evaluations used by fire departments nationwide. Evaluations that simulate entanglement, low profile maneuvers, equipment identification and orientation were all noted to be in use by other departments.

In summary, there is information on the topic of SCBA competency training and evaluation. "Recognizing that our SCBA is probably the most important piece of equipment at an incident should help all to realize the need for good SCBA training" (Lasky, 2006, p. 43). This information and researched data, reflects the concern and dedication of America's Fire Service leaders to provide firefighters with the constant training and confidence to ensure their safety. The literature reviewed for this research project has demonstrated the need for the development of an SCBA training regimen and evaluation program.

Procedures

This applied research project will use the descriptive method to answer the research questions identified. The use of this method was based on the identification of a problem area that required corrective action in the form of a Training Standard in order to ensure firefighter

safety while operating with SCBA in IDLH atmospheres. The problem that the SCFD does not have a method to adequately evaluate its firefighter's ability to perform fireground tasks while using SCBA was identified, resulting in the research of other departments nationwide and how they deal with similar circumstances.

A personal observation was performed by this author as part of the research data. The observation took place at the SCFD Training Center during the evaluation phase of the RIT and Firefighter Survival training. Two forms were created for the observation. The first consisted of the firefighter's names, apparatus unit numbers, starting air cylinder pressure, ending air cylinder pressure, and time to complete the evolution. The second form consisted of four categories which included: lack of confidence in personal abilities, lack of knowledge in use of equipment, air consumption/conservation, and psychological/physiological problems. A deficiencies list was added to each of the four categories. As the firefighters performed the evolution for the Firefighter Survival evaluation phase, deficiencies were documented under the appropriate category and deficiency list. As new deficiencies were noted, they were added to the documentation. Information was compiled and evaluated for identification of specific problem areas to be addressed at a later date. Firefighters from the SCFD, working in companies of two to three personnel were brought into the SCFD Fire Training Center while on duty to participate in this evaluation. The evaluation consisted of each group donning full structural firefighting protective gear including SCBA and having their initial cylinder pressure recorded. Each group started the evolution with 4500 pounds per square inch (psi) of air in a 45 minute duration air cylinder. Each group was then instructed to crawl, following a charged hoseline until they reached a coupled connection. All participants were started at the same location on the firefighter emergency egress course and their start time was recorded. At that point the

firefighters were to use the couplings to orient themselves appropriately so that they could follow the hoseline away from the nozzle and towards the appropriate exit. This course required the participants to negotiate several obstacles which required the use of psychological as well as physical problem solving skills. The goal was to have each group safely complete the course without depleting their cylinder air. The course consisted of 350 feet of 2 ½ inch hose, charged with air, intertwined between two large rooms. The first room consisted of maintaining crew integrity, coupling identification and maintaining orientation to the hoseline for emergency egress with multiple hoselines in place. The second room consisted of multiple obstacles to be negotiated which included doors, floor joist, attic rafters, several confined areas, void space, inclines and multiple hoselines. Although the deficiencies were not tracked by each individual, they were recorded on a master sheet. A critique was held for each evolution. See Appendix A for forms and results of the observation.

A personal interview was also conducted with Michael Hammonds, training lieutenant for the SCFD on August 10, 2007. Lieutenant Hammonds was one of the original RIT and Firefighter Survival instructors and had first hand knowledge of the firefighters who experienced significant deficiencies during the educational and training phase of the RIT and Firefighter Survival training. He noted some of the same firefighters who experienced SCBA deficiencies during the education phase also experienced the same problems the following year during the training phase. Each time, the firefighters were remediated, but some still experienced a lack of competence when performing SCBA functions at other training exercises.

A literature review was performed to obtain any documented information on firefighters and routine problems that others encountered while operating in IDLH environments using SCBA. Extensive searches were performed using the internet and the National Fire Academy's

Learning Resource Center's card catalog system for articles, reports and related research documents. In addition to the literature review, an internet search was performed to identify what types of respiratory protection training was currently being conducted. This search produced results from several agencies who train with SCBA as a part of their respiratory protection program. A table was compiled from the data that was pulled from this search listing the components that made up the annual respiratory protection training. See Appendix B. A second table was compiled with information on components of SCBA confidence and endurance training. See Appendix C. Additionally, OSHA Regulation Standard 29CFR 1910.134 Respiratory Protection, NFPA 1404 Standard for Fire Service Respiratory Protection Training and the SCFD Operations Bulletin #04015 Respiratory Protection Standard, were researched in an effort to find information on this topic.

Results

This applied research project revolved around five questions asked regarding the SCFD personnel and their use of SCBA. An extensive literature review and numerous hours of personal observation during training evolutions resulted in the following answers to the five research questions.

What process should be used to determine if each member of the SCFD is capable of performing fire ground tasks in simulated IDLH conditions using full PPE, including SCBA? SCFD currently has a respiratory protection standard. The standard specifics, located under SCFD Operational Bulletin 4015, state that all employees who are required to wear respiratory protection shall be fit tested at least annually. In addition to fit testing, the standard also indicates that training shall be conducted annually to ensure firefighters maintain a good understanding of the components of respiratory protection. The standard states, "All training

shall include at least the following items: Types of Respirators, How They Function, Selection Criteria, Limitations, PASS Devises, Respiratory Protection Standard, Emergency Operations, Inspection, Donning & Doffing, Seal Check, General Maintenance, Medical." (Seminole County EMS/Fire/Rescue [SCEFR] 2007, p. 53). However, the standard did not specify how the training would be accomplished to properly evaluate each firefighter. After further investigation, a review of the National Fire Protection Association 1404 Standard for Fire Service Respiratory Protection Training revealed that respiratory training would be delivered by the authority having jurisdiction (AHJ) according to their written standard operating procedures. Currently, SCFD does not have any established written guidelines on how this type of training would be delivered. NFPA (2006) has recommendations regarding SCBA training for firefighters. It specifies the minimum training requirements for SCBA training programs which include an annual evaluation of the firefighter's abilities in simulated emergency situations.

Implications of a practical evaluation in the use of SCBA may mean some firefighters would experience failure. With this, the second applied research question was answered. What are the causes or conditions contributing to those members who are not able to successfully complete the evaluation? The personal observation data collected by this author revealed minor and significant deficiencies in the use of the SCBA for the SCFD firefighters. The deficiency list was broken down into four components: lack of confidence in personal abilities, lack of knowledge in use of equipment, air consumption/conservation and psychological/ physiological problems. Out of the 240 SCFD firefighters who participated in the evaluation phase of the Firefighter Survival training 79 of them stated they were out of shape. Out of the 79 firefighters 10 lacked the physical endurance to complete the evolution. For the firefighters who stated they were out of shape, poor air consumption was a problem. Out of the 244 firefighters who

participated, 80 of them completed the evolution with less than one thousand psi of air remaining in their SCBA cylinders. However, due to this evolution being a team effort, some of the extended training times were due to one individual's poor performance, not the entire team. For some, experiencing a low air alarm created additional anxiety. For others, their anxiety derived from lack of visibility, being unfamiliar with their SCBAs and negotiating unfamiliar obstacles. "If the stress becomes excessive, the Firefighter's skills diminish and his decision-making becomes clouded" (Jankowski, 2005, p.19). Jankowski explains that firefighters must rely on their education and training in order to control their mental and physical state. Once the firefighter looses control, their behavior becomes erratic leading to actions like premature disconnecting regulators or removing facepieces in an IDLH atmosphere. Jankowski refers to this action as "Rescuer Panic and Fear" (p.19). There were several SCFD firefighters who experienced difficulties in the confined areas of the firefighter survival evaluation. Fear of confined spaces has been linked to several factors. "Physiological abnormalities influence how a person reacts to a confined space" (Brown, 2002, p. 11). Chemicals may also play a role in a firefighters behavior and performance. Sodium lactate, which is a chemical produced by the body during exertion may be attributed to increased panic and anxiety as well as other ingested chemicals, such as caffeine (Brown, 2005). According to Sendelbach during periods of stress, firefighters may experience hyperventilation which in turn will result in them feeling lightheaded and dizzy. This psychological effect will decrease their operational work time as well as place them in a more unsafe situation. Firefighters may experience physiological effects such as episodes of claustrophobia due to working in tight areas or becoming disoriented (2006). According to Brown (2002), firefighters who avoid training all together may also be exhibiting signs of psychological and physiological barriers. "Avoidance acts to reinforce the phobia,

because the feelings of anxiety are eliminated" (p. 11). Firefighters who show signs of avoidance should be encouraged to overcome the situation by conducting training in a safe and comprehensive manner (Brown, 2002).

How often is SCBA competency evaluation necessary? The Training and Education section of the SCFD Respiratory Protection Standard states, "Each employee on an annual basis shall complete training on respiratory protection and more specifically assigned respirators" Seminole County Fire Department, [SCFD] 2007, p. 53). OSHA (1998) states,

> Retraining shall be administered annually, and when the following situations occur:
>
> Changes in the workplace or the type of respirator render previous training obsolete;
>
> Inadequacies in the employee's knowledge or use of the respirator indicates that the employee has not retained the requisite understanding or skill; or
>
> Any other situation arises in which retraining appears necessary to ensure safe respirator use. (p. 23)

Furthermore, NFPA (2006) also states training shall occur annually and when the same situations occur as previously stated in OSHA's 29 CFR 1910.134. Annual training would ensure some firefighter skills retention. Jones, (2005) states, "…critical mistakes have no place on the fireground or emergency scene, and the only way to combat those negatives is with frequent aggressive, consistent and comprehensive training" (¶ 6).

What will the competency evaluation consist of? An online search of other agencies' respiratory protection training programs proved to be inconclusive. Though many respiratory protection training standards were found, none of them contained specific information as to how each agency evaluated their personnel to ensure competency. A table was created compiling a list of items each agency covered in their annual respiratory protection training. The results

listed in Table 1 below are from researched from 16 fire departments or universities across the United States.

Table 1

Annual Respiratory Protection Training Results

COMPONENTS	# TIMES REFERENCED
Annual Fit Testing	12
Donning/Doffing Procedures	8
Identification of SCBA Limitations	8
Identifications of Proper Maintenance	8
Identification of Proper Inspection	9
Identification of Proper Use	9
Identification of Respiratory Hazards	3
Demonstrate Proper Operations	7
Demonstrate SCBA Communications	1
Demonstrate Emergency Operations	7
Air Consumption Drill	1
No Criteria Listed on Demonstration of Proper Operations	16

The results from Table 1 were inconclusive as there was not specific information pertaining to how each individual was evaluated while demonstrating the tasks listed.

NFPA, as it applies to this research, requires the authority having jurisdiction to establish written policies for respiratory protection training. The standard also states there must be an

evaluation of each member during a practical application. This practical application must include conditions where each firefighter must demonstrate the ability to properly perform when the SCBA fails using emergency operation procedures, work under limited or obscured visibly, use emergency techniques to assist other firefighters, show they can conserve air as well as manage their air and not utilize the bypass valve unless it is necessary, be able to negotiate in confined areas, and properly clean the facepiece. The standard also states the practical application and evaluation should be accomplished under simulated stressful circumstances. This training shall be accomplished in a three phase process of classroom training, practical hands-on training, and a final practical which should be performed under stressful, simulated emergency condition. The training must be accomplished according to safety practices (2006).

NFPA 1404 recommends departments have a means of evaluating their firefighters' ability to properly respond during emergency situations. "Although all aspects of the physical and emotional stresses an emergency scene creates cannot be fully duplicated, many of these aspects can be simulated" (NFPA, 2006, ¶ A.6.4.2). Emergencies such as face piece removal, air supply stoppages, early low alarm activation, depleted air supply, damaged lens or hose, air leaks from the regulator, hose connection or cylinder are equipment failures that must be corrected quickly. According to Sendelbach (2006) training for these types of emergencies will ensure competency in firefighter skills. Another area recommended by NFPA 1404 is an evaluation of the firefighters' ability to perform with limited or obscured visibly.

SCFD uses the Scott 4.5 manufactured SCBA equipped with a cylinder with 4500 psi of air and a duration rating of 45 minutes. The SCBA is equipped with an emergency breathing support system (EBSS) designed for the firefighter to give or receive air from another firefighter in the event of an SCBA emergency. The process to give or receive air using the EBSS can be

quite cumbersome in the emergency situation. During the personal observation of the SCBA firefighter survival evaluation evolution, 10 firefighters were encouraged by the training staff to use the EBSS with their partner instead of running out of air and disconnecting their regulators. Only 5 out of the 10 firefighters were successful in connecting to the EBSS. The remaining five experienced difficulty disconnecting their air hose and making the connection into their partner's EBSS. Inefficiencies in using their fire gloves and lack of confidence and skill contributed to the five firefighters who could no longer hold their breath attempting to make the EBSS connection and disconnected their regulators. The five firefighters who were able to connect the EBSS with their partners experienced difficulty staying next to their partner, which ultimately resulted in air leakage though their facepiece and inadequate air management.

An individual air management program was also recommended in the standard. NFPA (2006) states, "This program will develop the ability of an individual to mange his or her air consumption as part of a team during a work period" (¶ A.5.1.4). In addition, NFPA recommends the individual air management program should include exiting an IDLH atmosphere before their low air alarm sounded as well as recognizing the fact that once the low air alarm is activated the individual is now consuming their reserve air and immediate action should take place (2006). Salka explains that once an SCBA alarm is activated it can mean more than just low on air. The activation of the bell, whistle, or vibration, depending on the model of SCBA, is an indicator that something is wrong requiring immediate action on the firefighter's part to exit the structure with their partners (1993). Individual air consumption rates should be determined for each firefighter (NFPA 2006). Air consumption rates depend on level of fitness, workload and experience. Each individual metabolizes oxygen differently (Marino, 2006). The SCFD currently does not have an air management program.

The literature review revealed several articles on training for competency and endurance. A table was formulated listing the components used during all types of SCBA training from 5 agencies across the United States.

Table 2

Components of SCBA Training from Other Departments

COMPONENTS	# TIMES REFERENCED
Emergency Breathing Techniques	2
Reduce Profile Wearing SCBA	3
Entanglement Procedures	2
Air Management Procedures	1
Use of Limited/Obscured Visibility	3
Attic Simulator	1
Floor Joist Simulator	1
Proper Donning/Doffing Procedures	1
Search Techniques	1
Ventilation Simulator	2
Ladder/Stair Climb	2
Confined Space/Areas	3

Components such as an attic and floor joist simulators were included in several of the competency and endurance courses reviewed. These components reinforce skills like self-rescue techniques for entanglement and other hazards. Many individuals do not like working a tight or

confined area. This was the case during the SCFD evaluation phase of the Firefighter Survival training. In a documented personal observation by this author, some firefighters from the SCFD experienced difficulty in negotiating confined areas. Fifty firefighters were unable to negotiate props without instructor assistance. As a result several firefighters disconnected their regulators before successfully completing the evolution. "Firefighters frequently are confronted with stressful situations that can cause a change to their normal mental and physical status…firefighter safety is, first and foremost, controlled by the individual Firefighter and the individual's ability to cope with stress" (Jankowski, 2005, p. 20). Sendelbach (2006) believes successful negotiation of a low profile component would provide a realistic challenge to firefighters and develop confidence and competency. "As trainers we must design and develop drills that challenge and motivate those experience members while maintaining a high degree of realism" (p. 45).

A review of NFPA 1404 also recommended that donning and doffing of the SCBA in emergency situations be part of an annual evaluation. This would include firefighters wearing full personal protective equipment, donning their SCBA from the ground and breathing air within 60 seconds. Donning and doffing the SCBA is not just a pre and post entry function. Firefighters negotiating through areas requiring a low profile must be able to quickly and proficiently don and doff their SCBA during emergency situations (Salka, 1993). Donning and doffing procedures were found to be a routine part of annual SCBA training according to the review of other agencies' respiratory protection programs.

What methods will be used to remediate or rehabilitate these members? Data from the personal observation revealed the 20 firefighter's who were unable to complete the evaluation phase of the Firefighter Survival training was a result of three factors: lack of training, lack of

physical endurance or psychological and physiological barriers. Firefighters who showed a lack of confidence and proficiency in their skills required additional training. Jones (2005) compares firefighters to professional athletes. Athletes study game plans firefighters study preplans, athletes perform repetitive drills, firefighters perform evolutions, athletes practice fundamentals, firefighters practice basic skills. "Develop a set of basic plays (evolutions) that are reasonable and realistic for your department. Then run them over and over until they become second nature" (¶ 3). Sendelbach explains that firefighters who experience a lack of endurance need to have an understanding of what their limitations are in a controlled training environment. Trainers must provide firefighters with an understanding of what their limitations are. This can be accomplished through the use of air consumption drills (2007). For firefighters experiencing psychological and physiological issues can be dealt with by using a direct exposure to the phobic situation. This can be accomplished through practical training evolutions which progressively build in difficulty (Brown, 2002). "S.C.B.A. confidence training takes time and each individual must be allowed to progress at an acceptable pace to ensure the barriers are identified and overcome successfully" (Sendelbach, 2006, p. 45).

Discussion

The results of this author's research came from the personal observations made during the evaluation phase of the SCFD Firefighter Survival training. When compared to the reported findings of other authors, there were some similarities in deficiencies of their personnel and the personnel of the SCFD. Coleman et al., (2006) states, "…members arrived at the training location with low air connected to their SCBAs…members ran out of air during the training and proceeded to remove their face pieces" (p. 38). During the SCFD evaluation a total of 13 firefighters either removed their facepiece or disconnected their regulator from their facepiece

while in a simulated IDLH atmosphere. This author's research identified that in order to ensure firefighters could perform proficiently with their SCBA, it would require putting them in conditions that most closely simulated actual IDLH conditions encountered in structural firefighting.

The research results provided adequate information in relation to the research problem statement. The SCFD currently has a respiratory protection program; however, the program does not specify how training or retraining would be delivered. NFPA (2006) served as a reference in answering the five research questions. It was developed as an SCBA training guideline for fire departments. "The AHJ shall provide a means for evaluating a member's ability to act properly during emergency situation that require the use of respiratory protection equipment" (¶ 6.4.1). NFPA (2006) states,

> The training program of the AHJ shall evaluate the ability of members to demonstrate the following:
>
> (1) Knowledge of the components of respiratory protection
>
> (2) Use of all types of SCBA utilized by the AHJ under condition of obscured visibility
>
> (3) Emergency operations that are required when an SCBA fails
>
> (4) Emergency techniques using an SCBA to assist other members, conserve air, and show restrictions in use of bypass valves
>
> (5) Use of an SCBA in confine spaces
>
> (6) Proper cleaning and sanitizing of the facepiece (¶ 6.7.4)

During the literature review of other department's respiratory training programs, it was recognized that even though agencies did annual respiratory protection training, it was limited to fit testing and properly donning and doffing the SCBA. Though several departments' SCBA

programs did include a practical application, research information on specifics of the practical evolution was inconclusive.

It was noted during a personal observation by this author, that many of the SCFD firefighters had deficiencies in the use of their SCBA. Most of the deficiencies were minor in nature, but after a review of the literature used for this research paper it was recognized that all SCFD firefighters must maintain proficiency in the use of SCBA. The personal observation enabled this author to break down the failures into three categories. They included lack of training, lack of physical endurance and physiological and physiological barriers. Jones (2005), concludes, "…indecision, equipment fumbling, uncertain skills, dysfunctional teams, duplicated effort, knowledge deficiencies, slow actions and critical mistakes have no place on the fireground or emergency scene" (¶ 6). Sendelbach (2007) states, "Pushing ourselves beyond our personal limitations to overcome physical shortcoming presented by minimally staffed fire ground ensures our death and injury rate will remain unchanged" (¶2). "Rescuer Panic and Fear occur when a negative physiological reaction ensues, based on the psychological thoughts and perceptions of the rescuer" (Jankowski, 2005, p. 19). The findings for firefighter failure in the use of SCBA were relative to the information used in this research project.

Recommendations

Annual respiratory protection training within the SCFD will be required in order to have a positive impact on the competency of the SCFD firefighters' use of SCBA. Based on the results of this research, a training standard will be developed to outline what training will be accomplished and at what frequency to ensure that all firefighters of the SCFD are able to maintain competency in the use of their SCBA. The training standard will be written such that it provides for all of the required training items mandated by the NFPA 1404, OSHA 29CFR

1910.134, and the SCFD Respiratory Protection Standard. A firefighter's ability to demonstrate appropriate procedures and actions during emergencies involving the SCBA and negotiating difficult obstacles while using SCBA in a simulated IDLH environment will be covered extensively. The abilities of the firefighter to assist fellow crewmembers who are experiencing SCBA emergencies will be reviewed, practiced and evaluated. The training standard shall outline routine SCBA maintenance and provide for the evaluation of each firefighter's ability to perform all routine procedures with their assigned SCBA. The annual training as outlined by the new standard shall include at least one session carried out at the company level reviewing routine and emergency procedures as they relate to the type of SCBA currently in use. After a thorough review, each procedure will be practiced in a relaxed environment with unlimited visibility. After a crew has completed the company level review and practice sessions, and have demonstrated to their company officer that they are competent under ideal conditions, they will advance to the evaluation component of the annual training.

The evaluation component shall be conducted by SCFD training staff and will be carried out in such a way as to realistically simulate the situations that might be encountered by a firefighter working in an IDLH environment. Firefighters will be evaluated on how they react to SCBA failure situations, negotiating confined areas and obstructed means of egress, and assisting fellow firefighters who are experiencing SCBA emergencies. Each part of this evaluation will be conducted while the firefighter is wearing all structural firefighter protective equipment and working in zero visibility.

A second recommendation resulting from this research would be to develop and implement an air management program. The SCFD currently does not have an air management program is place. The literature review and results of this research project indicate a need for

such a program within the SCFD. To initiate an air management program as described by much of the literature reviewed and defined by NFPA 1404 would require a substantial change in the behavior of the firefighters of the SCFD. It is recommended that additional research related to air management be conducted to assist in the proper implementation of such a program. Upon development of an air management program, it should become a part of the annual respiratory protection training.

Upon the completion and implementation of the training standard identified above, the members of the SCFD will be more competent in the operation of their SCBA during routine as well as during emergency conditions. By developing and initiating an air management program firefighters would be less likely to find themselves in low air situation, thereby limiting the possibility of needing to use their emergency procedures. Each of these recommendations will result in the ability of the firefighters of the SCFD to more safely do their jobs.

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Appendix A
Seminole County Fire Department RIT and Firefighter Survival Evaluation Phase
Personal Observation Data (SCFD Combat Personnel Only)
Collected by: Rebecca Burkett, Training Lieutenant
Data collected at: The Seminole County Fire/EMS Training Center, Longwood, Florida

1. Lack of confidence in personal abilities and/or equipment	
Number of Firefighters	**Description**
68	Unable to negotiate props without instructor assistance at some point
20	Unable to properly determine direction of travel with coupling
30	Became disoriented at some point during evolution
10	Separated from crew at some point in evolution
79	Stated they were really out of shape
8	Had to be constantly coached in order to complete evolution
5	Inability to complete evolution
1	Did not complete due to chest pain
1	Did not complete due to partner having chest pain
5	Lost all ability to move or function
4	Lack of physical endurance to complete evolution
2	Inability to hold breath while attempting to buddy-breath
2. Lack of knowledge in use of equipment	
Number of Firefighters	**Description**
102	Improper wear of PPE (non-fire gloves, hood, Velcro on collar, chin straps not tight)
29	Helmets fell off during the evolution
63	Lost equipment during evolution
17	Pass device accidentally activated
12	Attempted to reset PASS by shaking remote gauge
5	Attempted to reset PASS activation by shaking the backpack/harness assembly
20	Improper donning of face piece
8	Improper donning of Nomex hood
8	Air cylinder not turned on all the way
2	Unfamiliar with battery portion of PASS
8	Improper donning of regulator
3	Accidental Regulator disconnection from improper donning
3	High pressure line disconnect
27	Began evolution with less than 3900 psi in their air cylinder
2	Inability to reconnect high pressure line
3. Air Consumption / Conservation	
Number of Firefighters	**Description**
22	Use of bypass valve in a non-emergency situation
29	Free-flowing of air (regulator or bypass pre-entry and during evolution)
13	Ran out of air during evolution
244	Completed evolution
80	Completed evolution with <1000 psi remaining in cylinder
10:15	Best time 3 person crew
27:51	Longest time 3 person crew
8:19	Best time 2 person crew
26:49	Longest time 2 person crew
4. Psychological and Physiological Problems	
Number of Firefighters	**Description**

9	Disconnected regulator in simulated IDLH atmosphere
4	Doffed mask in a simulated IDLH atmosphere
4	Hyperventilation
6	c/o dizziness, lightheadedness, SOB
5	Episodes of claustrophobia
10	Inability to determine his/her surroundings

Appendix A Continued

FIREFIGHTER SURVIVAL EVALUATION PHASE				
Unit/Name	**Evolution Time**	**Starting PSI**	**Ending PSI**	**Completed Evolution**
Engine 34 / Lieutenant xxxx	Incomplete	4000	2000	No
Engine 34 / Driver xxxx	17:57	4000	1800	√
Engine 34 / Jumpseat xxxx	17:57	4000	900	√
Rescue 34 / Officer xxxx	19:19	4000	1100	√
Rescue 34 / Driver xxxx	19:19	4000	900	√
Rescue 34 / Extra xxxx	19:19	4000	2000	√
Engine 42 / Lieutenant xxxx	21:52	4000	600	√
Engine 42 / Driver xxxx	21:52	4000	500	√
Engine 42 / Jumpseat xxxx	21:52	3900	200	√
Rescue 42 / Officer xxxx	22:42	4000	900	√
Rescue 42 / Driver xxxx	22:42	4000	1200	√
Rescue 42 / Extra xxxx	Incomplete	3900	0	No
Engine 14 / Lieutenant xxxx	18:20	4000	0	No
Engine 14 / Driver xxxx	16:02	4000	1100	√
Engine 14 / Jumpseat xxxx	16:02	4000	1000	√
Rescue 34 / Officer xxxx	10:04	4000	2000	√
Rescue 34 / Driver xxxx	10:04	4000	2000	√
Engine 13 / Lieutenant xxxx	16:02	4000	1100	√
Engine 13 / Driver xxxx	16:02	4000	1500	√

Engine 13 / Jumpseat xxxx	16:02	4000	2000	√
Engine 41 / Lieutenant xxxx	14:18	3800	500	√
Engine 41 / Driver xxxx	14:18	3800	1100	√
Engine 41 / Jumpseat xxxx	14:18	4000	1600	√
Rescue 52 / Officer xxxx	16:49	3700	1000	√
Rescue 52 / Driver xxxx	16:49	4000	1000	√
Tower 12 / Lieutenant xxxx	15:06	4000	900	√
Tower 12 / Driver xxxx	15:06	4000	1300	√
Engine 14 / Lieutenant xxxx	16:45	4000	100	√
Engine 14 / Driver xxxx	16:45	4000	1200	√
Engine 14 / Jumpseat xxxx	16:45	3900	900	√
Rescue 43 / Officer xxxx	15:08	4000	900	√
Rescue 43 / Driver xxxx	15:08	4000	0	√
Engine 43 / Officer xxxx	15:08	4000	1000	√
Engine 43 / Driver xxxx	17:06	3800	100	√
Engine 43 / Jumpseat xxxx	14:40	3500	0	√
Rescue 16 / Officer xxxx	18:04	4000	1000	√
Rescue 16 / Driver xxxx	18:04	4000	1000	√
Engine 27 / Lieutenant xxxx	17:08	4000	1000	√
Engine 27 / Driver xxxx	17:08	3900	200	√
Engine 27 / Jumpseat xxxx	17:08	4000	1000	√
Engine 11 / Lieutenant xxxx	15:37	4000	1800	√
Engine 11 / Driver xxxx	15:37	4000	1000	√

Engine 11 / Jumpseat xxxx	15:37	4000	1100	√
Rescue 11 / Officer xxxx	24:53	3500	400	√
Rescue 11 / Driver xxxx	24:53	4000	0	√
Engine 14 / Lieutenant xxxx	15:51	3900	1100	√
Engine 14 / Driver xxxx	15:51	3900	300	√
Engine 14 / Jumpseat xxxx	15:51	3900	1300	√
Engine 35 / Lieutenant xxxx	17:18	4000	1200	√
Engine 35 / Driver xxxx	17:18	4000	1500	√
Engine 35 / Jumpseat xxxx	17:18	4000	1100	√
Rescue 35 / Officer xxxx	9:40	4000	2000	√
Rescue 35 / Driver xxxx	9:40	4000	2000	√
Rescue 22 / Officer xxxx	18:05	4000	2000	√
Rescue 22 / Driver xxxx	18:05	3900	1500	√
Rescue 22 / Lieutenant xxxx	11:30	4000	2000	√
Rescue 22 / Driver xxxx	11:30	4000	2000	√
Engine 36 / Lieutenant xxxx	19:55	4000	1500	√
Engine 36 / Driver xxxx	Incomplete	4000	1000	No
Engine 36 / Jumpseat xxxx	19:55	4000	1200	√
Engine 22 / Lieutenant xxxx	16:30	4000	1200	√
Engine 22 / Driver xxxx	16:42	4000	1500	√
Engine 36 / Lieutenant xxxx	20:20	4000	300	√
Engine 36 / Driver xxxx	18:18	4000	1000	√
Engine 36 / Jumpseat xxxx	20:40	4000	300	√

Rescue 36 / Officer xxxx	12:51	4000	1800	√
Rescue 36 / Driver xxxx	12:51	4000	1500	√
Tower 27 / Lieutenant xxxx	16:50	4000	100	√
Tower 27 / Driver xxxx	16:50	3800	200	√
Tower 27 / Jumpseat xxxx	16:50	4000	1500	√
Rescue 27 / Officer xxxx	8:19	4000	3000	√
Rescue 27 / Driver xxxx	8:19	4000	2500	√
Rescue 34 / Officer xxxx	10:45	4000	1200	√
Rescue 34 / Driver xxxx	10:45	4000	2100	√
Engine 34 / Lieutenant xxxx	17:39	4000	0	√
Engine 34 / Driver xxxx	17:39	4000	900	√
Engine 34 / Jumpseat xxxx	17:39	4000	0	√
Engine 23 / Lieutenant xxxx	16:49	4000	1000	√
Engine 23 / Driver xxxx	16:49	4000	1000	√
Engine 23 / Jumpseat xxxx	16:49	4000	2000	√
Rescue 23 / Officer xxxx	10:10	4000	1900	√
Rescue 23 / Driver xxxx	10:10	3900	1200	√
Tower 12 / Lieutenant xxxx	19:20	4000	1500	√
Tower 12 / Driver xxxx	19:20	3900	1900	√
Tower 12 / Jumpseat xxxx	19:20	4200	1500	√
Rescue 12 / Officer xxxx	15:32	3800	1300	√
Rescue 12 / Driver xxxx	15:32	3900	1000	√
Engine 12 / Lieutenant xxxx	19:12	3900	1200	√

Engine 12 / Driver xxxx	19:12	3900	1300	√
Engine 12 / Jumpseat xxxx	19:12	3900	1900	√
Engine 12 / 2nd Jumpseat xxxx	19:12	3900	1900	√
Engine 34 / Lieutenant xxxx	12:50	3900	1100	√
Engine 34 / Driver xxxx	12:50	4000	1100	√
Engine 34 / Jumpseat xxxx	12:50	4100	1200	√
Rescue 34 / Officer xxxx	11:38	4000	1200	√
Rescue 34 / Driver xxxx	11:38	4100	2200	√
Rescue 13 / Officer xxxx	26:49	3900	200	√
Rescue 13 / Driver xxxx	26:49	3800	1200	√
Engine 13 / Lieutenant xxxx	12:04	4000	2000	√
Engine 13 / Driver xxxx	12:04	3800	1800	√
Engine 13 / Jumpseat xxxx	12:04	4200	3000	√
Rescue 36 / Officer xxxx	9:21	4100	2900	√
Rescue 36 / Driver xxxx	9:21	4000	2200	√
Engine 36 / Lieutenant xxxx	13:36	4000	1800	√
Engine 36 / Driver xxxx	13:36	4000	1000	√
Engine 36 / Jumpseat xxx	13:36	4000	2000	√
Tower 27 / Lieutenant xxxx	18:21	4000	200	√
Tower 27 / Driver xxxx	18:21	4000	1000	√
Tower 27 / Jumpseat xxxx	18:21	3600	1000	√
Tower 27 / 2nd Jumpseat xxxx	18:21	4000	1000	√
Engine 27 / Lieutenant xxxx	17:11	4100	200	√

Engine 27 / Driver xxxx	17:11	4000	900	√
Engine 27 / Jumpseat xxxx	17:11	3800	800	√
Engine 13 / Lieutenant xxxx	15:52	3900	900	√
Engine 13 / Driver xxxx	15:52	3900	1900	√
Engine 13 / Jumpseat xxxx	15:52	4000	1100	√
Rescue 13 / Officer xxxx	12:14	4000	2000	√
Rescue 13 / Driver xxxx	12:14	4100	1900	√
Engine 27 / Officer xxxx	2:57	3800	Stopped	No*
Engine 27 / Driver xxxx	2:57	3800	Stopped	No*
Engine 16 / Lieutenant xxxx	27:51	4000	0	√
Engine 16 / Driver xxxx	27:51	3500	500	√
Engine 16 / Jumpseat xxxx	27:57	4000	500	√
Rescue 16 / Officer xxxx	15:29	4000	800	√
Rescue 16 / Driver xxxx	15:29	4500	1200	√
Engine 11 / Lieutenant xxxx	14:30	3900	1900	√
Engine 11 / Driver xxxx	14:30	3900	1400	√
Engine 11 / Jumpseat xxxx	14:30	4000	1000	√
Rescue 11 / Officer xxxx	14:10	4000	2100	√
Rescue 11 / Driver xxxx	14:10	3900	300	√
Engine 35 / Lieutenant xxxx	12:45	4000	1900	√
Engine 35 / Driver xxxx	12:45	4000	1200	√
Engine 35 / Jumpseat xxxx	12:45	4000	2200	√
Rescue 35 / Officer xxxx	13:25	4000	1800	√

Rescue 35 / Driver xxxx	13:25	3900	1800	√
Squad 2 / Lieutenant xxxx	14:49	2000	0	√
Squad 2 / Driver xxx	14:49	3800	1800	√
Squad 2 / Jumpseat xxxx	14:49	4100	2000	√
Squad 2 / 2nd Jumpseat xxxx	14:49	4100	400	√
Engine 35 / Lieutenant xxxx	18:59	3900	800	√
Engine 35 / Driver xxxx	18:59	4000	1200	√
Engine 35 / Jumpseat xxxx	18:59	4000	1300	√
Engine 35 / 2nd Jumpseat xxxx	18:59	4100	1200	√
Rescue 35 / Officer xxxx	12:00	4000	1200	√
Rescue 35 / Driver xxxx	12:00	4000	900	√
Engine 14 / Lieutenant xxxx	20:05	4100	1000	√
Engine 14 / Driver xxxx	20:05	4100	200	√
Engine 14 / Jumpseat xxxx	Incomplete	4000	Stopped	No*
Engine 12 / Lieutenant xxxx	22:02	4000	800	√
Engine 12 / Driver xxxx	22:02	4500	1500	√
Engine 12 / Jumpseat xxxx	22:02	4100	900	√
Engine 12 / 2nd Jumpseat xxxx	22:02	3800	900	√
Tower 27 / Lieutenant xxxx	18:36	3800	1200	√
Tower 27 / Driver xxxx	18:36	3900	0	No
Tower 27 / Jumpseat xxxx	18:36	3900	1500	√
Rescue 27 / Officer xxxx	8:41	3800	1900	√
Rescue 27 / Driver xxxx	8:41	3800	2100	√

Engine 12 / Officer xxxx	22:02	4500	500	√
Engine 12 / Driver xxxx	22:02	3900	1000	√
Rescue 11 / Officer xxxx	12:04	4200	2000	√
Rescue 11 / Driver xxxx	12:04	4000	2000	√
Engine 11 / Lieutenant xxxx	13:46	4000	1800	√
Engine 11 / Driver xxxx	13:46	4000	2000	√
Engine 11 / Jumpseat xxxx	13:46	4000	1800	√
Engine 23 / Officer xxxx	13:35	4000	1000	√
Engine 23 / Driver xxxx	13:35	4000	1000	√
Engine 23 / Jumpseat xxxx	13:35	4200	900	√
Battalion 3 / Chief xxxx	13:35	3800	1000	√
Rescue 23 / Officer xxxx	13:13	4000	1500	√
Rescue 23 / Driver xxxx	13:13	4000	600	√
Rescue 22 / Officer xxxx	15:53	3900	1500	√
Rescue 22 / Driver xxxx	15:53	3900	300	√
Engine 22 / Officer xxxx	18:29	4000	800	√
Engine 22 / Driver xxxx	18:29	3900	0	√
Engine 22 / Jumpseat xxxx	18:29	3900	800	√
Engine 41 / Lieutenant xxxx	12:00	4000	1800	√
Engine 41 / Driver xxxx	12:00	4000	1500	√
Engine 41 / Jumpseat xxxx	12:00	2500	900	√
Rescue 52 / Officer xxxx	17:01	4000	500	√
Rescue 52 / Driver xxxx	17:01	4000	300	√

Engine 43 / Lieutenant xxxx	10:15	4200	1700	√
Engine 43 / Driver xxxx	10:15	3900	2000	√
Engine 43 / Jumpseat xxxx	10:15	4200	2000	√
Rescue 43 / Officer xxx	14:00	4000	1000	√
Rescue 43 / Driver xxxx	14:00	4000	1000	√
Engine 41 / Lieutenant xxxx	13:04	4000	1500	√
Engine 41 / Driver xxxx	13:04	4000	1000	√
Engine 41 / Jumpseat xxxx	13:04	4000	1500	√
Rescue 52 / Officer xxxx	10:01	3900	2000	√
Rescue 52 / Driver xxxx	10:01	3900	1800	√
Engine 11 / Lieutenant xxxx	12:30	4000	2200	√
Engine 11 / Driver xxxx	12:30	4000	900	√
Engine 11 / Jumpseat xxxx	12:30	4000	1700	√
Rescue 11 / Officer xxxx	10:30	2100	0	No
Rescue 11 / Driver xxxx	10:30	3900	1900	√
Squad 2 / Officer xxxx	11:01	3800	1000	√
Squad 2 / Driver xxxx	11:01	4000	1200	√
Squad 2 / Jumpseat xxxx	11:01	3900	2000	√
Squad 2 / 2nd Jumpseat xxxx	11:01	4000	2000	√
Engine 35 / Lieutenant xxxx	18:24	4000	1000	√
Engine 35 / Driver xxxx	18:24	4000	1000	√
Engine 35 / Jumpseat xxxx	18:24	4000	200	√
Rescue 35 / Officer xxxx	16:23	3900	1000	√

Rescue 35 / Driver xxxx	16:23	4000	300	√
Engine 42 / Lieutenant xxxx	14:21	4200	200	√
Engine 42 / Driver xxxx	14:21	3900	1200	√
Engine 42 / Jumpseat xxxx	14:21	4000	900	√
Rescue 42 / Officer xxxx	12:48	3900	1500	√
Rescue 42 / Driver xxxx	12:48	4000	2000	√
Tanker 42 / Driver xxxx	12:48	4000	1800	√
Engine 16 / Lieutenant xxxx	18:18	4100	1500	√
Engine 16 / Driver xxxx	18:18	4000	900	√
Engine 16 / Jumpseat xxxx	18:18	4000	1200	√
Rescue 16 / Officer xxxx	11:15	4000	2000	√
Rescue 16 / Driver xxxx	11:15	4000	2000	√
Engine 22 / Lieutenant xxxx	12:21	4000	2000	√
Engine 22 / Driver xxxx	12:21	3900	1900	√
Engine 22 / Jumpseat xxxx	12:21	4000	2000	√
Engine 43 / Lieutenant xxxx	8:56	3900	2000	√
Engine 43 / Driver xxxx	8:56	4000	2900	√
Rescue 43 / Officer xxxx	15:35	4000	0	√
Rescue 43 / Driver xxxx	15:35	4000	600	√
Rescue 13 / Officer xxxx	13:18	4000	1700	√
Rescue 13 / Driver xxxx	13:18	4000	1100	√
Engine 12 / Lieutenant xxxx	16:00	4000	1800	√
Engine 12 / Driver xxxx	16:00	4000	800	√

Engine 12 / Jumpseat xxxx	16:00	4000	2000	√
Engine 12 / 2nd Jumpseat xxxx	8:59	4000	1800	√
Division 35 C xxxx	8:59	4000	2000	√
Tower 12 / Lieutenant xxxx	11:04	4000	1900	√
Tower 12 / Driver xxxx	11:04	4000	1600	√
Tower 12 / Jumpseat xxxx	11:04	4000	1800	√
Rescue 65 / Lieutenant xxxx	19:15	4000	1000	√
Rescue 65 / Driver xxxx	19:15	4000	900	√
Engine 42 / Lieutenant xxxx	12:33	4000	1000	√
Engine 42 / Driver xxxx	12:33	4000	1000	√
Engine 42 / Jumpseat xxxx	12:33	3900	2000	√
Rescue 42 / Officer xxxx	18:24	4000	1000	√
Rescue 42 / Driver xxxx	18:24	4000	900	√
Rescue 34 / Officer xxxx	9:26	3800	900	√
Rescue 34 / Driver xxxx	9:26	4000	1200	√
Engine 23 / Lieutenant xxxx	14:07	3800	100	√
Engine 23 / Driver xxxx	14:07	4000	1800	√
Engine 23 / Jumpseat xxxx	14:07	4000	1500	√

Appendix B

Other Agencies' Annual Respiratory Training Table

	Fit testing	Don/doff procedures	ID limitations of SCBA	ID proper maintenance	ID proper inspection	ID proper use	ID hazards	Demonstrate operations	Demo communications	Emergency procedures	Air consumption drill	No criteria on demo
Ankeny Fire Dept.	X	X					X	X	X	X	X	X
Adelphia Fire Dept.				X	X	X		X		X		X
University of Virginia	X	X	X			X		X				X
Maine Fire Dept.	X	X			X					X		X
Lincoln Fire Dept.	X	X						X				X
Salisbury University	X	X	X	X	X					X		X
New Jersey Div. of Fire	X		X	X		X				X		X
Oaks Corner Fire Dept.	X	X	X	X	X	X				X		X
Plymouth Fire Dept.	X							X				X
Santa Clara County FD		X	X	X	X	X	X	X				X
FD Town of Menash		X										X
Michigan Occup. Safety	X		X	X	X	X	X					X
Walled Lake FD	X											X
North Cventry Fire			X	X	X	X		X				X
Anderson City FD	X			X	X							X
NJ Division of Fire Safety			X	X	X	X				X		x

Appendix C

Survey of SCBA Competence Training Components

	Emergency breathing	Reduced profile	Entanglement	Air management	Decreased visibility	Attic simulator	Floor joist simulator	Donning procedures	Search techniques	Simulated ventilation	Ladder / stair climb	Confined Space
Tim Sendelbach SCBA Confidence	X	X	X		X	X						X
Tim Sendelbach SCBA Endurance				X				X		X	X	X
Effective Training SCBA Confidence		X	X		X		X					
Fire Engineering Drill of the week SCBA					X				X			
Plymouth FD SCBA training										X	X	
Fire Engineering SCBA Competence Training	X	X										X

Appendix D

Training Standard for SCBA Competency Evaluation

PURPOSE:

This training standard outlines the procedures to be used to carry out annual competency training in the use of self-contained breathing apparatus (SCBA) by Seminole County firefighters. This standard is intended to provide consistent training and evaluation of SCBA competency as recommended by NFPA 1404 Standard for Fire Service Respiratory Protection Training, OSHA 29 CFR 1910.134 Respiratory Protection Standard, and SCFD Operations Bulletin 4007 Respiratory Protection Standard. This standard is designed to educate, train and evaluate each firefighter's ability to perform fireground tasks while using the SCBA in immediately dangerous to life and health (IDLH) environments.

BACKGROUND:

Due to the toxic smoke and gases produced by the fuels of today's fires, firefighters are at a greater risk to injury and death than ever before. The SCBA is considered the firefighter's only defense against these toxins when performing the duties of fire suppression and rescue. It is crucial that every firefighter be proficient in the use of SCBA. Each firefighter must maintain a level of competency that allows him or her to work through every type of emergency situation that may be encountered. This proficiency can only be maintained through regularly scheduled training and practice. NFPA 1404 states that departments shall provide a means for evaluating each member's ability to act properly during emergency situations which require the use of respiratory protection equipment.

OVERVIEW:

Education Component- Annually the Training Section shall develop and distribute respiratory protection training material as outlined in Operations Bulletin 4007 and NFPA 1404 to all company officers. Each company officer will review the material with his or her personnel and ensure and document that each firefighter has a thorough understanding of all the information presented.

Training Component- Annually the Training Section will provide to each Battalion, the equipment and resources necessary to carry out competency based skills training at the company level. Each company officer will ensure their assigned personnel can demonstrate proficiency in the use of SCBA when placed in situations simulating emergency conditions which may be encountered on the fireground. This training shall start out with the firefighter performing emergency procedures with full visibility and no confinement and/or entanglement situations. The difficulty of this training shall be escalated by the company officer as each firefighter's level

of proficiency allows. At the completion of the training each firefighter should be able to perform all of the procedures outlined in the standard proficiently.

Evaluation Component- Once the education and training components have been completed, an annual evaluation of each firefighter will be administered through the Training Section. The evaluation will be based on companies performing routine and emergency fireground procedures while working in simulated IDLH environments.

PROCEDURE:

Education Component - Annual respiratory protection retraining and certification materials will be distributed in the form of handouts, PowerPoint presentation, and/or a DVD. A roster pertaining to Annual Respiratory Protection training shall be filled out and signed by each participant and submitted to the Training Section Staff Assistant by the Company Officers. The retraining and certification material shall include, but not be limited to:

- Types of Respirators used by the SCFD
- How Each Type Functions
- Appropriate Selection Criteria
- Limitations of Each Type
- PASS Device Operation
- Review of the Respiratory Protection Standard
- Emergency Operations with Respirators
- Inspections
- Donning & Doffing
- Seal Check
- General Maintenance
- Medical

All persons employed by the Seminole County Fire Department(SCFD) who may be required to use SCBA must complete the educational requirements as listed above.

Training Component – Training shall be conducted at the company level and in sequential format (i.e. performing skills with visibility and then without visibility) so that a logical progression toward developing competency based skills are achieved for proficiency. A performance evaluation check off sheet shall be completed by each company officer for his or her assigned personnel. These skills shall include, but are not limited to:

- Proper Donning / Doffing SCBA for Pre/Post Entry
- Donning / Doffing During Emergency Situations
- Emergency Procedures for Air Supply Stoppage
- Emergency Procedures for Decreased Air Flow
- Emergency Procedures for Depleted Air Supply
- Emergency Procedures for Cracked/Broken/Damaged Lens
- Emergency Procedures for Ripped or Severed Hose

- Emergency Procedures for Uncontrolled Discharge of Air from Regulator
- Emergency Procedures for Uncontrolled Discharge of Air from Cylinder
- Emergency Procedures for Walking While Buddy Breathing
- Emergency Procedures for Crawling While Buddy Breathing
- Emergency Procedures for Climbing While Buddy Breathing
- Emergency Procedures for Descending a Ladder While Buddy Breathing
- PASS Activation / Deactivation
- Reduced Profile Procedures for Partial Escape
- Reduced Profile Procedures for Full Escape
- Reduced Profile Procedures Cylinder First Approach
- Disentanglement Procedures
- Emergency Egress Procedures
- Air Consumption Rate Awareness and Control Procedures

Evaluation Component: Annually, units will be scheduled to attend an Annual SCBA Proficiency Evaluation. Location of the evaluation will be the same for all personnel each year and shall include the SCFD Training Center or acquired structures. The proficiency evaluation shall consist of an accumulation of skills listed in the training component of this standard. NFPA has recommended guidelines for firefighter evaluations for the use of SCBA which include:

- Demonstrate the operation of the SCBA used by SCFD
- Demonstrate the possible means of communications when wearing SCBA
- Demonstrate techniques for donning and doffing SCBA
- Demonstrate knowledge of the components of respiratory protection
- Demonstrate use of all SCBA utilized by SCFD under conditions of obscured visibility
- Demonstrate operations when that are required when an SCBA fails
- Demonstrate techniques using an SCBA to assist other members, conserve air, and show restrictions un use of the bypass valve
- Demonstrate use of an SCBA in confined spaces (or areas)
- Demonstrate proper cleaning and sanitizing of the facepiece

Competency Evaluation Exercise

In order to complete each of the benchmarks identified above by the NFPA, a scenario based exercise will be completed by each SCFD firefighter. This exercise will be completed by intact companies of two, three or four firefighters in order to most accurately simulate actual structural firefighting situations encountered. The evaluation will be administered by members of the training staff as follows:

- Individuals will start the evaluation dressed in full structural firefighting PPE and will demonstrate the proper procedures for donning the SCBA in sixty seconds or less.
- By the use of a vision barrier device provided by the Training Staff, each firefighter's visibility through there face mask will be limited to near zero.
- Companies will perform routine simulated firefighting operations including but not limited to; forcible entry procedures, advancing charged hose lines, and room search

techniques. These tasks will be performed by all members of the participating crew in order to, as accurately as possible, bring each firefighter to the physiological and psychological condition experienced while performing interior structural firefighting operations.

- At a point determined by the Training Staff members conducting the evaluation, the crew will be instructed to orient themselves on a hose line or wall to allow for an expeditious exit of the structure, using the hose or the wall as a reference.
- The egress route will be set up by members of the Training Staff and will lead members of the participating crew through a series of obstacles representative of those which could be encountered in an actual structure fire. The obstacles encountered will include but not be limited to; entanglement simulator, reduced profile props, confined area props and bare rafter/joist simulators.
- During the emergency egress exercise at least one member of each crew will be placed in a simulated "out of air" or "SCBA failure" situation by the Training Staff in order to evaluate how the members of the crew will respond to a "no air" event.

It is expected that each crew will be able to successfully make egress through the series of obstacles and appropriately respond to any and all simulated SCBA related emergencies that may be inferred on them by the training staff. Crews should complete the exercise while successfully maintaining crew integrity. In the event a member or members of a crew cannot successfully complete the exercise, the remaining members will be expected to carry on as they would during an actual structure fire event involving the same emergency. Members of the Fire Training Staff will ensure that each member of the participating crew can negotiate each obstacle and/or situation encountered safely and proficiently and without exposing themselves to the IDLH atmosphere. Evaluators will observe and document all information regarding participants who show signs of physical and/or psychological difficulties completing the exercise and this documentation will be submitted immediately for review by the Division Chief of Professional Standards, who will determine the appropriate action to be taken with those personnel who cannot successfully complete the evaluation.