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NFPA 1851: What this Standard Means for Wolfforth Fire and EMS

Christopher R. Addington

Wolfforth Fire and EMS, Wolfforth, Texas

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

Wolfforth Fire and EMS has experienced growth and change throughout the years and is now attempting to endure compliance measures provided to them by the Texas Commission on Fire Protection (TCFP). The problem was: Wolfforth Fire and EMS did not have the TCFP required personal protective equipment program that complied with the National Fire Protection Association (NFPA) standard 1851. By not having a compliant program in place, the department was subject to fine and reprimand to varying degrees. The purpose of this research was to identify the components of NFPA 1851 and to establish an NFPA 1851 compliant personal protective equipment program. This ARP employed a descriptive research method, including a literature review, interviews, and questionnaires, all of which were conducted to provide the needed information to answer the following research questions: (a) How was the NFPA's standard 1851 developed? (b) What are the primary components of NFPA 1851? (c) Why does the TCFP require an NFPA 1851 compliant program? (d) What are the consequences for non-compliance with this standard? (e) What are other departments doing to satisfy this requirement? (f) What is the knowledge base of Wolfforth Fire and EMS in regard to NFPA 1851?

The research results revealed that changes were necessary on behalf of all personnel. Recommendations were made at the national level which included addressing the makeup of technical committees for the NFPA, garnering involvement from the fire service in standard development, and a review of the current edition of NFPA 1851. Recommendations were also made at the local level concerning the replacement cycle for gear, the purchasing of lockers for proper storage, and a change in mindset and leadership style on the part of the officers.

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Wolfforth Fire and EMS transitioned from a volunteer to a combination department in October of 2006 with the implementation of 24 hour staffed EMS/Fire Fighters. Along with this transition the decision was made in 2009 to be regulated by the state-certifying agency, the Texas Commission on Fire Protection (TCFP). Wolfforth Fire and EMS provides fire, life safety, and emergency medical services to not only the 4,170 people residing within the city limits of Wolfforth, but also to an approximate population of greater than 15,000 in the 98 square mile response area surrounding the city limits (Wolfforth Fire and EMS, n.d.). Wolfforth Fire and EMS also provides regional hazardous materials response to a 15 county area in the Texas panhandle through both the paid and volunteer portions of the department. Aside from these normal response duties, Wolfforth Fire and EMS also hosts a state certified structural firefighting training academy. Wolfforth Fire and EMS has always provided outstanding service to the community and also ranks among the top educational institutions in the state for structural fire suppression training. However, with the training academy and the decision to become a regulated department under the Texas Commission on Fire Protection, many things that used to seem relatively un-important are now paramount. The problem was that the Wolfforth Fire and EMS does not have the TCFP required personal protective equipment program that complies with the National Fire Protection Association (NFPA) standard 1851 (National Fire Protection Association, 2008). By not having a compliant program in place, the department is subject to fine and reprimand to varying degrees (Larry Renfro, personal communication, November 22 2009) The purpose of this research was to identify the components of NFPA 1851 and establish an NFPA 1851 compliant personal protective equipment program. This ARP employed a

descriptive research methodology. The procedures used to collect data were interviews and a questionnaire. The following research questions used to guide this research were: (a) How was the NFPA's standard 1851 developed? (b) What are the primary components of NFPA 1851? (c) Why does the TCFP require an NFPA 1851 compliant program? (d) What are the consequences for non-compliance with this standard? (e) What are other departments doing to satisfy this requirement? (f) What is the knowledge base of this and other departments in regard to NFPA 1851?

Background and Significance

The Wolfforth Fire Department was established in 1956 as an all-volunteer department. At that time the members were just local businessmen and local citizens who were willing to show up and prevent fires from spreading from house to house as the culture of that time, according to log books, was not to enter a house but to protect exposures and prevent conflagrations. In the late seventies Wolfforth EMS was established as a separate entity to provide emergency medical services to the people within the city limits and surrounding county. These two agencies, despite being housed within the same building, remained separated for the better part of three decades until a leadership change in the two departments led to a joining of the agencies and a change in name to Wolfforth Fire & EMS.

Even though the name was changed, many of the old ways of doing business continued. New fire apparatus were purchased along with self-contained breathing apparatus, but bunker gear or turnout gear had never been an intense focus of the department. Again demonstrating a link with the past, the staffing model of all-volunteer remained for both the fire and EMS divisions of the agency.

The twenty-first century brought many changes to the department that greatly impacted the practices within the agency and the regulations under which the agency now fell. The first change that came to the department was the initiation of a TCFP certified training academy in May of 2003; another major change transpired in October of 2006 with the first change in staffing of the department, moving from volunteer to full-time staffing of the ambulance. This staffing model originally was only for the provision of emergency medical services and did not require that personnel be certified in fire protection which, like everything else, was about to change. The latest change in the department (which began in late 2009 with plans to be fully implemented by October 31st of 2012) stands to produce the greatest impetus for change in the city's budget, as well as the department's purchasing, maintenance, and record-keeping policy and procedure. This change is the move to a fully regulated department under the auspices of the TCFP. With this change, all certified personnel on the department - approximately 32 volunteer and 30 paid staff - will be required to comply with the standards of the TCFP. More specifically, this change will require that the gear of all personnel be maintained in accordance with NFPA 1851 (Texas Commission on Fire Protection, 2001). Previously, bunker gear had been purchased on an "as needed" basis and was maintained on hooks in direct light of skylights in the apparatus bay. When the gear became worn or unusable, it was either replaced or handed down to junior members that were not allowed to make entry into structure fires. Gear was rinsed after a structure fire or grass fire with hose lines and then left hanging on the member's hook on the wall to dry. Formal washing of the gear was only done if the gear was exposed to some type of hazardous material or occasionally done incorrectly in the local Laundromat.

In order to further provide the significance these changes pose to the department, an explanation of NFPA 1851 (National Fire Protection Association, 2008) is included in Appendix A. The original version of NFPA 1851 was written in 2001 as a companion to previous documents concerning protective ensembles for structural firefighting. These previous documents were intended to provide the manufacturers with the specifications for the production of protective clothing. NFPA 1851 was written with the intention of providing departments the ability to evaluate the risks responders encounter, to promote the development of and improvement of purchase specifications and to enable the users to be able to inspect, care for, and properly maintain the protective clothing provided them by their departments.

The standard intends for the person who actually uses the protective ensemble to be aware of its condition, any need for cleaning, repair, or further inspection. Also explained in the standard were advanced inspection techniques to be completed by trained members of the department and a requirement for the development of a records management system.

The edition of NFPA 1851 adopted in 2008 was a complete revision of the standard from the original. The formatting of the standard followed that of most standards in regard to purpose, scope, application, and explanation of reference materials, but the later chapters were revised to address the program requirements, the selection criteria, the inspection processes, the cleaning and decontamination of ensembles, how repairs were to be accomplished, retirement of clothing, storage, and advanced testing.

It was in these later chapters that many of the new changes were identified such as the new requirement for independent service providers and their verification for the performance of inspection, cleaning, and repair of protective garments; the new

requirement that any part of the protective ensemble that reached ten years from manufacture date be retired from service. In addition, new light and vapor test additions were introduced and explained.

With this short summary of NFPA 1851, it is clear that a department which previously had little or no concern for gear now has to insure that certain cleaning, storage, maintenance, testing, and retirement standards are met or risk coming into not just non-compliance with NFPA 1851 but more so the TCFP who adopted and therefore enforces the standard.

This research is directly linked to the Executive Fire Officer program (EFOP) – Executive Development through the concept of change management (United States Fire Administration, 2011, p. SM 5-3). The topic of this research is relevant to one of the United States Fire Administration (USFA) operational goals, which is to improve local planning and preparedness (United States Fire Administration, 2012). A major emerging concern dealing with planning and preparedness is fire fighter safety and improvements in structural firefighting protective ensembles, while providing gear to the members of the fire service in the most cost effective manner possible while still remaining within both accepted and required regulations.

Literature Review.

Because of the volume of press surrounding NFPA 1851, there have been several articles and opinions written regarding its validity, purpose, and potential outcomes. This review serves to reference a few of these articles and provide support for positions and statements made after this particular section.

Although being an older article, Piliero (1988), in his article for *Fire Journal*: *The NFPA and the Standards Making Process*, explains that one of the greatest contributions that the

private sector makes to the public sector is the development of standards for use in public safety. This article explains that this volunteer process is very beneficial to the public sector as it incorporates the knowledge and experience of experts from the private sector into a usable media for those in the public sector. One area of concern that is mentioned, however, is that the potential for abuse does exist as those members of the committees representing the private sector could potentially misuse the process for gain. Should this misuse occur the potential for standards that do not provide the necessary levels of safety could be written and therefore enforced without just cause (Piliero, 1988, p. 24).

Varone (2008), in a portion of *Firehouse*, labeled: From the NFPA, authored an article entitled *The NFPA: Why Should You Care?* In this article, the question is asked: how are NFPA standards developed? Following the question, an explanation is given which illustrates that the codes process is the most important activity of the NFPA. Also explained, is the fact that the actual standards are developed by committees of technical experts who have studied the subject matter scientifically and gathered data about the particular subject being discussed. (p. 46). The remainder of the article addresses why firefighters care and urges greater involvement on behalf of the fire service.

Related to both of these articles is a publication from the NFPA, entitled *The NFPA Standards-Making System*, which addresses another aspect of the standards development process, compliance. This publication explains that the NFPA does not have enforcement power and that the standards developed are merely to be advisory. However, because of the unique reputation of the NFPA and its committees, many levels of government have adopted the standards, thereby giving them the force of law (NFPA, n.d.).

Looking further at NFPA standards, Murphy (2007) provides a synopsis of the code development process. Murphy explains that the process begins with a call for proposals to amend existing or create new standards. From start to finish the process takes nearly two years to complete. In the first step, the committee meets and decides to act on proposals through a balloted vote and prepares a report on its decisions. The second step involves another meeting which allows public comment, further development of committee comments, and subsequently, the preparation of a supplemental report. Also a function of the second step is the taking of another vote to determine if the process should continue or end. To advance to the next step a two-thirds approval vote must be received. Once this vote of approval is received, a report is then published which is now available for public review. During the third step of the process, NFPA membership meets to take action on the committee report usually in a meeting held in May or November. During this meeting the committee again votes on any amendments to the report. In the fourth step, a notification of intent to file an appeal with the Standards Council must be filed within 20 days of the May/November meeting. Nearing completion, the Standards Council decides (based on their interpretation of the evidence) whether to issue the code of take further action. Murphy (2008) explains that the number of fire service members who attend the hearings is very low—at times you will hear from the floor of a code hearing meeting: ”There is no one from the fire service here objecting to this code change.” “The percentage of fire service attendees at building code and fire code hearings is 10 percent or less; it sometimes may reach 20 or 25 percent. The fire service must strengthen its participation and must stay the full length of the code hearing” (Murphy, 2007, pp. 80-82).

Bradley (1992), a former EFOP candidate from the North Carolina Fire and Rescue Commission, wrote an ARP which examined and compared the application of standards (more specifically, training standards) to local practice. Many determinations were made throughout the paper but Bradley (1992), in the recommendations section, explained that national standards should be utilized as guidelines for the development of procedures and policies which govern training activities. Also explained is the premise that every effort should be made to strengthen the use of the standards, especially as they relate to local use. Bradley (1992) states that when a national standard is not a perfect fit for local use, the intention should not be to discard the standard completely but rather to determine the portions that are applicable and apply them locally.

Redler (2005), in an article written for *Firehouse* entitled *Rugged Turnout Gear Requires Delicate Care,* makes several references about gear and NFPA 1851. Redler (2005) explains that "firefighter turnouts can withstand the effects of a burning building, yet a simple home washer can render them useless" (p.80). Redler details much concerning the proper washing of gear and he also explains that cleaning and decontaminating fire gear can either be done at an on-premises laundry (OPL) at the firehouse or by working with a gear-cleaning service that specializes in handling firefighter turnouts" (Redler, 2005, p.80). Redler closes with a pointed statement saying that "properly cleaned turnout gear will last longer because the various components of the gear—shell, moisture barrier, and temperature barrier—will be cleaned without damage to the goods" (Redler, 2005, p. 80).

Stull (2006) outlines fire department regulations for the proper selection, care, and maintenance of structural firefighting PPE in accordance with NFPA 1851. Specifically a

department must: (a) establish a program that tracks the life of the personal protective equipment, (b) develop risk-assessment procedures and field tests, (c) educate personnel how to insure that both routine and advanced inspection are accomplished, (d) provide a mechanism for routine, advanced, and special needs cleaning, (e) perform repairs, (f) provide storage safe from ultraviolet light, and (g) complete and document the retirement of any garment that has past ten years from manufacture.

Brehm (2007), who has served on the technical committee for NFPA 1851 since 1987, authored an article entitled, *Well Worn*, for Fire Rescue Magazine. Brehm (2007) explains, in regard to the inspection section, that departments should create SOPs to help members determine how and when to inspect, clean and repair PPE so that some level of safety and consistency are maintained. These SOPs, if possible, should be created through interaction with and with assistance from the manufacturer. The inspection practices detailed in NFPA 1851 could perhaps be undertaken as recruit education or assigned as routine station drills for companies to complete. Brehm (2007) explains that the standards inspection practices are easily accomplished at the fire station with a minimal investment in equipment. To inspect the thermal barrier the standard recommends holding a light behind the thermal barrier and looking for bright spots indicating a bunching or thinning of the barrier. Another test which provides quick assessment of the moisture barrier integrity is the "bucket test" (Brehm, 2007, p.56). It explains that to conduct this test, the user drapes a high use area of the moisture barrier over the top of an open five gallon bucket, forming a cupped area. Once draped, a water/alcohol mixture is poured into a cupped area and allowed to sit. After a short period the underside of the barrier is assessed for any sign of leakage. The standard - NFPA 1851- provides detailed instructions concerning how

to conduct both tests and recommends which areas (more susceptible to degradation) of the liner firefighters should test.

> One new addition to the document regarding inspection is the requirement for a complete visual inspection of PPE liner systems every 3 years. This inspection must be performed by a qualified person, either within the department or by an ISP, as the liner system must be opened for visual examination of both sides of the moisture and thermal barriers. (p. 56)

Swartzwelder (2005) penned the article *Are You Friend or Foe?* In this article, Swartzwelder explained that the new guidelines published by the NFPA focus particular attention on properly cleaning and maintaining protective clothing. Later in the article, after providing background on the build-up of hydrocarbons and carcinogens in bunker gear, Swartzwelder explains that "there are over 20 accredited cleaning and repair companies in North America that are environmentally sensitive and can provide a biodegradable cleaner for cleaning high performance fabric used in your PPE" (p.78). The article describes these companies abilities and services, and states the following: "they provide training seminars, and have programs and information to assist agencies in developing standard operating procedure (SOP) documents" (p.78) ; "they can provide a higher level of safety for firefighters by providing maintenance in house;" (p78) and these companies can also assist fire departments in taking previously thought of unusable turnouts and economically refurbish them to meet the NFPA 1851 Standard. The potential use of the turnouts as a second set or as loaner gear is inferred in the article, as well as the ability of departments to stretch their budgets farther through the utilization of refurbished but safe and clean PPE. (Swartzwelder, 2005, p.78).

Former Lubbock Fire Chief Cooper (2001), an EFO graduate, did an ARP over Strategic Management to Change. In his project he evaluated the attitudes of entry level firefighters and how the diversity of applicants has caused a change in values among the new recruits. In his discussion section, Cooper explains that "change is inevitable. If the fire service had not changed, we would still be trying to put out fires with bucket brigades and horse drawn pumps" (p. 22).

Zender (2008) explains the necessary steps for proper maintenance of protective clothing. Included in these steps is advanced cleaning prior to reuse, advanced inspection of all protective ensembles and extensive record keeping; all of which may lead to ineffective use of time and a high price because of the costs involved with the proper training of employees to perform advanced inspection, the cost of specialized equipment, and the needed repair materials. "Departments often choose to pass advanced maintenance, and the liability that goes with it, to professional cleaning services, but firefighters can still perform the basic record keeping, cleaning, and inspection of the gear that could save their lives" (Zender, 2008, p. 127). A related side note is found at the bottom of the article, where it explains that "Donald Zender is founder and president of Apex Fire Services, a Columbus, Ohio-based NFPA 1851-compliant ensemble cleaning, inspection, maintenance, and repair specialist" (Zender, 2008, p. 127).

Cleaveland (2008), in an article for Fire Chief magazine entitled *Texas Turnout: Texas Law Requires Fire Departments to Comply With the Latest Edition of NFPA 1851 for PPE Maintenance,* explains that Texas fire departments have been required to comply with NFPA 1851 since the standard was formally adopted by the TCFP in 2004. However, "on June 24, the 2008 edition went into effect, bringing with it more rigorous testing requirements and for many

departments, more cost" (Cleaveland, 2008, P. 88). Later in the article, Cleaveland also states that one of the tests now required by the new standard is a pressure test which is actually a water-penetration barrier evaluation requiring that one psi of water pressure be placed against the backside of the barrier on specific areas of the garment. This particular test is to be performed at the three year anniversary of the garment from its date of manufacture and then every year after that until retirement at the 10 year mark. Highlighted in the article is the fact that this test is problematic for many departments because a considerable amount of gear is failing this water penetration test. Cleaveland explains that even new unused protective clothing is failing the test and that perhaps what exists is not a test problem but, more so, a manufacturing problem (p. 92). Even so, these two items are not the only issues of concern that arise from this article. If one recalls the new requirement set out in Chapter 10 of the 2008 edition of the standard which requires the retirement of gear upon its ten year anniversary, Cleaveland provides some insights on this, as well, when he explains that many departments maintained reserve gear to be utilized in case of emergency, i.e. damage to a fire fighters gear which needed repair. Some of the reserve gear would typically be older than 10 years but with the new standard, this would be impossible because the standard requires retirement at the 10 year mark (p. 93).

Markley (2007), posits that the majority of fire chiefs would agree that minimum standards for cleaning and maintenance of protective clothing are beneficial to the members, the department and the protective clothing. However, there is more than one route to compliance with the requirements of NFPA 1851. A program offered by Lion Apparel - Lion Total Care - has surfaced as an option or path for some to take in obtaining compliance with the standard. Ultimately, this service provides onsite pick-up of equipment, advanced cleaning, inspection, and

repair of the equipment and then timely return. Regarding price and other concerns, Markley explains that this service does not come cheap and that many departments would be unable to justify the expense incurred (p. 90).

Another EFOP paper was written by Cheshire (2006), and was entitled *A Survey in Measuring the effectiveness of NFPA 1851*. Many points of interest can be derived from this particular writing. Some of these are included in the following paragraphs.

Cheshire conducted a survey of 484 fire service professionals across the State of Texas. Overall it was determined that of the departments polled 65% did in fact utilize NFPA 1851 within their respective jurisdictions. This means therefore, that there are 35% which do not and what this means in simplified terms is that (at the time of the study) of those surveyed 35% were already non-compliant.

Cheshire, while doing his research obtained literature for review. In a particular portion of the literature review for the project, Cheshire identified two articles out of a publication called "Personal Communication." This review revealed that deciding whether to comply or not was clear; either the department fell in line with the requirements of the standard or faced penalty and fine (p. 22).

In a later portion of his work Cheshire shows the importance of the standard when he discusses the 35% of departments that were non-compliant and the need for compliance. Regardless of the cause- budgetary constraints, poor or inadequate training, or perhaps even ineptitude - the fire service cannot stand by idly when the safety of firefighters is compromised. "These un-needed risks are preventable, and can be alleviated by complying with NFPA 1851"(p. 26).

For the purposes of providing support for the statements made by those supporting NFPA 1851 and accusations made by those in favor of full compliance, an attempt was made to find (through articles, data, or any other publication) evidence that bunker gear failure was a true and factual cause leading to the death of fire fighters. Among numerous reports and publications made by the United States Fire Administration (2001) and even as part of the *Courage to be Safe – Everyone Goes Home* (2012) campaign that is being led by the fire service nationwide, not a single piece of literary work could be located which evidenced that failure of bunker gear led to a fire fighter's death. There were articles which stated that lack of wearing the proper PPE contributed to the injuries sustained, but not a single article, book, or publication able to maintain that a failure of the personal protective equipment, when worn, was a cause of injury or death. This being the case, a more stringent examination of the requirements set forth in the new standard (specifically, changes from the old standard) is required.

In an effort to simplify the material presented in both standards (and to make the changes more understandable), a publication from Globe Manufacturing (2008) was obtained highlighting the most significant changes to the standard. This publication is available in Appendix B.

Rezazadeh and Torvi (2010), in their work published in Fire Technology, explain that to quantify the useful years for fire fighters' protective clothing is extremely problematic. Taking into account the many variables, such as different fire fighters, different roles of fire fighters even on the same department, different fire conditions experienced by these fire fighters, there is no way to say exactly how long a piece of protective clothing is able to be used. "For example, a

fire department in a large metropolitan area may not be comparable with a fire department in a rural area in terms of number and size of fires and type of firefighting operations" (p. 569).

Also arising from the research of the literature was a discovery of communication between the TCFP and the NFPA 1851 committee. This first letter was from the Presiding Officer of the TCFP, Kelly Stalder (2008), (Appendix C) to the NFPA committee asking some questions from the committee that needed clarification. Specifically the letter addresses gear manufactured prior to the new standard and how it was to be handled when manufacturers admitted it would not pass the new tests. A recommendation was also made that accredited independent facilities be utilized to determine what was an adequate and appropriate performance of PPE and what testing should be conducted.

There was also a letter from NFPA Committee Chair Stephen J. King (2008) (Appendix D) which explains the selection and standards development process, who composes the committee, and insists that no one portion of the committee has greater than one-third of the voting membership. The letter states that gear built in compliance with the previous standards should pass the new tests without fail, and that manufacturers should be responsible for providing training related to the areas of testing, inspection, and cleaning. King (2008) admits that some problems will arise from the new standard as many retailers will no longer stock expiring gear on their shelves forcing wholesalers to become retailers, subsequently causing a backlog in the provision of gear to departments (p. 3).

Bruegman (2005) explains that change is motivated by internal and external forces but that a leader must have an integral role in change. As a part of this change top management must take an active role and set an example for others to follow. Systems must be in place to track the

progress of change at all levels of the organization, including everyone from both the very top and the day-to-day operations. As a true leader, part of one's position is to establish the set points and to force the organization to move beyond them. Finally, the provision of vision and education in reference to the path to change must be disseminated throughout the organization (p. 117). The literature reviewed provided an overview and foundation for further data collection.

Procedures

The processes used to complete this paper varied and admittedly changed from its original concept into its completed form. The descriptive research for this paper consisted of two procedures: interviews of experts and involved parties to determine a true and factual result and a questionnaire to assess the knowledge base and opinions of members of Wolfforth Fire and EMS.

Multiple interviews were conducted with different people, involved in various ways with the fire service. The first of these was with Dr. Burton Clark (personal communication, March 17, 2009) of the National Fire Academy in regard to standards development and validity. The next interview was conducted with Larry Renfro (personal communication, September 6, 2011) (now retired), compliance officer for the TCFP, to gain perspective about compliance with the standard and potential punishment for non-compliance. The third in this series of interviews was with Derek Briggs (personal communication, November 8, 2011). Mr. Briggs is a Lieutenant with the Abilene Texas Fire Department. Briggs, under the direction of Captain Eddie Crane, oversees the department's bunker gear / PPE program. The purpose for interviewing Briggs was to get the first-hand perspective from someone involved with the

testing of gear and to obtain firsthand factual results of bunker gear testing under the new standard. Deputy Chief Chris Angerer (personal communication, December 13, 2011) of the Lubbock Fire Department was chosen to complete the fourth and final interview. Angerer is the person from the department who oversees the management aspect of the bunker gear and PPE for the Lubbock Fire department as well as being responsible for budget recommendations and requests. The last interview was conducted with Caitlin Creed (personal communication, December 16, 2011) of Gear Cleaning Solutions, a bunker gear repair, cleaning, and rental facility in Dallas, Texas. The interview with Ms. Creed was conducted to determine availability of rental programs and their possible and existing utilization.

A questionnaire (Appendix J) was developed to obtain the knowledge level - regarding NFPA 1851, their feelings about their personal protective equipment, and recommendations for compliance with NFPA 1851 from the members of Wolfforth Fire and EMS. This questionnaire was distributed to those present at the regular business meeting on January 9th, 2012. At this meeting a total of 19 questionnaires were distributed. All of the questionnaires returned were used for the completion of the results explained below. The only limitations placed on the respondents to the questionnaire were to answer honestly and to try and provide as much detail as possible. An unintended but unavoidable limitation was the limited members in attendance at the meeting. To better assemble the responses, the questionnaires were sorted into two separate groups of respondents - current officers and firefighters.

Results

Research question one asked: How was the NFPA's standard 1851 developed? Clark (personal communication, March 17, 2009) explained that in regard to the development of

standards, the new fire standards are “made by a group of people sitting around a table, and perhaps even worse they are primarily written by salespeople who are trying to move their products (B. Clark, personal communication, March 17, 2009).

Research question two asked: What are the primary components of NFPA 1851? Two different perspectives and explanations were obtained from the interviews conducted regarding this question. Renfro (personal communication, September 6, 2011) explained that the standard requires mainly two things: interaction with the manufacturer to determine what advanced testing and cleaning is required and extensive record-keeping, including the testing and maintenance that is undertaken. Briggs (personal communication, November 8, 2011), explained that a portion of the standard required individuals or agencies to become certified as testers. Also explained during the interview was that a hydrostatic test was required at the three year mark from manufacture date. Briggs (personal communication, November 8, 2011) explained that for a full set of gear (coat or pants), each garment is tested in three places - two high friction areas and one other area. Speaking about the Abilene Fire Department, Briggs stated that the coats were tested in the armpit area, over the shoulders, and some portion of the chest. The Pants are tested in the crotch, the knees, and a portion of the buttocks area. The actual testing was explained as follows: “a metal ring clamps thermal and vapor barrier down against a rubber boot on a plate. The plate has two ports, one with water and the other with a gauge. Once connected and secured, what looks like an aquarium pump is turned on and pressure is increased until one psi is reached on the pressure gauge. The test runs thirty seconds under direct water pressure, not vapor pressure, and then you remove the garment and look for moisture on the thermal

barrier. If moisture is present the garment fails" (D. Briggs, personal communication, November 8, 2011).

Research question three asked: Why does the TCFP require an NFPA 1851 compliant program? Renfro (personal communication, September 6, 2011) explained that the TCFP actually adopted NFPA 1851 in 2004 along with subsequent updates since then. The standard was originally adopted as a way to try and provide for compliance with some type of bunker gear standard, because the Texas Government Code stated that departments had the liability to provide gear and to maintain it according to the NFPA standards.

Research question four asked: What are the consequences for non-compliance with this standard? Renfro (personal communication, September 6, 2011) explained that should a department be found to be non-compliant, the fine can be greater than one hundred dollars per day. The fines, though, are not immediate and he further explained that once the non-compliance is determined the department is given 14 days to start attempting to become compliant. If nothing is done, then a subpoena is issued for the administrators to report to Austin, TX for a face-to-face discussion. However, this is all about to change as the Commission undergoes a Sunset Commission Review; the new policy will be the immediate issuing of a citation with thirty days to correct. Re-inspection will then occur, and if the deficiency is not corrected, an automatic fine is issued.

Research question five asked: What are other departments doing to satisfy this requirement? Angerer (personal communication, December 13, 2011) explained that Lubbock Fire Department had explored many options in order to become compliant. The first of which was to hire a full time employee just for testing of protective equipment. Angerer (personal

communication, December 13, 2011) explained that with the number of personnel and the amount of gear to be tested and recorded, this full time person would have to be dedicated to this program and nothing else. With adequate pay and benefits this employee would cost the department between $50,000 and $60,000 per year (C. Angerer, personal communication, December 13, 2011). Angerer then explained the process that was in place to maintain compliance by Lubbock Fire Department. The department will replace one third of the department's gear every three years. This process is the best fit for the department when one considers: the cost of equipment to perform the tests, the increased cost of replaceable liners, the time spent to conduct the test, maintaining training and validation of the person conducting the tests, and the yearly salary for a person to conduct the tests and track PPE (C. Angerer, personal communication, December 13, 2011).

Creed (personal communication, December 16, 2011) stated that the goal of GCS is to help any size fire department develop and implement an NFPA 1851 selection, care and maintenance program. Creed (personal communication, December 16, 2011) explained that many departments are renting gear and/or sending gear to their facility for repair, cleaning, and inspection. "Our state of the art facility has experienced, knowledgeable staff that can help you and your department create a compliant care and maintenance program" (C. Creed, personal communication, December 16, 2011).

Research question six asked: What is the knowledge base of Wolfforth Fire and EMS in regard to NFPA 1851? Compiling the results from the questionnaire given to the members of Wolfforth Fire and EMS provided the following data. Nineteen questionnaires were returned, nine from officers and ten from firefighters. Greater detail was provided due to the limited

number of responses, and therefore the responses are provided as written in table format in Appendix J Tables 1-4.

Sixty Eight (68%) of the respondents, 13 of 19, answered question one with something besides "I don't know, or no knowledge of." Of these 13 responses there was a variety of answers, although many of them stated that some type of inspection was necessary - washing should be done annually. One response by Lance Barrett (a bunker gear and fire equipment salesperson on his off days) was most accurate concerning the standard and included the aforementioned puddle test, light test, and hydrostatic test after the third year. Only 36%, seven respondents, mentioned any type of record keeping as a requirement.

Question Two (Table J2) provided similar results in that 47%, nine respondents, indicated that yearly or annual washing was required by the department. Only 42%, 8 respondents mentioned a newly implemented program of gear replacement for certified members at three year intervals.

Question Three, (Table J3) had an almost 100% response, being NO or some very close variation of NO. Three respondents indicated that they believed their gear was compliant. Of interest, when comparing their responses from question one to question three, two of the three indicated that they did not know what was required for compliance.

Question Four (Table J4) brought the widest array of responses, which is exactly what the question was intended to do. Some of the generic answers included that the department was either compliant or to keep doing exactly what we have been doing as it has kept us safe thus far. Two responses dealt with improving record keeping and better records management. One of these two indicated a potential need to implement new gear buying procedures. Two responses

indicated that a need exists to lobby against standards that are too stringent or to request a change in the standard to make it more realistic. Two other respondents felt that simply buying gear on a more frequent rotation was the best course, listing the aforementioned three year replacement with one stating a preference of buying new gear every year. Lastly, one recommendation was to rent or lease gear as a way to stay in compliance. These findings show that a lack of knowledge about NFPA 1851 and what is required to maintain compliance exists. This also illustrates that a potential for a mindset change in regard to the importance of protective clothing and compliance among the members of the department is essential in progressing toward obtaining and continuing compliance.

Discussion

Varone (2008) in his work explains that NFPA standards are developed by technical experts who have studied the subject matter. Piliero (1988) confirms this and states that this volunteerism on behalf of the private sector is something of great benefit as it produces an increased safety factor for the public sector. Also mentioned however in the same article is the potential for abuse and the misuse of the standard writing process for gain. (Piliero, 1988, p. 24). Clark (personal communication, March 17, 2009) explains that now the standards are generated by people sitting around a table and perhaps unjustly created by salespeople attempting to promote their livelihood and sustainability. Angerer (personal communication, December 13, 2011) explains this as well when he states that:

> PPE manufacturers are lining their pockets. The manufacturers sell new gear as well as offering to test and repair gear. What a deal? Money for new gear, money for testing,

> failing, and then providing new gear. (C. Angerer, personal communication, December 13, 2011)

Briggs (personal communication, November 8, 2011) explained that the standard was written in such a way that it put the fire service in a hockey fight, in which the manufacturers have our jersey pulled over our head and are delivering several good blows. A process that will continue until the fire service steps up to make a change. Cleaveland (2008) supports Briggs' comments by explaining that the new unused gear is failing the test which will inevitably place a burden on fire departments who try and maintain compliance. In regard to the standards development process, it appears that as outlined by Murphy (2007) the process takes about two years to complete and allows for interaction by the fire service to steer or make recommendations before adoption. Yet as Murphy states, "There is no one from the fire service here objecting this code change" (Murphy, 2007, p. 82). There was even concern about this process and the formation of the committees by the TCFP, which resulted in the letter sent from Stalder (2008) to the NFPA 1851 committee. This letter was met with a reply stating that the process worked and that there was no chance for abuse because the committee was made up of fire fighters and persons representing fire fighters, service organizations, union, compliance agencies, manufacturers, research and testing representatives, and special experts, and that "No one of these member classifications can have more than one-third of the voting membership of the committee" (King, 2008, p. 1).

Renfro (2011) explained that the even from the compliance side of TCFP that the basic premise of NFPA 1851 requires two basic elements: interaction with the gear manufacture to develop advanced testing and cleaning procedures and extensive recordkeeping in regard to

every aspect of the gear. Stull (2006) takes this a bit further explaining that there are considerably more steps involved, such as the establishment of a tracking program which tracks the protective clothing from manufacture to retirement, development of risk-assessment and field test procedures, performance of routine and advanced inspection, the provision of a mechanism for routine, advanced, and special needs cleaning, performing repairs in accordance with manufacturer recommendations, providing proper storage means to avoid direct unnecessary exposure to ultraviolet light, and the retirement of protective clothing at 10 years from manufacture. Brehm (2007) explained that one of the new major changes in compliance with NFPA 1851 is the new complete visual inspection of the liner and the hydrostatic test at the third year and every year after. Briggs (personal communication, November 8, 2011) explained that this test was frivolous at best because it utilized water pressure to test instead of vapor. Briggs (personal communication, November 8, 2011) also explained that new gear that had never been worn when tested failed the hydrostatic test, indicating a potential manufacturing defect.

Cleaveland (2008) explained that Texas fire departments have been forced to comply, since the formal adoption of NFPA 1851 in 2004. Renfro (personal communication, September 6, 2011) explained that the TCFP adopted the NFPA standard and subsequent updates as a means to comply with the Texas Government Code, which stated that departments had the liability to provide gear and to maintain it according to the NFPA standards. Therefore NFPA 1851, was adopted to try and provide some backbone for a Texas Government Code ruling that required fire departments to provide gear according to the NFPA standard. Bradley (1992) provided input in regard to the utilization of standards that do not fit exactly with the local need, and the concept of partial utilization of the standard to further develop more appropriate regulations for the local

level. The NFPA (n.d.) in the text *The NFPA Standards-Making System,* explains that the NFPA does not have enforcement power and that the adoption or partial adoption of the standard, as well as the power to enforce the particular standard remains with the authority having jurisdiction.

Compliance with the standard is required as mentioned above by the TCFP, and Renfro (personal communication, September 6, 2011) explained that the fines can be extensive for non-compliance. Originally, the department would have 14 days to comply and try and make a change, and then could tie the process up for years before any legal or punitive action was seen. Now under the new regulation after the Sunset Commission Review the department now immediately receives a citation, thirty-days to correct the violation, and if the corrections are not in place fines began immediately and increase depending on the infraction and the length of time it continues. Cheshire (2006) explained that according to his survey 35% of departments that he surveyed within the state of Texas were non-compliant with NFPA 1851. Two things about this standard bear mentioning here, the first of which is that Cheshire surveyed career and volunteer departments (which volunteer departments are not regulated by TCFP - unless regulation is requested - and therefore not required to comply with NFPA 1851); the other is that Cheshire's study was conducted in 2006 before the new edition of NFPA 1851 was adopted.

Markley (2007) indicates the need for routine cleaning of gear and the fact the most fire chiefs are in agreement that routine cleaning and maintenance of the gear is good not only for the clothing but also for those persons wearing the protective garments. Markely (2007) also explains that there are programs available that will perform these functions for the individual fire departments removing the burden from the department. Creed (personal communication,

December 16, 2011) explains that Gear Cleaning Solutions is one such company and that they will work with any department to create and maintain an NFPA 1851 compliant program.

Being a smaller department that responds to less calls than the larger metropolitan fire departments the members of Wolfforth Fire and EMS, felt that the gear they had was sufficient and that for the most part or systems in place were compliant. Rezazadeh and Torvi (2010) support this as they state that quantifying the useful years and maintenance necessary for gear is problematic. This in due in large part to the multiple variables that apply to the varying fire departments, type of runs, number of runs, duties performed by fire fighters. Wolfforth would take 30 years to run the number of calls that Lubbock Fire Department does.

Two important points significant to Wolfforth Fire & EMS can be derived from the literature and research that has been collected. The first of which is that there are steps that are going to have to be taken to achieve and maintain compliance with NFPA 1851 as a TCFP regulated facility. The other can be illustrated by the literature. Cooper (2001) explains that change is inevitable and that with the advances and changes in the fire service departments are being forced to change not only their mindset but also their actions. Bruegman (2005) explains that change is motivated by internal and external forces, but that a leader is the integral part of change. The implications for the Wolfforth Fire and EMS is that with the changes that are in store from external motivators in regard to compliance with NFPA 1851, those in leadership roles are going to have to be the leading force in the change that sweeps throughout the department.

Recommendations

Based on the literature and the data collected for this study, the following recommendations are presented: a proposal should be made to the City Council and City Management of Wolfforth requesting additional funds in the fire department budget. As a portion of this proposal request, a letter should be sent from the City of Wolfforth Mayor, City Manager, and Fire Chief to TCFP requesting that a review of NFPA 1851 be conducted. Suggestions should be included in this letter that perhaps partial compliance with portions of the standard be approved by an independent committee established by the TCFP, or that the TCFP request a complete review of the 2008 edition of NFPA 1851.

Secondly, immediate interaction should begin with Gear Cleaning Solutions (GCS) to develop a rental policy and NFPA 1851 compliant program. As part of this interaction, processes should be identified for: 1) obtaining services from GCS, 2) establishing how gear will be delivered to and from their facility, and 3) renting gear for the academies to maintain the same compliance requirements.

Separate but related recommendations to the above are: a) the purchase of a bunker gear extractor for the fire station to facilitate the annual washing of protective equipment before locally conducted inspection and to reduce costs of GCS providing all services required; b) the purchase of individual lockers for the fire fighters to store their gear where it is not constantly exposed to ultraviolet light; c) the contracting for development of a records-management system to track all protective equipment accompanied by budgeting changes to allow the purchase of new gear on a three year rotation in order to avoid the requirements and expense of a frivolous hydrostatic vapor barrier inspection.

As these recommendations are being accomplished it is also imperative that the development of a departmental standard operating guideline (SOG) that addresses NFPA 1851 in its entirety be created. This SOG should also highlight the importance of compliance with this standard as it relates to the individual members of the department.

Finally, it is recommended that all the officers of Wolfforth Fire and EMS embrace this change and foster this change in mindset to the subordinates. Through the provision of education and training this change can be implemented and dispersed throughout all levels of the organization. It is recommended that future researchers and readers of this subject matter consider the implications of NFPA 1851 as it relates to their own local needs and training.

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Appendix A

Introduction to the 2008 edition of National Fire Protection Association Standard 1851:

The first edition of NFPA 1851, in 2001, was titled *Standard on the Selection, Care, and Maintenance of Structural Fire Fighting Protective ensembles,* and was developed to be a companion document for NFPA 1971, *Standard on Protective Ensemble for Structural Fire Fighting.* NFPA 1971, which has been in effect since 1975, specifies product design, performance, testing, and certification. NFPA 1971 is written for use by manufacturers to design and produce their products and by certification organizations to evaluate and test those products to determine compliance with the standard as well as to provide checks on production to ensure continuing compliance. While NFPA 1971 is primarily written for those groups, the standard is also used by fire departments and other organizations in developing purchase specifications for structural fire fighting protective ensembles and ensemble elements to ensure that the products they purchase are certified as being compliant with the standard.

NFPA 1851 is written for the organizations that evaluate the risks their emergency responders face and their particular needs for the protective clothing, that develop and purchase specifications, and that purchase structural fire fighting protective ensembles and ensemble elements. It is also written for end users of structural fire fighting protective ensembles and ensemble elements to be able to inspect, maintain, and care for the protective ensembles and elements they use during structural fire fighting operations.

The overall protection and safety of fire fighting personnel depends not only on adequate protective clothing but equally on the organization's policies, training, and administration of the correct use of the proper protective ensemble in fire fighting situations. To satisfy the portion of the organization's overall protective clothing and equipment program that addresses structural fire fighting protective ensemble, this document provides criteria for the selection, care, and maintenance of the protective ensemble and ensemble elements.

In this standard, the requirements for several areas are written to begin with the person who actually uses the protective ensemble being constantly aware of the protective ensemble's condition and need for cleaning, repair, or more in-depth inspection. Users can perform the simple actions to improve the condition of the protective ensemble. The more involved actions of advanced inspection, evaluation, cleaning, decontamination, and repair are handled by the organization's designated staff who are trained and authorized to perform more advanced duties. In other areas, the requirements are written for the organization to perform the administrative functions of the program and periodic actions to evaluate the structural fire fighting protective ensemble program to ensure that the program is achieving its goals and that the quality of the protective ensembles and ensemble elements provides optimum safety to the fire fighters.

This second edition of NFPA 1851 is a complete revision of the first edition. Because NFPA 1976, *Standard on Protective Ensemble for Proximity Fire Fighting*, was incorporated into the 2007 edition of NFPA 1971, *Standard on*

Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, under the Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment, NFPA 1851 has been expanded to include both structural fire fighting ensembles and proximity fire fighting ensembles.

The complete revision follows the standards format according to the *Manual of Style for NFPA Technical Committee Documents,* which has Chapter 1 covering scope, purpose, and application; Chapter 2 covering referenced publications; and Chapter 3 covering definitions. Chapter 4 covers the organization's program; Chapter 5, selection; Chapter 6, inspections; Chapter 7, cleaning and decontamination; Chapter 8, repairs; Chapter 9, storage; Chapter 10, retirement, disposition, and special incident procedures; Chapter 11, new requirements for independent service providers (ISPs); and Chapter 12, testing procedures.

New requirements in Chapter 11 for organizations and ISPs and for verification of the ISPs by independent, third-party certification organizations set the criteria for organizations and ISPs to perform the tasks of inspection, cleaning, and repairing of protective ensembles and ensemble elements. New requirements for testing methods for trained personnel in the organization as well as the ISPs set the criteria to determine the functionality and protection afforded by the ensembles and ensemble elements.

Revisions to Chapter 10 for retiring structural fire fighting ensembles and ensemble elements and proximity fire fighting ensembles and ensemble elements now

require retirement not later than 10 years from the date the ensembles or ensemble elements were manufactured. The radiant reflective outer shell of proximity fire fighting ensembles and ensemble elements must be replaced a maximum of 5 years from the date the ensemble or ensemble elements were manufactured. More frequent replacement of fire fighting ensembles and ensemble elements is now required to better ensure that fire fighters have state-of-the-art protection from fire fighting environments. The significant changes that technology undergoes within two editions of this standard (approximately 10 years), in addition to the normal 'wear and tear' of fire fighting, other emergency incident responses, training, and other factors, dictate that protective ensembles and ensemble elements be replaced. Fire departments that respond to higher than average number of emergency incidents or that have frequent or extensive 'working fire' operations might want to plan for replacement of ensembles or ensemble elements on a more frequent cycle (NFPA, 2008).

Appendix B

T E C H N I C A L D A T A

GLOBE MANUFACTURING COMPANY, LLC.

MOST SIGNIFICANT CHANGES TO NFPA 1851:

General

As with all NFPA documents, 1851 was completely reformatted in "official" NFPA text. Basically, this means that the document consists of specific chapters:

Chapter 1 – Administration
Chapter 2 – Referenced Publications Chapter 3 - Definitions
Chapter 4 – Program
Chapter 5 – Selection
Chapter 6 – Inspection
Chapter 7 – Cleaning
Chapter 8 – Repairs
Chapter 9 – Storage
Chapter 10 – Retirement
Chapter 11 – Verification
Chapter 12 – Test Procedures Annex – Explanatory Material

We will briefly touch on each chapter, but go into more detail as the chapters refer to garments and footwear.

Administration

This is the chapter that explains the standard and what it does and does not apply to.

Referenced Publications

This is a listing of all documents or publications that are referenced in the standard.

Definitions

NFPA has adopted a universal set of definitions for consistency among the various documents. This chapter, as well as chapters one, two, and four, fall under the purview of the Technical Correlating Committee.

Program

This chapter outlines the various sections in the standard and provides direction for the organizations using the standard. It is applicable to all elements, and includes such topics as record keeping, manufacturer's instructions, reporting concerns, and other topics of general interest.

Selection

This chapter discusses the selection and purchase of protective elements. It covers items such as risk assessment, wear trials, and development of specifications.

Inspection

The chapter outlines the requirements for inspection of elements, which have been significantly increased from the 2001 edition of NFPA 1851. Routine Inspection is still a very rudimentary inspection, performed by the wearer after each use, to check for soiling, contamination, and any physical damage that needs to be addressed. Routine Inspection applies to every element of the ensemble: garments, drag rescue devices, gloves, helmets, hoods, footwear, and interface components.

Advanced inspections can only be conducted by a verified ISP or by the organization's trained personnel. The level of training necessary for organizations personnel is determined by the element manufacturer, or a verified ISP, and the organization itself and it is necessary that either the element manufacturer or verified ISP provide written documentation of this training. Advanced inspection must be conducted every 12 months as a minimum, and the findings must be documented on an inspection form. As with Routine Inspection, Advance Inspection applies to every element of the ensemble, although there are two additional inspection criteria for garments. For garment elements, in addition to all of the requirements of routine inspections (soiling, contamination, and physical damage), advanced inspections include loss of moisture barrier integrity, assessment of fit and

overlap, evaluation of label and closure integrity, and review of assembly and size compatibility of shell, liner and DRD. With the exception of the DRD requirements, footwear is also inspected for the above, plus for exposed or deformed steel toe, steel midsole, and shank.

Also under Advanced Inspection, new requirements have been added:

(1) Light degradation inspection of the liner. This involves holding the liner up to a bright light to see if the quilt batting has migrated, resulting in thin spots in the batt.

(2) Leakage evaluation of the moisture barrier. This test has been referred to as the "cup test" and involves a field evaluation whereby water is introduced against the barrier layer, but the thermal layer is examined for wetness.(3) A new test, called the complete garment liner inspection, is required to be performed as a minimum three years after the initial purchase and annually thereafter. This liner inspection requires that the liner system be opened in such a manner that the inside or film side of the moisture barrier, and the quilt or batt side of the thermal layer, is exposed for inspection. The complete liner inspection includes a hydrostatic test for water penetration, to be performed on a minimum of three fabric areas and three seamed areas on each barrier. The test is run at 1 psi for 15 seconds and the results are documented; any signs of leakage constitute a failure.

Cleaning & Decontamination

The most significant change is that Advanced Cleaning must be undertaken at the time of Advance Inspection, if not subjected to advance cleaning in the previous 12 months. The 2000 edition of NFPA 1851 required the advanced cleaning to be done every 6 months as a minimum for elements that had been issued, used, and are soiled. Advanced cleaning is performed by a verified ISP or by the organization's trained personnel, who need to have been trained by the element manufacturer or by a verified ISP, and there must be written documentation of the training. The section also provides step by step procedures for the washing and drying of each individual element, including proximity protective gear. There is an exclusion for footwear, specifically pointing out that footwear should not be machine cleaned or dried using equipment that produces mechanical action from tumbling or agitation.

Repairs

Other than formatting, the chapter on garment repairs did not change significantly. It is still broken down into the various elements, with the majority of the chapter pertaining to garment repairs. Garment repairs are further divided into Basic Garment Repairs and Advanced Garment Repairs. Advanced repairs can only be performed by a verified ISP, the original

manufacturer, or a verified organization and includes all but the very basic type of repair.

With the exception of the replacement of bootlaces and zipper assemblies, which must be supplied by the footwear element manufacturer, all repairs to boots shall be performed by either the original manufacturer or an independent service provider.

Storage

Again, other than formatting, the chapter on storage did not change and is basically the do's and don't for proper storage of protective elements.

Retirement

This was one of the most heavily debated sections in the 2007 edition of NFPA 1851, and one of the last issues to achieve consensus. With the effective date for 1851, which is anticipated to be mid-February, there is a mandatory retirement requirement for all ensemble elements for 10 years after the date of manufacture. The standard further goes on to state that proximity outer shells must be retired 5 years after the date of manufacture. The standard is very clear that this does not mean all ensemble elements will last or should remain in service for the full 5 or 10 years, and does provide other criteria for retirements. However, the mandatory retirement is applicable to any element still in service ten years after the date of manufacture.

This chapter also discusses disposition of retired elements and contains a section on special incident procedures, including chain of custody.

Verification [of Recognized repair facilities]:

Rather than having the manufacturer recognize outside repair facilities, the standard has established a system of third party verification for independent service providers (ISP's) to become recognized. This requirement is intended to benefit the end user, and protect against any problems that might develop between a manufacturer and an outside repair facility. For example, a fire department could purchase gear from a manufacturer and as part of the purchase, require the manufacturer to provide the name of a recognized repair facility to work on this gear. If two or three years after the initial purchase, the manufacturer strips the facility of their recognition, where does this leave the dept. that has been successfully using their services? By having the recognition bestowed by an independent third party, it removes any affiliations and offers the fire service a larger range of choices as to whom they want to work on their gear.

A second advantage of this program is that it will establish consistency for independent service providers, since they will all be held to the same standards in determining their ability to work on protective gear. Rather than

obtain their recognition from each separate ensemble manufacturer, an ISP or verified organization would obtain the recognition one time from an independent source.

The standard sets specific test parameters for the third party organization to use as the basis for the verification, including specific seams, patches, and other repairs. There is also a requirement for the ISP to establish and maintain a Quality System, including a Quality Manual which is subject to periodic review.

Test Procedures

This chapter contains the various tests that can be used to establish serviceability of protective elements. Some of the tests included are leakage evaluation (i.e. the cup test), and water penetration (hydrostatic testing).

Annex

The annex to the document is very important, since it contains explanatory material on the actual requirements contained in the standard. The annex also contains suggestions for additional testing, requirements, and other useful information for a department in understanding and even implementing the standard.

The annex items are always tied to a requirement in the document. For example, if you look at section **3.2.1*** you will see that it is the definition for Approved. The asterisk indicates that there is an annex item tied to this section and if you turn to section **A.3.2. 1** you will find additional material on the subject of Approved.

Appendix C

Texas Commission on Fire Protection

July 16, 2008

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

RE: NFPA 1851-2008 Standard on Selection, Care, and Maintenance of Structural Fire Fighting Protective Ensembles

The commissioners of the Texas Commission on Fire Protection respectfully request that the Structural Fire Fighting and Proximity Fire Fighting Technical Committee review the following items and provide a timely response, as we are in the final stages of review and implementation of this standard.

NFPA 1851 requires testing to standards that some Personal Protective Equipment (PPE) was not designed for and presents a few challenges for compliance. PPE purchased prior to the standard, were not designed for this new testing criteria and some manufacturers have already stated that their products will not pass the tests, even though the items are brand new. Some manufacturers are in the process of improving their product lines, such as moisture barriers to meet this new standard. Some manufacturers have provided neither testing and inspection procedures nor training for these procedures for their products. There needs to be a timeline established for compliance by these manufacturers and for them to distribute this information to the fire service.

The language contained in NFPA 1851 requires mandatory retirement of all PPE elements ten (10) years from the date of manufacture. We understand that the ten (10) year life cycle was based upon a technological improvement and NFPA edition revision procedural process more so than the expected life-cycle of the PPE to maintain its integrity. The consequence of this requirement is that many retailers will not stock inventory and wholesalers will become retailers, which results in delays in acquiring equipment. Also, if PPE (either that has been sealed on a shelf, or in a reserve status) can continue to pass the required tests beyond the ten (10) year life cycle can it continue to be utilized? What if the expected life-cycle is less than ten (10) years when degradation occurs? We believe that additional testing is needed to determine the actual degradation cycle.

It is recommended that accredited independent testing facilities, that have no interest in the manufacturing or sale of PPE, be utilized to determine the adequate and appropriate required performance of PPE and to develop the criteria for PPE testing and inspection.

Thank you for taking the time to review the commissioner's requests and we look forward to your reply.

Sincerely,

Kelley Stalder, Presiding Officer
Texas Commission on Fire Protection

Appendix D

Response Letter from NFPA 1851 Committee to TCFP

October 12, 2008

Mr. Kelly Stalder - Presiding Officer, Texas Commission on Fire Protection

Dear Mr. Stalder,

I am writing this letter to you in response to your letter of July 16, 2008, which addressed concerns of the Texas Commission on Fire Protection related to changes to the 2008 Edition of the Standard on the Selection, Care and Maintenance of Protective Ensembles for Structural and Proximity Fire Fighting (NFPA 1851). Your letter was presented to the committee members present on August 19th at our meeting of the Technical Committee on Structural and Proximity Fire Fighting (NFPA 1971) which was held at Colorado Springs, Colorado. The **letter *was*** distributed to us by Lt. Jim Reidy of the San Antonio Fire Department. In addition, Lt. Reidy addressed the committee and discussed with us issues which were coming to his attention as chairman of the FF *Advisory* Committee *of* the Texas Commission on Fire Protection. 1 will try to address some of these issues with you in this letter.

I would like to start, if I may by giving you an understanding of the makeup of our committee and of the NFPA process for making any changes or revisions to a standard.

Our committee membership, as well as all other committees in our project, is comprised of fue fighters or persons representing fire fighters, fire service organizations, labor unions, enforcing authorities, product manufacturers, installers/maintainers, research and testing, and special experts. On our particular committee our firefighters bring a wide depth of knowledge and experience to the table, with fire fighters or officers from departments such as New York City, Virginia Beach, Fairfax County, City of El Paso, Sacramento Metro Fire District, Los Angeles City, Phoenix, Chicago, La Mesa, Lexington, Charlotte, and others. Fire service members on our committee serve in all ranks from fire fighter through Fire Chief. Additionally, on our committee we have members who represent the U.S. Navy, NIST, NIOSH, National Volunteer Fire Council, UL, Intertek, protective ensemble manufacturers, as well as repair and cleaning organizations.

No one of these member classifications can have more than one-third of the voting membership of the committee. Committee consensus is reached by a two-thirds majority of the voting members. All of the changes to the 2008 edition of NFPA 1851 passed the required voting of the members in both the Technical Committee and in the Technical Correlating Committee. The 'fechnica] Correlating Committee is responsible for all of the

Technical Committees in the Project of Fire and Emergency Services Protective Clothing and Equipment and must pass the technical committees work by a three-quarters majority vote. Representatives of service providers were present at the committee meetings and had input into the document. Service providers who were voting members of the committee also voted on the revisions to the standard.

In addition, prior to developing the Report on Proposals (ROP), the document where the Committee presents to the public its "proposed" revisions to the standard for the next edition, the public is invited to submit "public proposals" to the committee for their consideration. The "public proposals" submitted and the Committee's action on those proposals, along with the Committee's proposals for revisions is then published in the "Report on Proposals" that is sent to Al persons who submitted "public proposals" and to anyone who requests an ROP. ROP's can also he read and/or downloaded from the NFPA website (www.nfna.ori) under "codes and standards".

After release of the ROP, the public can again respond to the Committee with a "public comment" on any proposal and further recommend change to the standard. And again, following the close of `'public comments" the public can again respond to the Committee's actions on any "public comments" received. This report, the "Report on Comments" is also sent to all persons who submitted "public comments" and to anyone who requests an ROC. ROC's can also be read and/or downloaded from the NFPA website (www.nfpa.org) under codes and standards.

I hope this explanation into how standards are written and revised provides insight to your organization in understanding the numerous checks and balances that are in place to ensure that the finished product has been well scrutinized.

Now I would like to address some of the specific issues raised in your letter to the NFPA. In your letter you state that some PPE purchased prior to the standard, *were not* designed for this new testing criteria and that some manufacturers have already stated that their products will not pass the tests, even though the items are brand new.

The purpose *of* the NFPA [851 standard is to establish a program to reduce the safety risks and potential health risks associated with poorly maintained, contaminated, or damaged PPE. In addition, this standard establishes base criteria for the selection, inspection, cleaning, decontamination, repair, storage, and retirement of PPE.

New PPE that was manufactured as compliant with NFPA 1971 should be able to pass the testing requirements specified in NFPA 1851, 2008 U . Reputable manufacturers should provide information and training related to testing, inspecting, and cleaning procedures. This training of an organization's personnel can also be performed by a verified Independent Service Provider (ISP), who will provide written documentation of training. Additionally, there is general information related to these issues and others, found throughout the NFPA 1851 document, particularly in the Annex areas.

In your letter you indicate that you are familiar with why the committee instituted a ten year retirement requirement for Structural PPE, so I will not go into that further. You do state, however, that many retailers will not stock inventory as a result of this, causing wholesalers to become retailers, which results in delays in acquiring equipment.

I am aware that this is happening in some instances and I believe that this should correct itself in time. While this issue is beyond the scope of this committee, I can understand the frustration this issue can cause.

Next, you ask whether PPE that has been sealed on a shelf, or in a reserve status and that can continue to pass the ten year life cycle, can continue to be utilized beyond ten years. Section 10.1.2 of NFPA 1851 clearly states that structural fire fighting ensembles and ensemble elements shall be retired in accordance with 10.2.1, no more than 10 years from the date the ensembles or ensemble elements were manufactured. Additionally, Section 10.2, Disposition of Retired Elements, gets into the specifics of what the retired elements can or cannot be used for.

Continuing, you ask what happens if degradation of the PPE occurs before the expected life-cycle often years? Once again it is important to understand that Section 1 0.1.2 states that structural fire fighting ensembles and ensemble elements shall be retired in accordance with Section 10.2.1, no more than 10 years from the date of manufacture. This in no way is meant to imply that you should expect to get a full tens years of *use out of* all PPE *elements.* When this committee was debating about what a reasonable life span might be *for* PPE, there were many in the fire fighting sector of this committee that felt that ten years was too generous a number.

In your letter, you state that we believe that actual testing is needed to determine the actual degradation cycle. While on the surface this sounds like a reasonable way to proceed, and indeed our committee is always interested in obtaining additional data related to the effective life-span of the various elements *of* PPE, it is very difficult to pin down with specifics. It is important to understand that the actual service life of ensembles and ensemble elements varies because of the many factors that can impact on it. Some of these factors are the size of the department, the geographic's of the department, the amount of responses within that department, the type of workload within that department, the exposures that the PPE is subjected to, the aggressiveness of the individual fire fighter, to name but a few. These factors, along with many others, are all considerations in how long any ensemble element will last. It is completely possible that a protective element could be exposed to circumstances that totally destroy it the first time it is utilized. Since the purpose of fire fighters' protective elements is to protect the wearer, if the element has saved a life or prevented serious injury, even just o n , it has done its job. In many cases, an ensemble or ensemble element will need to he retired sooner than ten years.

Finally, you make a recommendation that accredited independent testing facilities be utilized to determine the adequate and appropriate required performance of PPE and to

develop the criteria for PPE. In the beginning of this letter, I gave you the snake-up of this committee. Accredited independent testing facilities are a part of the make-up of this committee. They, along with fire fighters, labor unions, enforcing authorities, research and testing experts, product manufacturers, special experts and others are all working together to continue to make improvements to, and set performance standards for PPE. n closing, I hope that the information in this letter is of assistance to you and that you will continue to provide input to the various committees who develop standards within the NFPA standards development process. We, on the committee, *are keenly* aware that some of the changes that *we* put forth can initially cause hardships to a department. Our goal *is to ensure* that our fire fighters are outfitted in PPE that will due its' job when it needs to.

I would like to specifically thank Lt. Jim Ready, of the San Antonio Fire Department and chairman of the FF Advisory Committee of the Texas Commission on Fire Protection, for traveling to Colorado Springs to meet with and speak frankly to our committee about some of the issues that are being faced by departments in Texas. It is this kind of input that helps us to better understand the real issues in the field, and hopefully to do a better job protecting our fire fighters.

Please feel free to contact me about any other concerns you may have. I deeply appreciate your invaluable input to this committee.

Sincerely,

Stephen J. [illegible]

Appendix E

Interview notes from personal communication with Dr. Burton Clark (March 17, 2009)

During the conversation Dr. Clark posed many questions and many thoughts directly tied to this research and related to the concepts presented.

The first question asked was, "who is it that actually makes the standards." When speaking or talking about medical standards, Clark said "there are years and years of data and testing that take place before a medical standard is changed. That was not the case with these new fire standards, these standards are made by a group of people sitting around a table. Even worse perhaps the standards are written primarily by the salespeople out there trying to move their products."

Clark explained, at that point, for any test (or measurement for that matter) to be valid there is a series of four criteria that must be met. The first is the measurement that is to be obtained - the measurement must be explained and reasonable. Next is a specific test that is made to obtain and to make the measurement. For the test and measurement to be worth their weight in salt, there must be validity that is assured and reproducible. Having a measurement that is tested and validated results in a reliable measurement and a usable evaluation which ultimately provides reliability, the fourth criteria.

Posed with the question about using a hydrostatic test to measure the steam penetrability of bunker gear, Clark then returned to the matter at hand. When looking at the standard, "what is the measurement and what is the test? Our ability to measure is only as good as the tools used for measurement. For a tool to be useful it must be designed exactly for the specified type of

measurement." Therefore, if the test and the measure are not tied and are not designed for each other, they are bogus, "absolute BS."

Clark then explained a little clearer what he was saying by stating very simply, "standards must be based on data and research; if they cannot give you the research to support the standard, then it is all just smoke and mirrors. How did these particular members of the committee come to a consensus on this particular standard? No one really knows."

Being that Dr. Clark was exceptionally busy, the time for the discussion was limited but before leaving, Dr. Clark spoke very clearly on his opinions about the standard and the risk that bunker gear plays to fire fighters. Clark stated "that we [the fire service] consistently kill over one hundred fire fighters a year. They continue to make new standards and to improve equipment, but that has yet to fix the problem. The way - the only way - to fix the problem is for the whole of the fire service to be held accountable. Bunker gear is not the issue! You want a real issue: try wearing seat belts in emergency vehicle! There is an issue that can save lives."

Appendix F

Interview Notes from Personal Communication with Larry Renfro (September 6, 2011)

Renfro began the interview by explaining that the commission had sent a letter to the NFPA asking questions and requesting a review of the standard. Next he explained that "three years ago bunker gear would protect you right up to the point of catastrophic failure, but now (one year ago) it is no good and will not last ten years."

The TCFP actually adopted NFPA 1851 in 2004 along with the subsequent updates since then. The standard was originally adopted as a way to try and provide for compliance with some type of bunker gear standard, because the Texas Government Code stated that departments had the liability to provide gear and to maintain it according to the NFPA standards. When the newest edition of the standard came out and was reviewed, it was determined by the commissioners to give an additional two years to the newly imposed ten - allowing gear which was previously in service and compliant to remain in use for a total of twelve years. This was done in an attempt to help departments defray the cost of becoming compliant.

Renfro then explained that to truly determine what advanced testing was required, departments must contact the bunker gear manufacturer. Some departments across the state were attempting to obtain the training that, unfortunately, some manufacturers simply did not offer. Some departments then turned to ISP, but the ISP had to be specific to each manufacturer's type of garments.

The perspective sought from Renfro was that of a compliance official and what could be expected from the compliance side of the issue, rather than the departmental aspect. Renfro explained that insuring compliance with this new edition of the standard "will easily add thirty to

fifty percent more time to inspections. It is easy to estimate this number because it is not just inspection of the gear that is required but also the recordkeeping of the department concerning the gear, testing, and maintenance that now has to be undertaken." According to Renfro, the state is already attempting to take measures to eliminate the burden on inspectors by hiring two more - increasing the staff from six to eight.

It is not just the burden on compliance officers that bothers Renfro; it is the possible costs that the departments are likely to experience. Should a department be found not to be non-compliant, the fine can be greater than one hundred dollars per violation per day. "But what is a department to do? If there is not enough money to replace or repair the gear, how is a fine going to help matters?" These fines are not immediate, however, and when asked to explain the process and how long a department could drag out the process, Renfro explained the following: "currently the department is given fourteen days to start attempting to become compliant. If nothing is done, then a subpoena is issued for the administrators to report to Austin, TX for a face-to-face discussion. Pending this discussion, a decision is made and the usual outcome is for a consent order to be given. If the department complies and is able to stay clear of trouble for three years then the fine is dismissed. This being said, a department could possibly drag out the proceedings for seven years. However, the Sunset Commission will change all of this. The new process will be the immediate issuing of a citation with thirty days to correct. Re-inspection will then occur and, if the deficiency is not corrected, an automatic fine is issued. This required inspection and reinspection could add another one hundred and fifty percent to the inspectors work load"

The interview then turned to a discussion of risk management to which Renfro spoke very plainly. “Most departments are not willing to take the risk of not being compliant. You could do the tests yourself and fudge them, sure enough, but you get somebody hurt and when the suits are filed and the investigation happens, the lawyers and other agencies are going to hang departments out to dry. It is just not worth it”

Appendix G

Interview notes from personal communication with Derek Briggs (November 8, 2011)

Derek Briggs was trained by Globe Manufacturing to be a certified tester, specializing in the thirty-six month vapor barrier test. The training was done over a four hour period and certified the participants for local testing of gear. Abilene (since that time) has entered into contract with a third party out of Dallas, TX to provide quick turn-around of needed repairs and other maintenance issues besides simple testing.

After obtaining this brief history, the interview began with the simple question of how Briggs felt about the validity and viability of this testing. Briggs response was simple, "It is a waste of time – if I am ever in a one psi vapor pressure environment, I have much bigger problems than my vapor barrier, my breathing apparatus, my hood, and other things are going to fail much sooner than having to worry about the vapor barrier on my protective clothing. In my opinion, the manufacturers got together and sold a bill of goods and now everyone is forced with complying by them".

Briggs was asked to explain, in simple terms, how the test was conducted and he explained it in the following manner. For a full set of gear (coat and pants), each garment is tested in three places with two high friction areas and one other area. In Abilene, the coat is tested in the armpit area, over the shoulders, and some portion of the chest. The pants are tested in the crotch, the knees, and a portion of the buttocks area. The actual test was explained in the following manner: "a metal ring clamps thermal and vapor barrier down against a rubber boot on a plate. The plate has two ports, one with water and the other with a gauge. Once connected and secured, what looks like an aquarium pump is turned on and pressure is increased until one psi is

reached on the pressure gauge. The test runs for thirty seconds under direct water pressure, not vapor pressure, and then you remove the garment and look for moisture on the thermal barrier. If moisture is present the garment fails the test. We paid about fifteen hundred dollars for this 'recommended' test equipment that I could have built in my garage with a pump and some J.B. weld for about fifteen dollars."

Briggs has taken a particular interest in this standard and has requested permission to obtain assorted liners from different manufacturers to conduct testing to see for himself whether or not the standard has merit. Abilene does not utilize gear from a single manufacturer but, instead, has purchased gear from Morning Pride, Globe, FireDex, and Lion Apparel. Briggs stated that, " at face value the test appears good, but when you start testing gear that has never been used and it fails, you have to question the validity. Abilene has three battalion chiefs on the department. The bunker gear for these chiefs is stored in a bunker bag and is not exposed to direct sunlight. According to Briggs, this gear is not (and has not been) worn in thirty-six months, but when subjected to the above testing two of the three sets failed. To make matters worse, Briggs explained that there have been fifty-five to sixty sets of gear tested by the department. Of the sets tested, seventy percent of the sets have failed some portion (either the coat or pant)

When asked about the gear that failed, Briggs replied that "the Chief asked how well are my men protected, and no one could answer the question. No one knows the correlation between one psi of water pressure and a one psi vapor burn or pressure. The Chief then replied, "Put the gear back in service, we can't afford to replace the gear right now. If you cannot afford to replace the gear that fails, what do you do?"

In closing, Briggs was asked for his recommendation about what to do to correct the standard. Briggs provided the following opinion: that the light test is reliable and indicates a thinning of the liner. "But right now it's like being in a hockey fight, our jerseys are pulled over our heads and the manufacturers are delivering several good blows to our head. There is a lack of common sense out there and that needs to be changed. What is going to happen is that many will ignore the standard and then someone will get hurt or killed and then it will come out in a NIOSH report that the standard was not followed and the city will pay millions, for nothing. I think there should be a review of the standard because it would reveal that the gear being provided as new is already substandard and non-compliant."

Appendix H

Interview notes from personal communication with Chris Angerer (December 13, 2011)

To begin his interview, Deputy Chief Chris Angerer spoke of a discussion he previously had with Battalion Chief Roger Woodward of the Fort Worth Fire Department. During that conversation, Woodward explained that Fort Worth had conducted testing of new gear that was stored in the storeroom for issue to new hires. Woodward explained that fifty-seven percent of this gear (brand new - never worn or issued) failed the required test. Even more shocking than this was the revelation that the department was experiencing an over eighty-five percent failure rate after the second year of use - alarming numbers for a department employing over seventeen hundred souls.

Angerer then stated that Lion Apparel, the current provider to the Lubbock Fire Department, had recently offered to place a three year warranty on the vapor barrier, to which Angerer replied that it was all smoke and mirrors because it was not until after the third year that the moisture barrier was required to be tested. The availability and study of options for the department were sought from Angerer, and he explained that the option of hiring a full time person just for the testing of protective equipment was considered. He also explained that (with the number of sets of gear and the data entry and tracking required) a full time employee dedicated to nothing else would be required. Angerer then noted that a person with adequate pay and benefits for the job would cost the department between $50,000 and $60,000 per year.

Next, Angerer revealed that “the department was spending approximately $140,000 a year on PPE under the 2001 edition of the standard. Year-to-date expenditures for this fiscal

year have been $293,000 in an effort to get closer to compliance. This was due (in large part) to the replacement of boots and helmets to meet the mandatory ten year retirement.

Lubbock Fire Department's plan to continue in compliance with the new standard is to replace all PPE every three years. To do this, the department will replace one third of the department's gear every year at an estimated cost of $260,000 per year - a noted increase of one hundred twenty thousand dollars above previous years' spending. Angerer explained that "when the following were considered:

1. the cost of equipment required for testing,
2. the increased cost of replaceable liners versus non-replaceable liners,
3. the time spent to conduct tests,
4. maintaining training and validation of the person conducting tests,
5. yearly salary for a person to conduct tests and track PPE,

the cost of replacing gear with brand new gear was only a $10,000 to $12,000 difference." Coupling all of the above with the fifty-seven percent failure rate made the decision to go with a replacement program an easy choice.

Angerer explained that what is occurring (with the new standard) is that "PPE manufacturers are lining their pockets. The manufacturers sell new gear as well as offering to test and repair gear. What a deal? Money for new gear, money for testing, failing, and then providing new gear."

Angerer was asked about risk management and whether compliance was a concern for the department. Angerer took a different approach than most when asked about risk. "Risk? It is using the gear at all that is a risk! Why are the manufacturers - if this standard is so reliable -

not tasked with testing the gear at the time of manufacture… not in three years? Should the gear not be tested coming right off of the manufacturing line? The risk then is the vapor barrier that does not work brand new. A blatant double standard is in place here! Gear manufacturers will not or cannot meet the standard, yet they won't replace or warranty the new gear because (under this new version of the standard) testing is not required until the third year anniversary of the manufactured date"

Angerer, still speaking about risk, was asked if there really was a risk.

There has never been a fire death documented because of bunker gear failure. But non-compliance is a risk with the TCFP. The failure of one set could land a thousand dollar fine. That is why we, in Lubbock, have been and will remain compliant with all proximity gear and bunker gear since the end of fiscal year 2009. Replacing the gear one third per year - all gear within three years - removes all argument unless the tag is removed or the records are lost.

Appendix I

Interview notes from personal communication with Caitlin Creed (December 16, 2011)

Caitlin Creed is the rental liaison for Gear Cleaning Solutions. She opened the interview by reading a blurb from the website, "GCS is a full service ISP (Independent Service Provider) owned and operated by firefighters. It is the goal of GCS to help any size fire department develop and implement an NFPA 1851 selection, care and maintenance program. Our state of the art facility has experienced, knowledgeable staff that can help you and your department create a compliant care and maintenance program." Ms. Creed then explained that the number of departments renting gear and sending gear to them for service is growing almost by the day. Creed explained that the departments around the Dallas/Fort Worth Metroplex are almost guaranteed one-day service. When asked to clarify, she explained that the gear is picked up in the morning after the fire fighters go off shift, is brought back to their facility, cleaned, inspected, repaired, and then returned the next day, so it is there for the firefighter when he returns to shift. Creed also explained that for a fire academy that has random sized people coming through or for the occasional needed repair or short-term use by a small fire department, they would be more than able to provide gear. Creed, when asked about the ability to service gear for Wolfforth Fire & EMS, stated that next day turn around might be difficult due to the six hour drive between locations, but that if the arrangements were made her drivers could either meet us in Abilene or some other location along the route. She also stated that they could provide a loaner set of gear that would be NFPA 1851 compliant until the gear could be returned. Caitlin also stated that she was, of course, a salesperson, but that "as simple as it is for them to turn-around gear, and with

all the credentials they are forced to maintain, I don't know why any department would try and maintain gear in-house."

Appendix J

Name:_____

Executive Development – Questionnaire for Chris Addington
Concerning Protective Equipment

1. What is involved with the NFPA Standard 1851, as far as testing, maintenance, and recordkeeping?

2. What is the current requirement for gear washing and replacement, upheld by Wolfforth Fire and EMS?

3. Do you feel that your bunker gear puts you at risk, because it is currently non-compliant with NFPA 1851?

4. How do you feel the department is best suited in complying with the standard?

Appendix J

Table 1

Wolfforth Fire and EMS	Question One Responses
Fire Chief, Dr. Charles E. Addington II	The mandated requirement for the evaluation of gear, inspection of gear, and rehabilitation of gear. Each set of gear will be inspected annually, with a barrier test every three year.
Deputy Chief of Suppresion, Lance Barrett	testing - annual puddle test & inspection for any damage (visual & light) after three years to include hydrostatic test on annual basis.
Deputy Chief of EMS, Lance Hamilton	gear to be inspected annually, washed annually, full test every 3 years.
Captain, Jordan Weaver	every piece of PPE is recorded and issued to each member.
Captain, Jeff Webb	gear should be tested annually (puddle test, etc.) gear should be kept cleaned and washed and documented each time. Hydrostatically tested every 3 yrs.
HazMat Captain, Brent Smith	cleaned when needed or annually, visual inspection after each use, full inspection annually, have record keeper, light test once a year.
Training Captain, Mike Henricks	testing - ight and puddle test annually hydrotest three years, maintenance - repaired as needed, recordkeeping - documented each time, cleaned, tested, and repaired.
Lieutenant, Henry High	Don't really know.
Lieutenant, Chad Dillard	Gear is to be washed annually, tested annually, and keep in recorded in gear book.
Firefighter, Aubrey Stark	I don't know.
Firefighter, Chase Dillard	should be tested once a year, keeped clean of soot, and should be keep on record and up to date.
Firefighter, Greg Moyers	requires that gear be tested at least once a year and records be kept in case of problem. It need to withstand and maintain fire resistance and hydrotested and washed annually
Firefighter, Matthew Craft	yearly testing, periodic maintenance, and constant record keeping, I do not know any specifics involved in any of these three areas.
Firefighter, Thomas Alonzo	testing is done once a year
Firefighter, Anthony Banda	Don't know
Firefighter, Shawn Forbes	no knowledge of.
Firefighter, Chris Garza	I don't know.
Firefighter, Seth Stephens	I don't really know.
Firefighter, Joe Wells	annual testing and inspection, annual washing and record keeping of when tested, inspected and washed.

Appendix J

Table 2

Wolfforth Fire and EMS	**Question Two Responses**
Fire Chief, Dr. Charles E. Addington II	Gear is washed at least annually and evaluated after each fire for possible need to clean and wash.
Deputy Chief of Suppresion, Lance Barrett	annual washing and replacement at 3 years of service.
Deputy Chief of EMS, Lance Hamilton	annual wahsing or when needed, replace every 3 years.
Captain, Jordan Weaver	if TCFP certified new gear every three years. If not certified find a good set in good shape.
Captain, Jeff Webb	annually washed and replaced every three years
HazMat Captain, Brent Smith	wash when soiled, replace every three years
Training Captain, Mike Henricks	gear is cleaned as needed & replaced at least every three years
Lieutenant, Henry High	don't know
Lieutenant, Chad Dillard	wash annually and every three years
Firefighter, Aubrey Stark	I don't know.
Firefighter, Chase Dillard	wash after fire with hose, and washed in machine when needed
Firefighter, Greg Moyers	must be washed and tested once a year and if not compliant it must be tagged and placed out of service.
Firefighter, Matthew Craft	replaced as mandated by TCFP. Which I think is every two years for live-fire gear, washing as needed.
Firefighter, Thomas Alonzo	yearly washing and inspection
Firefighter, Anthony Banda	Don't know
Firefighter, Shawn Forbes	no knowledge of.
Firefighter, Chris Garza	washing, cleaning, drying, testing
Firefighter, Seth Stephens	wash it when its dirty, stinks, exposed to hazardous materials or annually, whatever comes first
Firefighter, Joe Wells	wash annually or when you feel necessary to wash

Appendix J

Table 3

Wolfforth Fire and EMS	Question Three Responses
Fire Chief, Dr. Charles E. Addington II	No, the gear on this department has never failed an individual or been responsible for an accident
Deputy Chief of Suppresion, Lance Barrett	NO
Deputy Chief of EMS, Lance Hamilton	NO
Captain, Jordan Weaver	NO I'm confident in my gear.
Captain, Jeff Webb	No I do not. My gear is brand new.
HazMat Captain, Brent Smith	No it will stil pass test
Training Captain, Mike Henricks	My gear is compliant as far as I know.
Lieutenant, Henry High	No, it is compliant.
Lieutenant, Chad Dillard	NO
Firefighter, Aubrey Stark	NO
Firefighter, Chase Dillard	NO, I do not.
Firefighter, Greg Moyers	NO, I do not.
Firefighter, Matthew Craft	No, my gear is almost new now, was brand new when I received it.
Firefighter, Thomas Alonzo	NO
Firefighter, Anthony Banda	I think it is compliant....
Firefighter, Shawn Forbes	no knowledge of.
Firefighter, Chris Garza	NO, I feel my gear is good enough.
Firefighter, Seth Stephens	I don't believe so, my gear should be in compliance with 1851.
Firefighter, Joe Wells	No, I feel comfortable with my gear.

Appendix J

Table 4

Wolfforth Fire and EMS	Question Four Responses
Fire Chief, Dr. Charles E. Addington II	need new recording procedures, better documentation, records, and new gear buying procedures.
Deputy Chief of Suppresion, Lance Barrett	replacing the gear after three years of service
Deputy Chief of EMS, Lance Hamilton	Change the standard to be more realistic
Captain, Jordan Weaver	we are working our way to be compliant. But we replace certified members gear every three years.
Captain, Jeff Webb	keeping documentation on file to be able to tell when gear is no longer compliant.
HazMat Captain, Brent Smith	buy gear every year
Training Captain, Mike Henricks	gear replaced every three years or when damaged beyond repair
Lieutenant, Henry High	we keep records and have a washing machine now
Lieutenant, Chad Dillard	buying gear every three years
Firefighter, Aubrey Stark	staying informed and to attempt to lobby against standards that are useless or too stringent
Firefighter, Chase Dillard	replacing old gear after out of date
Firefighter, Greg Moyers	not sure
Firefighter, Matthew Craft	testing every 1-2 years should be adequate to ensure gear is suitable for firefighting activity. If it passes at that time, it should be back in service. There should be no max-term or shelf life of gear as long as it passes the tests.
Firefighter, Thomas Alonzo	I feel we are very compliant
Firefighter, Anthony Banda	don't know not sure about it
Firefighter, Shawn Forbes	no knowledge of.
Firefighter, Chris Garza	keep doing what we are doing, it has kept us safe this far
Firefighter, Seth Stephens	we may be better leasing / renting gear to stay in compliance
Firefighter, Joe Wells	annual testing and inspection