Division of Labor on Incidents for Colleton County

# Colleton County (S.C.) Fire-Rescue's Division of Labor on Incidents: Making the Big Jobs, Smaller

David A. Greene
Colleton County Fire-Rescue
Colleton County, South Carolina

October 2009

## 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.

Signed: _____

David A. Greene

## Abstract

The problem was that Colleton County (S.C.) Fire-Rescue's (CCFR) size, composition, personnel training and experience levels do not allow for an effective division of labor at incidents. The research purpose was to identify improvements, alternatives and operational adjustments to create a more effective division of labor at incidents.

Using a descriptive research method, questions about the current training standards for operating and supervising operations on incidents, disparities between career versus volunteer personnel, how other departments or organizations divide labor during incidents, and what operational changes could be made to improve labor division at incidents were answered.

The results identified training standards for both career and volunteer personnel, how other departments and organizations divide labor during incidents, and what changes CCFR could make to improve labor division. The recommendations were for CCFR to develop procedures that will insure the proper training of all personnel, a more effective organization of personnel at incidents and continued research into alternatives.

Table of Contents

# Colleton County (S.C.) Fire-Rescue's Division of Labor on Incidents: Making the Big Jobs, Smaller

## Introduction

The problem is that Colleton County Fire-Rescue's (CCFR) size, composition and personnel training and experience levels do not allow for an effective division of labor at incidents, which requires the Incident Commander not only to supervise the incident operations, but many task level activities as well. The research purpose is to identify improvements, alternatives and operational adjustments to create a more effective division of labor at incidents. Using a descriptive research method, a review of existing literature was conducted and a questionnaire was distributed to combination paid/volunteer and volunteer fire departments to answer the following research questions: a) what are the current training standards for both operating and supervising operations on incidents and are there any disparities for career versus volunteer personnel, b) how do other departments or organizations divide labor during incidents, c) what operational changes can be made to improve labor division at incidents? CCFR operations will also be reviewed, compared and contrasted to identify improvements that can be made to improve labor division.

## Background and Significance

Colleton County Fire-Rescue (CCFR) is a combination all-hazards fire-rescue department responsible for providing service to an area of 1,697 square kilometers and a population of approximately 40,000 people. CCFR is responsible for providing fire suppression, inspections, and investigations. Additionally, CCFR is Colleton County's only hazardous materials mitigation, technical rescue, and advanced life support treatment and transport provider. CCFR provides service from 30 stations with a staff of 70 full-time and approximately 240

volunteer/paid on-call personnel. All full-time personnel are cross-trained as firefighters and as emergency medical technician-basics. Approximately half of the full-time staff is trained to emergency medical technician-paramedic level. Standard staffing has a full-time firefighter as a sole driver/operator on an engine in three stations 24 hours a day. Six advanced life support ambulances are staffed 24 hours a day with two firefighters. Additionally, five stations are staffed with sole driver/operators during daytime hours, Monday through Friday, as this is the time period when the bulk of the volunteer work force is unavailable due to their full-time occupations. Minimum staffing requires all 24-hour positions to be filled, but occasionally allows for a daytime firefighter position to be uncovered.

The majority of full-time personnel are trained to the International Fire Service Accreditation Congress (IFSAC) Firefighter II level. Volunteer personnel have various levels of training. In the late 1990's, the South Carolina Fire Academy, the lead training agency in the state, adopted the IFSAC curricula for many levels of fire training. However, the first firefighting class only meets state Occupational Safety and Health Administration (OSHA) requirements and does not meet IFSAC standards. The majority of CCFR volunteer personnel complete the first class but do not continue with the IFSAC Firefighter I and II classes. This translates to a relatively low level of training among the majority of volunteer personnel.

Calls for service are processed by the 9-1-1 Center, which is managed by the Sheriff's Department. Fire-Rescue personnel are alerted using a very-high frequency (VHF) paging system. Given the size or the response area, volunteer personnel respond apparatus with only one person on a frequent basis. The bulk of volunteer personnel respond in their privately owned vehicles (POV's).

A method for assembling companies or groups of firefighters for the purposes of completing work is needed. The role of incident commander as incident manager, instructor, and group organizer is directly linked to Unit 5 of the Executive Leadership student manual, which addresses managing multiple roles. Additionally, this research is linked to two United States Fire Administration operational objectives, which are: Reduce the loss of life from fire-related hazards, particularly among firefighters and appropriately respond in a timely manner to emergent issues. Continued research into dividing labor to effectively operate on incidents will equip our current and future incident commanders with a better organized labor group with which to accomplish tasks on the incident scene and provide for the safety of all personnel on the incident, which will reduce the loss of firefighters' lives from fire-related hazards.

## Literature Review

Colleton County Fire-Rescue (CCFR) is a combination paid/volunteer department, which is similar to the majority of fire departments nationwide. Roughly 22% of CCFR personnel are classified as paid or career while the other 78% of CCFR personnel are classified as volunteer. "There are an estimated 1,148,800 firefighters in the United States. Of these, 323,350 (28%) (sic) are categorized as career firefighters and 825,450 (72%) (sic) are considered volunteer" (Rielage, 2009, p. 16). It is important to mention that CCFR volunteer personnel are paid a stipend for each emergency response and training class. Given the lack of tax base in Colleton County, the fire-rescue department will continue to rely on volunteer personnel both in the near and distant future. In fact, since career personnel are often assigned to driving and operating apparatus, volunteer personnel often fill many firefighting roles on emergency scenes. Rielage (2009) also recognizes the importance of volunteers filling these roles stating, "Why shouldn't

volunteers or reserves, who would allow us to increase the staffing on our apparatus, fill some of the tasks?" (p. 18).

Render (2008) also recognizes the importance of volunteers in the following:

The U.S. Census Bureau reported that there were 226,542,199 people living in America in 1980. By 1983, the population was growing, and there were an estimated 884,600 volunteer firefighters serving communities nationwide. By 1989, the number of volunteer firefighters had dropped to just more 770,000 (sic). Because about 75% of U.S. fire departments are staffed by volunteers and the U.S. population was approaching 250 million, the declining number of volunteer firefighters was becoming a threat to the safety of the American populous. (p. 62).

Colleton County is much like the bulk of the United States in that any decrease in the number of active volunteer firefighters places the residents and transients of Colleton County at risk. As previously stated, given the size of Colleton County's service area, service cannot currently be adequately provided by the career staff alone.

Colleton County firefighters are required to complete the basic firefighting course that meets the state Occupational Safety and Health Administration (OSHA) requirements. However, the national standards, the most important of which being the National Fire Protection Association (NFPA), are not being met by this first course and many volunteer firefighters do not voluntarily go on to take the International Fire Service Accreditation Congress (IFSAC) Firefighter I and II courses. "Training is key to protecting firefighters and extinguishing fires, which is why every fire department must ensure every firefighter, career or volunteer, receives the right amount of the right kind of training before they set foot on the fireground" (Dugan, 2007, p. 31).

The South Carolina Fire Academy has three main courses to complete IFSAC Firefighter II certification. However, as Schliek (2008) identifies:

The NFPA standard is divided into two firefighter competency chapters. One of the chapters deals with knowledge and skills needed to operate at the Firefighter I level, while the succeeding chapter completes the standard and describes Firefighter II proficiencies... For firefighters that only train to the Firefighter I level, the standard has added some requirements while moving other knowledge to the Firefighter II level. (p. 22)

Since NFPA only recognizes two levels of firefighting training, it is apparent that the basic firefighting course meeting the South Carolina OSHA requirements does not meet NFPA standards. At the time the South Carolina Fire Academy adopted the IFSAC curricula, the firefighting curriculum was separated into three classes, the state OSHA class, IFSAC Firefighter I, and IFSAC Firefighter II, in an effort to prevent an undue burden to volunteer personnel becoming qualified to fight fires.

Smith and Purcell (1999) recognize the importance of this, stating:

Often many volunteers, who have only a limited amount of time they are both willing and able to commit to volunteer service, see increased levels of required certifications, necessary to maintain proficiency and safety at an acceptable level, as something on which they are not willing to spend time. For some in the volunteer service, the idea that they would have to train and do fundraising either did not occur to them or was not explained fully prior to their joining. (p. 7).

This presents an interesting dichotomy. One side of the issue is that the courses have been well developed to minimize the amount of time a recruit firefighter must spend in order to become qualified to participate in interior structural firefighting. Although this may have been

the intent of the course development in the state of South Carolina, there is no separation of courses for career versus volunteer personnel. Each department is responsible for setting minimum standards for firefighting personnel. NFPA also has not established a separate set of standards for volunteer versus career personnel.

Windisch and Crosby (2008) state the following:

Standards are necessary to maintain order, discipline, and good conduct. These expectations are applicable to all employees regardless of status. To minimize problems, these standards should be consistent to the greatest possible extent. Although equal standards are continually promoted whenever possible, there are circumstances that make career personnel and volunteers different. One of the major issues is time available, which must be kept in mind as standards are created. Don't make it impossible for a volunteer to comply. Conversely, hold stead on important issues that affect service levels (p. 41).

The other side of the issue is that firefighting personnel should be properly trained prior to allowing those personnel to participate in interior structural firefighting. NFPA standards only recognize two levels of firefighter training and do not recognize the state of South Carolina basic firefighting course as a minimum level of training. It would appear that firefighter training must be comprehensive and meet national standards, but must also recognize the burden it places on volunteer personnel. As previously mentioned, Colleton County Fire-Rescue currently pays a stipend for each class attended by volunteer personnel. Pillsworth (2007) recognizes that the safety of personnel may not be free in his citation of the following:

Of those who think that "volunteers" should not get any compensation for their efforts, times have changed. Thirty years or more ago, the times and requirements were different. But what was true then and is now is that volunteers should not have to pay money out of their own

pocket, whether in unpaid salary or hard-earned vacation time, to protect their communities. We are in different times today. The age of something for nothing is over, and if the communities want the very affordable services a volunteer fire department provides and to keep its members highly trained, more money is needed to maintain service. But even so, it is just a fraction of the cost of a paid or even a combination department. (pp. 21-22).

It is estimated that if a volunteer were to participate in 240 hours of training to complete the IFSAC Firefighter II training in eight hour classes, they would be required to attend 30 classes at a minimum. If each volunteer received a ten dollar stipend for each class, they would receive 300 dollars for the entire program. If this were converted to an hourly rate, it would translate to the equivalent of one dollar and twenty-five cents per hour. It is important to mention that this figure is for comparison purposes only, as federal labor laws prohibit paying volunteer personnel an hourly rate or any other performance based wage.

Command personnel are also in need of far more advanced training than the state of South Carolina OSHA firefighting course. The CCFR incident commanders are typically qualified to command incidents; however, supervisory personnel such as those that would fill the role of company level officer are not always immediately present during operations. These company level officer roles must be filled by available personnel, whether career or volunteer, and assembled with other personnel who may not have the training necessary to accomplish the incident commander's desired tactics. Assembling these companies, while also ensuring accountability and managing the incident, may be too much for the incident commander to accomplish. Huder (1995) recognizes the time critical nature of incident commander's decision making in the following:

The above story is a true account documented in *Rapid Decision Making on the Fire Ground*, a study conducted by the U.S. Army Research Institute on the Behavioral and Social Sciences. The study was commissioned by the Army when scientists found that, in time-pressured situations, individuals were unable to use standard analytical models for decision making (models requiring that trainees go through a process of analytical evaluating all possible solutions, comparing the pros and cons of each option, and choosing the best one). There simply was not enough time to go through all the steps. (p. 16).

Dube (2008) also recognizes that the group officers are responsible for maintaining accountability of their group. "Group/division officers shall account for all personnel under their command and be prepared to report this when called by the IC" (p. 76). This allows the IC to track group leaders and not have to track and account for every individual on the emergency scene during every second of operations.

Flin and Slaven (1995) also indicate the following:

A wide range of individuals may find themselves in the role of on-scene commander, most obviously military, police and fire service officers … General Montgomery's dictum on leadership is still stressed today at the Army Regular Commissions Board: "The two vital attributes of a leader are decision in action and calmness in crisis" (p. 114).

This calmness during crisis may be very difficult to maintain, but may be even more difficult or nearly impossible if the incident commander is required to assemble companies, verify training levels, match desired tactics to be completed, and ensure that a properly trained supervisor is assigned to the company, all while attempting to manage the incident. This may also affect the incident commander's accountability of personnel and the receipt of information necessary to change tactics during operations. "Firefighter accountability and crew/team

integrity (go in together, stay together and come out together) is huge in providing for the health, safety and welfare of all of your members" (Rubin, 2009, p. 81). However difficult it may be for the incident commander to assemble companies while managing the scene, in the absence of organized companies, the incident commander must account for every individual in lieu of being responsible for only tracking companies. By dividing the labor in this way each company's supervisor or company level officer is responsible for the accountability of the personnel assigned to his or her company. According to Carter (2003), NFPA 1021 requires that Fire Officers, "must understand the causes of unsafe acts, health exposures, or conditions that result in accidents, injuries, occupational illnesses, or deaths, and be able to communicate the results of their findings in writing" (p. 13). By understanding unsafe acts and health exposures, the supervisory personnel or company level officers at the scene of incidents, can avoid acts which could jeopardize the safety of the personnel assigned to their company, freeing the incident commander to focus on incident management.

Additionally, Cowardin (1981) cites the following:

No person should supervise more than five or at the most, six direct subordinates whose work interlocks… Reorganization is a continuous process. In every undertaking, specific provision should be made for it. It should be necessary to reorganize during an emergency. However, an organizational system which is in use should be flexible enough to permit slight adjustments to be made by the Incident Commander or supervisor (pp. 51-52).

Moreover, NFPA 1021 (2009) states that fire officer duties involve, "supervising emergency operations, conducting pre-incident planning, and deploying assigned resources in accordance with the local emergency plan…" (p. 9). This supervisory role must either be filled by company/group supervisors or the incident commander at incident scenes. The supervision of

task level activities are better accomplished by having a company level officer present where the work is being completed in lieu of the incident commander having to evaluate the effects of task level activities solely by changes in the overall incident. NFPA 1021 also requires fire officers to obtain IFSAC Instructor I certification. This instruction or guidance is only helpful for supervisory officers present at task level activities. In the absence of this, it is yet another role the incident commander is responsible for, while attempting to manage the incident. The incident commander, given the time compression of incidents, simply does not have the time to train, instruct or guide personnel on task level activities before assigning them.

Although many of the CCFR volunteer personnel arrive at scenes in their privately owned vehicles, it is beneficial for the incident commander to organize the personnel into companies, with an appropriately trained supervisor. This division of labor can allow the incident commander to focus on strategies and tactics and not be overwhelmed with task level activities.

There are many volunteer or combination departments that require apparatus to be fully staffed prior to leaving the fire station. In such cases, procedures may be developed for task level activities. "The procedure states, in specific terms, the initial tasks for what each person is responsible, by seating position on the pumper" (Cimino and Rubin, 1983, p. 24). Downey (1988) recognizes the importance of assembled companies prior to arrival, stating, "Progressive fire chiefs are of the opinion that companies should never be allowed to respond with less than five members" (p. 16).

Dunkel (1994) cites several tests where crew size greatly affected timed tasks and fire losses, citing:

In 1980, the Los Angeles, California, Fire Department conducted several tests to see if apparatus crew size had an effect on timed tasks and fire losses. The results demonstrated that the three firefighter crew took twice as long to complete a task when compared to a five firefighter crew size. Total fire loss also increased by 40% because of the additional time required to bring a fire under control and perform supporting activities with only three firefighters on a crew. In 1984, the Dallas, Texas, Fire Department administered some evolutions using three, four, five, and six firefighters on apparatus to determine staffing levels for their department (p. 5).

The results of the Dallas, Texas study were that a crew size decrease from six to five personnel decreased effectiveness by 20%, a decrease of crew size from six to four personnel, decreased effectiveness by 48%, and a decrease from six to three personnel, decreased effectiveness by 68%. "Similar studies with similar results were completed by the Columbus, Ohio, Fire Department (1980) and the Seattle, Washington, Fire Department (1982)" (Dunkel, 1994, p. 6).

Clark (1960) found similar results in a much earlier study, stating, "it can be seen that it takes 34 percent more time for three men to accomplish the work than it took four men and it takes 82 percent more time for two men to accomplish the work" (p. 1032).

The advantages of higher levels of staffing on each apparatus are clear. Increased apparatus staffing may not only be more efficient, but in many cases, it could be a much safer method of operation. In the summary of a National Institute of Occupational Safety and Health (NIOSH) firefighter fatality investigation involving a water tender that overturned while responding to a structure fire in a neighboring district, one of the recommendations is the following:

Fire Departments should consider staffing tankers with a minimum of two fire fighters. The second fire fighter in the cab can act as a second set of eyes to monitor potential hazards as well as operate warning devices, check maps, and act as a spotter for backing operations when necessary. The second person can also assist with hose connections, portable tank deployment, and other necessary tasks on the emergency scene or at the fill site (Berardinelli & Wertmann, 2008, p. 6).

Cottet (1990) disagrees, stating:

The Cleveland (NY) Volunteer Fire Department needed a way to deliver a substantial quantity of water to rural fire scenes with minimum manpower. Our solution was a tank truck that the driver could unload by himself into a portable holding tank. In the past we used a two-man crew for this operation – one member guided the driver in backing up to the portable tank and then manually opened the discharge valve to unload the tank. Because of reduced availability of personnel, however, we needed to streamline this operation so that the driver alone could handle unloading the truck (p. 73).

Nakatani (1968) also identifies the use of single firefighter unit in his description of the Bindo Tai, motorcycle firefighters of Osaka. He outlines that these firefighters are responsible for incipient fire suppression, investigation, photography, as well as other duties. "Because he is expected to do any or all these jobs by himself, the Bindo Tai fire fighter must be highly capable and have a thorough knowledge of fire fighting techniques" (p. 49).

McIlvenna (2000) states that single firefighters that are properly trained can greatly affect incident outcomes, particularly at wild land fires, citing the following:

Current fire science research indicates that when fires are attacked initially with high flows they require less water to extinguish than when small initial flow rates are used… One

properly trained firefighter using a deluge gun can produce the same effect on a fire as 15-20 firefighters with small lines working simultaneously (p. 32).

Although Cottet, Nakatani and McIlvenna cite that these methods of operation were necessary due to reduced availability of personnel, both Dunkel and NIOSH would argue that this is not the most efficient nor is it the safest method of operation. Additionally, NFPA 1500 recommends "a minimum of four members responding and arriving with each engine and ladder company responding to any type of fire" (National Fire Protection Association, 2002, p. 92-1). NFPA 1500 also recommends "a minimum of five personnel on engine companies and six personnel on ladder companies responding to high-risk areas" (National Fire Protection Association, 2002, p. 92-1).

NFPA standard 1720 (2004) outlines the appropriate responses for combination and volunteer fire departments. It states the following:

Initial attack operations shall be organized to ensure that at least four members are assembled before interior fire suppression operations are initiated at a working structural fire. In the hazardous area, two individuals shall work as a team. Outside the hazardous area, two individuals shall be present for assistance or rescue of the team operating in the hazardous area. One of the two individuals assigned outside the hazardous area shall be permitted to be engaged in other activities (p. 7).

Carter (2002), in his guide to understanding and meeting the requirements of NFPA 1720, asks the following questions:

Upon assembling the necessary resources at the emergency scene, does your fire department have the capability to safely initiate an initial attack within two minutes 90 percent of the time? Are the initial attack operations organized to ensure that at least four members are

assembled before initiating interior fire suppression operations at a working structural fire? (p. 15).

"The new NFPA 1710 and 1720 standards are essentially off-shoots of the old NFPA 1200 standards, which were abandoned after tremendous opposition, mostly from volunteer fire departments" (Ludwig, 2001, p. 34). Regardless of the method of delivering firefighters to the scene, they must be quickly organized to safely begin operations.

Given the paramilitary makeup of the fire service, an examination of the military integration into complex emergencies can give the reader an understanding of what is necessary to begin operations, as Sharp, Wightman, Davis, Sherman, and Burkle (2001) outline in the following:

Militaries not only must cooperate and coordinate extensively with each other, but also with governmental and non-governmental humanitarian relief organizations that will be engaged for the long term… For example, different militaries may communicate using different types of radios and encryption systems. All organizations must establish the basic means to communicate effectively in the field. Language and cultural differences also complicate interactions. More importantly, political leaders and military commanders of different nations may have different views on appropriate roles for their forces in any individual event (pp. 197-206).

This common communication needed for effective operations transcends far more than the same type of radio or frequency. The need is for effective organizational groups or companies and the integration of the personnel and leaders of those groups. Certainly common and consistent levels of training will improve operations. Consider the Allied invasion of the beaches of Normandy in World War II.

By June 5, 1944, the Allied army was poised to strike. Approximately nine thousand ships were either at sea or ready to cast off. High winds and rain were pummeling the coast and channel, but the forecast was for clearing skies and Eisenhower, as Supreme Commander, gave the order to attack. The paratroopers were the first on the ground, landing behind enemy lines shortly after midnight on June 6. The infantry landed on the five Normandy beaches shortly after dawn, with over ten thousand Allied airplanes striking just before the blunt German defenses. Nothing worked perfectly, but everything worked well enough, and courageous Allied troops secured the beaches and sealed the eventual fate of the Third Reich… The Allied casualties were high at 10,274 but the Allies gained their first foothold in France, and Hitler's days in power were numbered (Garner, 2008, p. 21).

Given the very high casualties associated with the ground invasion from the sea, military commanders on the ground, at the company level, were forced to patch or assemble companies from various personnel. For example, a soldier from one company may have had his entire company killed in action during the assault. An officer from another company would assimilate that single soldier into the officer's company. The soldier's tasks would change according to what the new company was ordered to accomplish; however, the consistent training and existing organizational structure allowed for this to occur while Allied forces were taking heavy casualties and with very little disturbance elsewhere in the organization.

A similar such organization is needed to assimilate various personnel at emergency scenes so that the incident commander can plan strategies and tactics based on the response.

Career members will have a response time established by staffing levels. If there is to be a combination response to incidents, the companies that are first to arrive need to know when they can expect help… Career organizations are aware of expected response times and what

vehicles are staffed for response. The incident commander (IC) can plan his strategy based on this information. It is equally important for the IC in a combination department to be able to do the same. Therefore, a combination department must have a response plan that includes the vehicles to be utilized and the order of response… There can be an engine, ladder truck, rescue, ambulance, or other apparatus. There should be a standardization of response order that would dictate to both career and volunteer fire fighters which vehicle needs to be deployed and when (Windisch and Crosby, 2008, p. 23).

Klaene and Sanders (2006) agree that organizing personnel into companies is best for dividing the labor at incidents in the following citation:

Division of labor improves efficiency by assigning individuals specific tasks. On the fireground, exact duties can't always be determined in advance and replicated; therefore, the strict division-of-labor principle used here would not typically apply. However, the fire service does broadly apply the division-of-labor concept to the fireground by splitting duties among engine companies, truck companies, and command. The division-of-labor concept isn't strictly adhered to in the fire service because firefighters should be cross-trained to accomplish many different tasks. The division-of-labor concept stresses the need for pre-assigning duties (functions) at an emergency to ensure that everyone is familiar, before the incident, with what will be expected of them during an emergency… The IC improves efficiency in coordinating activities at a structure fire using this fire company division of labor concept. The basic fire department unit is an engine company whose primary duty is to apply water to extinguish the fire… Company unity is important to effective management and maintaining a reasonable span-of-control. It's best to keep all members of companies together as a unit under the direct management of a company officer. However, there are situations where splitting companies is

necessary, such as when establishing a two-out team with only one company on the scene or assigning an apparatus operator to run an apparatus that is pumping or has its aerial device in use (p. 38).

Assembling the organizational unit or companies may be difficult. As previously stated, in many cases a CCFR apparatus may arrive with only one firefighter. This results in a lack of additional personnel that are immediately available to be assigned the many necessary tasks during the initial stages of the incident. This may prevent the incident from being controlled while it is still small in nature.

Brennan (2003) summarizes this concept in the following:

We have sulked away from the table taking a poor substitute that was won by our industrial (part-time engineer, elevator operator, maintenance service) fire protectors because it was the "best we can get" – called "two in and two out"! The real success should be "all in and attack all at once" and support and plan for the failure – rapid intervention. Yet we are led or told to perform by leadership what amounts to a "copout" or CYA mentality of establishing an understaffed, undertrained, and underequipped intervention team even before we are in place and able to mount and support the firefight of the offensive strategy – the interior attack. Through initial setup of intervention teams before adequate commitment, we are planning to lose, we are really placing "not enough people" in standby to enter an out-of-control situation (trapped firefighters). We try to save firefighters (who were not enough in the first place) who are now overwhelmed by a structure fire that should have been put under control with all the tactics (personnel and equipment) in place and performing professionally. We are sending the same "too few" into a structure fire that has now changed so severely as to trap those "two few" who are equally trained. We are killing and injuring more firefighters going to fewer fires that are

better protected than any time in our history. WHY? There are no operational forces on the scene! Surround the "thing" with equipment: maybe it will get scared and go away… Do you think police officers would go on duty with one or two bullets in their guns and ask for more only when they need it? (p. 216).

Brennan stresses the importance of arriving with an adequate number of personnel to begin operating safely. CCFR may have personnel arriving in privately owned vehicles faster than it takes apparatus to arrive. However, it requires the incident commander to quickly assemble companies or groups of those personnel to begin executing tactics to accomplish the overall strategies.

## Procedures

The procedures the author used for this descriptive research project began with a review of existing literature. The literature review commenced in the Learning Resource Center at the National Fire Academy in August of 2009. It was the author's intention to use existing literature to help answer the following research questions: What are the current training standards for both operating and supervising operations on incidents and identify any disparities for career versus volunteer personnel? How do other departments or organizations divide labor during incidents? What operational changes can be made to improve labor division at incidents?

Additionally, a questionnaire (Appendix A) was developed to gather general information regarding how other departments or organizations divide labor during incidents. Using seven closed ended questions, respondents were required to pick from a series of options. The first question was used to record on behalf of which department, city and state the respondent was reporting. The author did not use this data for statistical importance but to insure that the respondents were not from one area of the country. The second and third questions determine if

the respondent's department has a written staffing policy and which, if any, staffing standard the respondent's department strives to meet. Questions four, five and six were used to determine the number of personnel routinely staffing engines and ladders as well the percentage of volunteer personnel responding in privately owned vehicles and total number of personnel present at one alarm structure fires from the respondent's department. The seventh question gathers information on how volunteers arriving separate from fire department apparatus are assigned tasks. This questionnaire was distributed to a group of South Carolina fire service leaders listed on the firefighter mobilization and state fire academy instructors email groups. Additionally, the questionnaire was distributed by the National Society of Executive Fire Officers to its email list of executive fire officer candidates and alumni in order to gather information from other parts of the United States. The results of this questionnaire help to answer the following research question: How do other departments and organizations divide labor during incidents?

There are several limitations to this research. First, the questionnaire was distributed to those departments in South Carolina that are registered with the firefighter mobilization committee or with the state fire academy instructor list. Additionally, the questionnaire was distributed to executive fire officer candidates and alumni through the National Society of Executive Fire Officers' email list in order to determine how other areas of the country are dividing labor during incidents. This email list is not a random sample and represents only those departments with executive fire officer students or graduates; therefore, the data received from the questionnaire is limited by the nature of its distribution and is not statistically significant or reliable. It was not the author's intention to use the data for statistical significance but more to identify other methods or approaches of dividing labor at incidents.

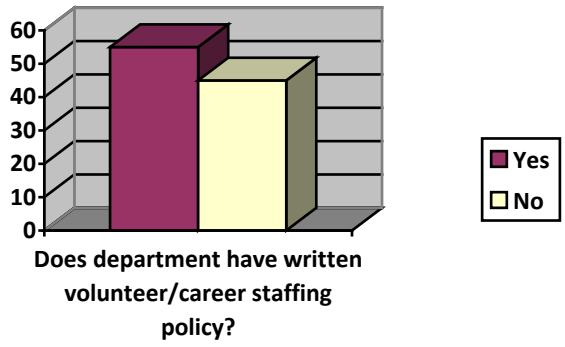
Most of the terms used in this research are unambiguous. However, for the purposes of communications with others, terms were often combined for better clarification. For example, the term "paid/career" was listed on the questionnaire to be inclusive of areas of the country that may refer to non-volunteer personnel as paid or other areas who may refer to the same personnel as career.

## Results

Questionnaire respondents included 53 personnel from 21 different states, with the majority, 17 respondents or 32%, responding on behalf of fire departments in the state of South Carolina. Although several states only had one respondent, the diversity of respondents allowed for a better understanding of questionnaire answers from across the country.

Approximately 55% or 29 respondents indicate that their departments have a written volunteer/career staffing policy. The remainder of the respondents (45%) replied that they do not have a written policy on staffing. Figure 1 shows this data in graphical format.

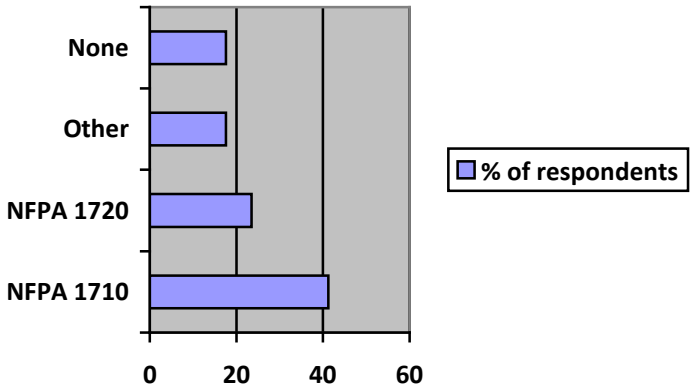
**Figure 1 - Staffing Policy**




When questioned regarding with what staffing standard the respondent's department strives to comply, 41.2% indicated NFPA Standard 1710, while 23.5% responded their department strives to comply with NFPA Standard 1720. The remaining 35.2% respondents

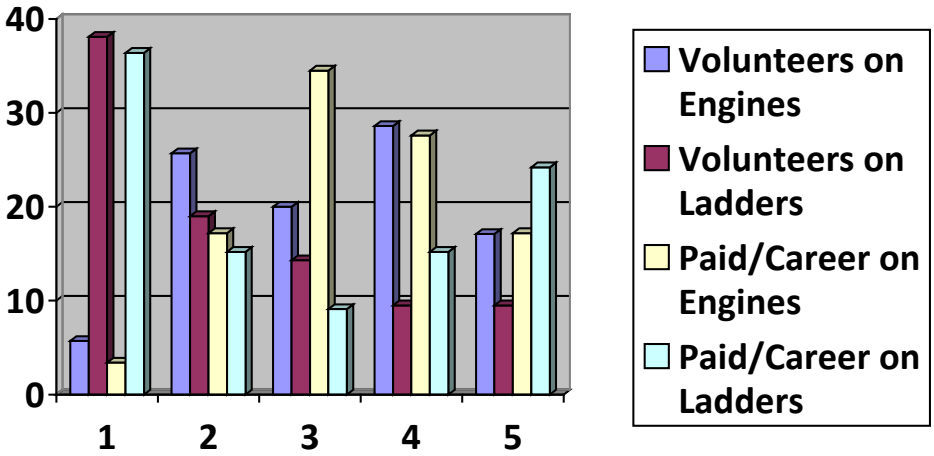
were evenly split between their departments striving to comply with another staffing standard or none at all. Figure 2 shows this data in graphical format.

**Figure 2 - Staffing Standard**




When questioned regarding paid/career versus volunteer staffing on apparatus, the responses were widely scattered. The largest percentages reported four volunteer personnel on engines, one volunteer person on ladders, three paid/career personnel on engines, and one paid/career person on ladders. Figure 3 lists all of the data in graphical format.

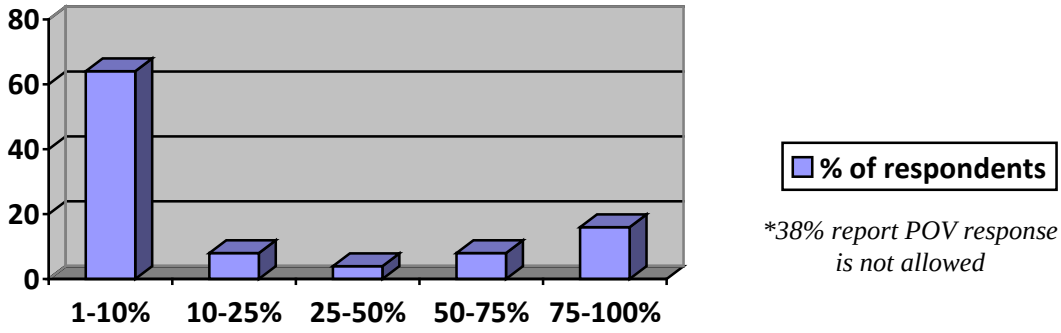
**Figure 3 - Average Number of Staff by Type and Apparatus - % of respondents**




Average Number of Personnel Staffing Apparatus

When respondents were questioned regarding the number of volunteer personnel that respond to scenes of structure fires in privately owned vehicles (POV's), nearly two-thirds answered between one and ten percent. The second highest percentage, 16% (8 respondents) reported that 75% to 100% of their volunteer personnel respond to the scenes of structure fires in their POV's. Approximately 38% (20 respondents) indicated that volunteer response in POV's is forbidden in their departments. Figure 4 illustrates the data associated with this question.

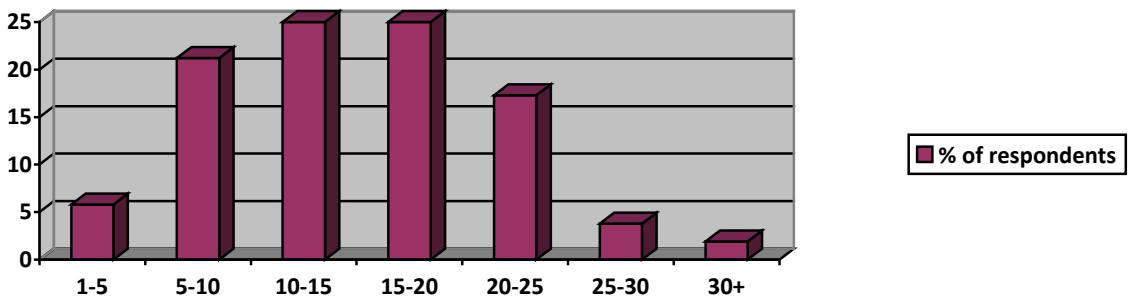
**Figure 4 - Percentage of Volunteer Personnel responding in POV's**




Percentage of Volunteer Personnel responding in POV's

The largest number of respondents, 13 or 25% each, were 15 personnel and 15 to 20 personnel when questioned regarding the average number of personnel, both paid/career and volunteer, that are present on first alarm at structural fires. The second highest percentage, 21.2% (11 respondents) indicate that their departments average between five to ten personnel. Figure 5 shows the data in graphical format.

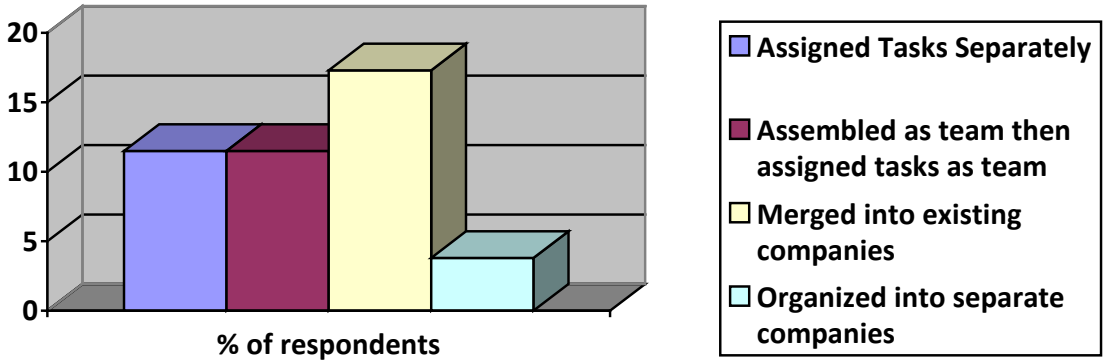
**Figure 5 - Average Number of Personnel at Structural Fires**




Average Number of Personnel at Structural Fires

When questioned regarding how volunteer personnel responding to structure fire scenes in their privately owned vehicles (POV's) are assembled when they arrive, the highest percentage of respondents, 17.3% (9 respondents) indicate that their volunteer personnel are merged into existing companies. The second highest percentage of respondents, 11.5% (6 respondents each) was evenly split between volunteer personnel being assigned tasks separately or being assembled as a team and assigned tasks as a team. Again, 38% or 20 respondents indicated that volunteer response to structure fire scenes in their privately owned vehicles is forbidden in their department. Figure 6 shows the distribution of this particular data.

**Figure 6 - How Volunteer Personnel Responding in POV's are Assembled**




**38% report POV response is not allowed*

The literature review identified training standards for firefighters which exist and are routinely revised to provide for the safety of firefighting personnel. The literature review also revealed that although the time available for volunteer personnel differs from that of paid/career personnel, the training standards are applied equally to both groups. This clearly answers research question number one, which is, what are the current training standards for both operating and supervising operations on incidents and are there any disparities for career versus volunteer?

The questionnaire revealed among the respondents that a small majority of volunteer and combination departments have a written staffing policy. The majority of departments also strive to meet NFPA Standard 1710. Additionally, questionnaire respondents indicate the majority of the departments have four volunteer personnel staffing engines or three paid/career personnel staffing engines. The majority of respondents indicate only one firefighter, either paid/career or volunteer, staff ladder apparatus responses. Nearly two-thirds of the respondents indicate that between one and ten percent of volunteer personnel respond in their privately owned vehicles. Moreover, 38% of respondents indicate that volunteer response in privately owned vehicles is forbidden in their departments. Half of the respondents indicate that the average number present on first alarm at structural fires is between 10 and 20 personnel. The majority of respondents indicate that volunteers arriving at scenes in their privately owned vehicles are merged into existing companies. These results clearly answer research question number two, which is, how do other departments or organizations divide labor during incidents?

Operationally, Colleton County Fire-Rescue (CCFR) could develop procedures that implement what the majority of questionnaire respondents have implemented in their own departments. For example, CCFR could develop a written staffing plan that strives to comply

with NFPA 1710. In this plan, an emphasis could be placed on volunteer personnel responding on apparatus. This would decrease the number of privately owned vehicles (POV's) responding to scenes without decreasing the number of personnel present at scenes. This would also improve the division of labor at scenes by having companies arrive as a group in lieu of each volunteer arriving separately which requires that they be patched into existing companies. CCFR could also use a mix of paid/career and volunteer personnel for apparatus responses, such as that presented in the questionnaire results. This clearly answers research question number three, which is, what operational changes can be made to improve labor division at incidents.

## Discussion

Early in the literature review, Rielage (2009) identifies that, "There are an estimated 1,148,800 firefighters in the United States. Of these, 323,350 (28%) are categorized as career firefighters and 825,450 (72%) are considered volunteer" (p. 16). CCFR is much like the country as a whole in that it cannot provide services to its citizens without the use of volunteer personnel. The literature review reveals the same expected level of training for both paid/career and volunteer firefighters. It is also more time consuming to complete training today then it has been in the past. Many speculate that this has led to a decline in volunteerism. Smith and Purcell (1999) recognize this fact in their citation of the following:

Often many volunteers, who have only a limited amount of time they are both willing and able to commit to volunteer service, see increased levels of required certifications, necessary to maintain proficiency and safety at an acceptable level, as something on which they are not willing to spend time. (p. 7)

The literature review also identified that the basic firefighting class that many CCFR firefighters complete does not meet the most accepted national standards. This will lead to a

deficient work force being present at the scene of emergencies. This also translates to a paramount need for supervision of those performing tasks on scene, and therefore, an even higher level of training needed for those that will supervise incident task level activities. The literature review identifies that in the absence of this task level supervision, it is the incident commander's responsibility to assemble and organize personnel, direct task level activities to accomplish tactics, and continue to plan strategies for the incident, all while maintaining accountability of and insuring the safety of personnel. Dube (2008) recognizes the relief of some of the incident commander's burden by having group officers, "account for all personnel under their command and be prepared to report this when called by the IC" (p. 76). With group officers supervising, accounting for, and directing their personnel in task level activities, it frees the incident commander to focus on overall management of the emergency.

The benefit to having personnel organized into groups with a leader for each group is easily seen. The question that remains is how volunteer personnel can be organized into groups. The questionnaire revealed that some departments do not allow volunteer personnel to respond to scenes in their privately owned vehicles. This insures that all of the needed apparatus respond to the scene and will also increase performance. Dunkel (1994) noted the following results from a 1980 Los Angeles Fire Department study:

Results demonstrated that the three firefighter crew took twice as long to complete a task when compared to a five firefighter crew size. Total fire loss also increased by 40% because of the additional time required to bring a fire under control and perform supporting activities with only three firefighters on a crew. In 1984, the Dallas, Texas, Fire Department administered some evolutions using three, four, five, and six firefighters on apparatus to determine staffing levels for their department (p. 5).

Not only does having personnel arrive together on an apparatus increase performance, decrease time needed for fire control, and decrease fire loss, it also addresses the aforementioned organizational problem. Personnel arriving together are already organized into a group and if a leader is present, the group can immediately be assigned tasks by the incident commander without requiring the incident commander to continually manage or oversee the task level activities. Also, the incident commander only has to maintain accountability of the group since it is the group leader's responsibility to maintain accountability of all the individuals within the group. However simple a solution this may appear to be, given the size of Colleton County and number of stations, it may not be feasible to disallow volunteer scene response in their privately owned vehicles.

Perhaps a hybrid solution lies in Garner's (2008) citation of the following regarding the invasion at Normandy:

Nothing worked perfectly, but everything worked well enough, and courageous Allied troops secured the beaches and sealed the eventual fate of the Third Reich… The Allied casualties were high at 10,274 but the Allies gained their first foothold in France, and Hitler's days in power were numbered (p. 21).

In this event, the military may have initially had personnel tasked to particular groups prior to the inception of the battle. However, given the high number of casualties, military officers likely had to merge soldiers into other companies to continue effective tactic completion. If volunteers arrive at a scene individually, there is a need to organize them into groups just as if they were a soldier and the majority of their company had been killed in action. Once grouped, the incident commander can divide the big jobs into smaller jobs by dividing the labor among the groups present. Klaene and Sanders (2006) stated the following:

Division of labor improves efficiency by assigning individuals specific tasks…the fire service does broadly apply the division-of-labor concept to the fireground by splitting duties among engine companies, truck companies, and command…The IC improves efficiency in coordinating activities at a structure fire using this fire company division of labor concept. The basic fire department unit is an engine company whose primary duty is to apply water to extinguish the fire… Company unity is important to effective management and maintaining a reasonable span-of-control. It's best to keep all members of companies together as a unit under the direct management of a company officer (p. 38).

The improved efficiency and better accountability allows for the incident commander to focus less on directing tasks, instructing personnel on the use of equipment or the proper way to perform a task and more on overall scene safety.

When personnel arrive on the same apparatus as a group, the assignment of tasks can be pre-determined prior to arrival, as Cimino and Rubin (1983) noted, "The procedure states, in specific terms, the initial tasks for what each person is responsible, by seating position on the pumper" (p. 24). In the absence of pre-determined assignments, personnel may be placed in virtually any role depending on the timing of their individual arrival. This makes a higher and more multi-role level of training much more critical. As Nakatani (1968) stated regarding the multi-purpose motorcycle firefighters, "Because he is expected to do any or all these jobs by himself, the Bindo Tai fire fighter must be highly capable and have a thorough knowledge of fire fighting techniques" (p. 49).

The combination of low levels of training associated with the lack of organization places an extreme burden on the incident commander, and in the absence of a highly micro-managed scene, creates a great potential for failure or safety concerns.

## Recommendations

Colleton County Fire-Rescue should continue to research alternatives to assist with organizational problems on incident scenes. Volunteer personnel will continue to be a necessary asset long into the future of the fire service in Colleton County. First, CCFR should insure that all its firefighters, both paid/career and volunteer, are trained to the NFPA Firefighter II level. This level of training will provide for more knowledgeable firefighters and leaders that can fill the role of company officer at emergencies. This will eliminate the need for incident commanders to instruct personnel in the use of equipment or the proper way to complete a task, freeing the incident commander to focus on scene management.

As previously written, if Colleton County was smaller in size with its stations in closer proximity to one another it may be feasible to disallow volunteer response in their privately owned vehicles, but a complete disallowance, at present, will likely not be effective. However, an emphasis should be placed on volunteer personnel responding in groups on apparatus whenever feasible. This insures the appropriate apparatus will arrive at the scene and also allows personnel to arrive already organized into groups. This solution is consistent with the questionnaire results of how other departments have addressed the division of labor problem at incident scenes. It will also reduce the number of privately owned vehicles responding to incidents without reducing the total number of personnel available at scenes. When this organization of labor is not immediately present on the incident scene, such as when personnel arrive on the same apparatus, there is an even higher need for personnel to possess a more advanced level of training. This will allow arriving personnel to fill the many roles necessary for safe and effective operations. CCFR could also explore the possibility of using an officer or other paid/career position to act as an organizer of those arriving. This would allow the

personnel arriving individually to be grouped together as if they arrived together. This would relieve the incident commander of the organizational responsibility and allow him/her to assign tasks to the organized groups and focus on safety and scene management

Both CCFR and future readers should also continue to research alternatives to reduce organizational problems at incident scenes. Importance should be placed on allowing for ease of grouping personnel, making the big jobs smaller by using the division of labor, and allowing the incident commander to focus on the safety of everyone on scene.

# References

Berardinelli, S. & Wertman, S. (2008). *Volunteer fire fighter dies in a tanker crash – Louisiana.* Cincinnati, OH: National Institute for Occupational Safety and Health.

Brennan, T. (2003, March). Great manning. *Fire engineering,* 156, 216.

Carter, H. (2003, November). An officer's guide to NFPA 1021 – part 3. *The voice.* 24, 11-14.

Carter, H. (2002, April). NFPA 1720 – A working guide – part 1. *Instruct-o-gram.* 23, 13-16.

Cimino, C. & Rubin, D. (1983, January). Volunteer manning: a developing problem and some solutions. *International fire chief,* 49, 24-26.

Clark, W. (1960, November). Time study trials of engine and ladder company evolutions. *Fire engineering,* 113, 1030-1033.

Cottet, J. (1990, June). One-man water delivery. *Fire engineering,* 143, 73-74.

Cowardin, D. (1981). *The on scene emergency management system.* Dallas, TX: Taylor.

Downey, R. (1988, August). Recruiting and manning. *Fire engineering.* 141, 12-19.

Dube, R. (2008, November). Communication breakdown. *Fire-rescue magazine,* 26, 76-78.

Dugan, M. (2007, June). Time to train. *Fire-rescue magazine,* 25, 28-31.

Dunkel, R. (1994). *Apparatus manning levels for paid on-call fire departments.* Unpublished manuscript.

Flin, R. & Slaven, G. (1995, June). Identifying the right stuff: selecting and training on-scene emergency commanders. *Journal of contingencies and crisis management,* 3, 113-123.

Garner, J. (2008). *We interrupt this broadcast: the events that stopped our lives…from the Hindenburg explosion to the Virginia Tech shooting.* Naperville, IL: Sourcebooks, MediaFusion.

Huder, R. (1995, March). Training incident commanders for decision making. *Fire engineering*, 148, 16-21.

Klaene, B. & Sanders, R. (2006, September/October). Time constraints at emergency scenes: coordinating activities on the fireground is simplified by using a division-of-labor concept. *NFPA journal*, 100, 38.

Ludwig, G. (2001, July). How NFPA 1710 and 1720 affect fire service ems. *Firehouse,* 26, 34.

McIlvenna, M. (2000, March). Minimum manning, maximum effect. *Wildland firefighter,* 3, 28-30.

Nakatani, Y. (1968, January). Bindo tai – the motorcycle fire fighters of Osaka. *Fire engineering,* 121, 48-49.

National Fire Protection Association. (2009). *NFPA 1021- Standard for fire officer professional qualifications.* Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2002). *NFPA 1500- Fire department occupational safety and health program.* Quincy, MA: National Fire Protection Association.

National Fire Protection Association. (2004). *NFPA 1720- Organization and deployment of fire suppression operations by volunteer fire departments.* Quincy, MA: National Fire Protection Association.

Pillworth, T. (2007, June). Paid two-week training spurs retention and recruitment. *Fire engineering,* 160, 18-22.

Render, G. (2008, December). Decade of training. *Fire chief,* 52, 62-66.

Rielage, R. (2009, May). Take statistics one step further. *Fire chief,* 53, 16-19.

Rubin, D. (2009, June). Firefighter accountability: critical in reducing America's LODDs. *Firehouse,* 34, 78-81.

Schliek, D. (2008, September/October). NFPA 1001 – A new standard. *Minnesota fire chief,*

45, 22.

Sharp, T., Wightman, J., Davis, M., Sherman, S., & Burkle, F. (2001, October-December). Military assistance in complex emergencies: what have we learned since the Kurdish relief effort. *Prehospital and disaster medicine,* 16, 197-208.

Smith, M. & Purcell, R. (1999, June). Volunteerism: a staffing dilemma. *The voice,* 28, 7-8.

Windisch, F. & Crosby, F. (2008). *A leadership guide for combination fire departments.* Sudbury, MA: Jones and Bartlett Publishers.

## Appendix A – Staffing Questionnaire

This questionnaire has been designed to collect information regarding volunteer or combination (volunteer/career) fire departments. ** If you are answering this survey on behalf of a fully paid/career fire department (you have no volunteer personnel) PLEASE DO NOT COMPLETE THIS SURVEY.

1.) On behalf of what fire department are you reporting (Department Name, City/State)?
2.) Does your department have a written volunteer/career staffing policy?
    A) Yes
    B) No
3.) What standard does your department strive to comply with for staffing?
    A) NFPA 1710
    B) NFPA 1720
    C) Other
    D) None
4.) What is your average number of personnel staffing each of the following apparatus (How many of each of the following types of personnel are on each apparatus during an average response)?
    A) Volunteer Personnel Staffing Engines (1-5+)
    B) Volunteer Personnel Staffing Ladders (1-5+)
    C) Paid/Career Personnel Staffing Engines (1-5+)
    D) Paid/Career Personnel Staffing Ladders (1-5+)
5.) What is the percentage of volunteer personnel responding in privately owned vehicles (POV's) that respond on first alarm to the scenes of structure fires?
    A) 1-10%
    B) 10-25%
    C) 25-50%
    D) 50-75%
    E) 75-100%
6.) What is the average number of personnel (Total of Paid/Career and Volunteer) that are present on first alarm at structural fires?
    A) 1-5
    B) 5-10
    C) 10-15
    D) 15-20
    E) 20-25
    F) 25-30
    G) 30+
7.) How are volunteer personnel responding in privately owned vehicles (POV's) assembled when they arrive at the scenes of structure fires?
    A) Each is assigned a task separately
    B) They are assembled as a team and assigned tasks as a team
    C) They are merged into existing companies
    D) They are organized into separate companies