

**EVALUATING THE JEFFERSON CITY FIRE DEPARTMENT'S
COMPLIANCE WITH NFPA 1720'S FIRE SUPPRESSION AND OPERATION
OBJECTIVES**

Executive Leadership

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CERIFICATION 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 the appropriate credit is given, where I have used the language, ideas, expressions and writing of another.

Signed: _____

ABSTRACT

The Jefferson City Fire Department had never conducted a formal review of compliance with NFPA's standard 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments*. The purpose of this Applied Research Project (ARP) was to determine if the Jefferson City Fire Department is compliant with the fire suppression and operation objectives of NFPA 1720. The identified research questions were:

1. What are the requirements for meeting compliance with the fire suppression and operational objectives of NFPA 1720?
2. Does the Jefferson City Fire Department currently meet NFPA 1720's objectives for suppression and operations?
3. Based upon the findings of the research, what actions should the Jefferson City Fire Department enact to meet and assure compliance in the future?

Descriptive and historical methodologies will be used to answer the research questions. A literature review of national, local and state resources was conducted to determine the current level of compliance with NFPA 1720. Data was entered into a compliance matrix to determine the current level of compliance with the identified operational components of the standard. The research showed that the JCFD was least compliant in the areas of staffing for initial scene operations, succession planning, health and safety program for reserve firefighters and its ability to sustain operations over more than one operational period.

It was recommended that the fire department seek further research on combating the inability to provide adequate levels of staffing at initial operations, develop a departmental strategic plan to assist with succession planning, improve mutual aid relationships to increase sustainment of operations and offer post offer physicals to our reserve firefighters.

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INTRODUCTION

Since organized fire departments and fire suppression services have existed, it has rarely been agreed upon just how many firefighters are needed to safely and effectively combat fires in structures, save lives of trapped occupants and perform the needed support functions to complete these evolutions. In order to ensure the safety of firefighters and the citizens they serve, numerous rules and standards have been developed and implemented over the years. Few of these standards have caused as much debate and discussion as NFPA 1720. The purpose of this Applied Research Project (ARP) is to determine if the Jefferson City Fire Department is compliant with the fire suppression and operation objectives of NFPA 1720, *Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations and Special Operations to the Public by Volunteer Fire Departments*.

The problem is that the Jefferson City Fire Department has never conducted an official review to determine compliance with NFPA 1720. In the past, this did not appear to be an issue. However, in the fall of 2006, the Department was selected to receive a Staffing For Adequate Fire and Emergency Responders (SAFER) Grant to hire an additional five firefighters to supplement on-duty career firefighter staffing. The Department choose to follow NFPA 1720 through the SAFER Grant process due to the Department's majority contingent of reserve, volunteer firefighters. This applied research project is designed to meet one of the United States Fire Administration five operational objectives "To appropriately respond in a timely manner to emergent issues" by determining if the Department indeed has the needed resources and responders to respond and if the Jefferson City Fire Department is meeting the other operational components to

appropriately respond. By evaluating the Department's current level of compliance, we will be able to develop and implement a plan to assure that areas lacking compliance are identified, and establish a plan to address these issues and insure future compliance NFPA 1720.

The identified research questions are:

1. What are the requirements for meeting compliance with the fire suppression and operational objectives of NFPA 1720?
2. Does the Jefferson City Fire Department currently meet NFPA 1720's objectives for suppression and operations?
3. Based upon the findings of the research, what actions should the Jefferson City Fire Department enact to meet and assure compliance in the future?

Descriptive and historical methodologies will be used to answer the research questions.

BACKGROUND AND SIGNIFICANCE

Jefferson City is located in Jefferson County, Tennessee, which has been deemed the second fastest growing county in the entire State of Tennessee (Annual Report, East Tennessee Development District, 2002). Although Jefferson City is not the county seat of Jefferson County, it is the largest community in this rural county.

Jefferson City, Tennessee, is a small rural city, which has a permanent residence population of 8,500 citizens (Special Census Report, 2007). The City employs twelve career firefighters and maintains approximately twenty reserve, paid-on-call firefighters, which operates out of a single station. The City encompasses approximately 3.2 square miles and operates under a City Manager/City Council form of government. Council members are elected to four-year terms on a staggered schedule and the Mayor is elected to a two-year term. The City Manager reports to the Mayor and Council and provides the guidance for the day-to-day operation of the City. Jefferson City is primarily residentially zoned with some light industrial and manufacturing facilities. Carson-Newman College, a private religious college, lies in the heart of Jefferson City and has approximately 6,000 students enrolled each year. A majority of the structures on the Carson-Newman Campus are considered historical in nature and therefore lack basic fire protection characteristics and features.

A Fire Chief, who is a career employee of the City, leads the fire department. The remaining career employees include three shift supervisors, three firefighter/Driver-Operators, who drive and operate all responding apparatus, and six firefighters. The Jefferson City Fire Department was formed in September of 1909. Currently, the Department staffs three engines, one aerial platform, one squad type support vehicle and

two support vehicles. The Fire Department responds to structure fires, fire alarm activations, motor vehicles collisions with and without injury, emergency medical first responder calls, hazardous materials incidents and service calls in the community. Firefighters are also called to respond with the seven other fire departments in Jefferson County to provide mutual aid and support on-scene operations. In 2006, fire department resources and personnel responded to 915 calls for service. The operating budget of the fire department was \$533,960 in FY 2006 – 2007. Currently, there is no capital project budget.

The most important reason the Jefferson City Fire Department exists is the services, especially emergency response, it provides to its citizens. Nothing presents the goals and objectives of the Department better than its Mission Statement. The fire department's mission statement should direct all operational aspects of a department including planning, administration, emergency response/operations, training and public education emphasis. The Mission Statement of the Jefferson City Fire Department:

To protect the citizens and visitors of Jefferson City from the adverse effects of fire, natural and man-made disasters and to provide effective fire prevention opportunities through public fire and life safety education.

However, it must also be noted that the Department must provide these services with the safety of its members being the primary importance. Norman (1997) wrote, "there has been a concerted effort to reduce firefighter deaths over the last twenty years with some successes – deaths are down from a high of 140 deaths per year in the 1970's to around 100 deaths per year in the 1990's." The Jefferson City Fire Department is not immune to this trend. The Department suffered a Line of Duty Fatality on March 1, 2002 and has

implemented numerous changes to improve firefighter safety in all areas that NFPA 1720 addresses.

LITERATURE REVIEW

An extensive review of periodicals, Internet articles, appropriate books and textbooks were used in the review of materials relevant to this research project. This review of the literature greatly demonstrated the need for the Jefferson City Fire Department to perform a review of operations in comparison with the required components of NFPA 1720.

First, What are the requirements for meeting compliance with the fire suppression and operational objectives of NFPA 1720? In reviewing the literature, it was determined that most of the fire suppression and operational requirements are found in chapter four of the standard. As found in chapter 4, paragraph 1, “Fire suppression operations shall be organized to ensure the fire department’s fire suppression capability includes sufficient personnel, equipment and other resources to efficiently, effectively, and safely deploy fire suppression resources” (NFPA, 2004). These objectives refer to the number of responders (as determined by the local jurisdiction), record keeping and reports, the use of an incident command system and incident commander, chain of command issues, initial attack operations, and mutual aid response operations. Other authors and researchers have determined numbers of responders needed to accomplish the list of fireground responsibilities. The International Association of Firefighters (IAFF) writes:

Historically, the standard for fire suppression in North America has mandated an offensive attack in situations involving structure fires. Study after study has demonstrated that the force available to initiate an interior fire attack is less than

fifteen personnel, the goals of victim rescue, fire control and property conservation are seriously compromised (IAFF, 1993, p.2).

An intricate part of NFPA's conscious standards is the responsibility of the local jurisdiction to adopt and implement the standard. NFPA also states it is the responsibility of the local agency to determine and implement a "sufficient" number of members are available to operate safely and effectively (NFPA, 2004). Freeman (2002) places the decision of staffing at the local level, emphasizing the following:

Different staffing schemes prevail depending upon budgetary considerations, actual fire frequency, and demand for such fire department corollary services such as EMS. In fact, fire company staffing levels vary from department to department. They may be influenced not only by the factors just mentioned, but also by the population protected (which may be different from the census population), population density, type of structures, and response distances; by response and workload data; or by local labor agreements. But although fire unit staffing levels vary from department to department, most departments establish minimum staffing levels (i.e. the minimum number of personnel necessary to operate each unit of firefighting equipment) on the basis of the afore mentioned factors (Freeman, 2002, p. 126-127).

Pegram (2001) offers a sensible, true method for determining the appropriate level of staffing for preventing firefighter injuries and deaths. He states, "The formula used to determine the minimum number for this response is simple: the number of tasks + the number of firefighters needed to complete each task = the total manpower needed" (p.

27) Pegram further demonstrates the needed staffing level and states the responding department will need approximately 16 to 20 firefighters as outlined below:

- (1) Incident Commander to command the incident
- (1) Driver/Operator to operate apparatus
- (2) Firefighters to advance the initial attack hose line
- (2) Firefighters for search and rescue of trapped occupants
- (2) Firefighters to place ground ladders and provide ventilation
- (2) Firefighters for deployment and advancement of a back-up hose line
- (1) Additional Driver/Operator to assist with water supply and hydrant operations
- (2) Firefighters to relieve the first attack crew
- (2) Firefighters to check for extension/overhaul
- (3) Firefighters for the Rapid Intervention Team

For a total of 18 firefighters (p.27).

Other NFPA resources can be used to guide compliance and determination with the requirements of Chapter 4, paragraph 1's staffing components. NFPA's Fire Protection Handbook recognizes the need for proper staffing of fire department operational units by "... it has been demonstrated that when staffing levels fall below four firefighters per company, fire ground effectiveness may be compromised"

(Paulsgrove, 2003, p. 7-22). Paulsgrove also recommends the following:

In general, however, each engine company should have a minimum of four firefighters on duty, including an officer. This parallels NFPA 1500 and OSHA requirements to have at least four firefighters on scene before starting interior

structural firefighting. It would seem inappropriate to dispatch an engine company to a fire if the crew could not start firefighting or rescue operations because of safety concerns (p. 7-22).

NFPA 1410, 2000 Edition, *Standard on Training for Initial Emergency Scene Operations* state "... the company officer shall insure that the following are accomplished in interior structure fires:

- (1) At least two firefighters enter the immediately dangerous to life and health (IDLH) atmosphere and remain in visual or voice contact with each other at all times.
- (2) At least two firefighters are located outside the IDLH atmosphere (NFPA 1410, Section 3-2.2).

Annex A of NFPA 1410 further notes:

With the exception of very small communities and isolated rural areas, the standard response to an emergency incident on the initial alarm is generally a minimum of two engines and a truck company. This practice is for several reasons. First, one engine company cannot be expected both to operate the proper streams promptly for fast attack and to provide the necessary back-up streams. Experience has frequently shown that small streams often prove to be inadequate. Second, fire commonly necessitate prompt application of hose streams from two positions. Finally, the possibilities that an accident or mechanical failure will delay the arrival of one company is always present (Section 1-2.1).

Finally, NFPA 1410 (2000) details:

The minimum recommended staffing level for a fire company responding to any type of fire consists of four members responding on or arriving with each engine and aerial ladder company. Companies responding in high-risk areas should have a minimum acceptable staffing of six firefighters on ladder companies and five firefighters on engine companies (Section A-3-2.5).

NFPA (2000) bases these recommendations upon "... studies have indicated significant reductions in performance and safety when crews have fewer members than recommended. Overall, five members crews were found to provide a more coordinated approach for search and rescue and fire suppression tasks (Section A-3-2.5).

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Programs*, 2002 Edition, addresses the recommended level of staffing on the incident scene prior to response to the IDLH atmosphere. NFPA (2002) identifies the following:

In the initial stages of an incident where only one crew is operating in the hazardous area at a working structure fire, a minimum of four firefighters shall be required, consisting of two individuals working as a crew in the hazard area and two individuals present outside this hazard area available for assistance and rescue at emergency operations where entry into the danger area is required (Section 8.4.7).

NFPA 1500 further clarifies who can make up this crew and what functions they can serve on the incident scene. NFPA 1500 (2002) outlines this guideline by stating:

The assignment of any personnel, including the incident commander, the safety officer, or operators of fire apparatus, shall not be permitted as stand-by personnel if by abandoning their critical task(s) to assist or, if necessary, perform rescue, they clearly jeopardize the safety and health of any firefighter working on the incident (Section 8.4.12).

Another NFPA standard addresses the issue, recommends the initial staffing of a minimum of four firefighters for initial operations, and provides suggestions on how the staffing situation may be solved (NFPA, 2002, Appendix C). NFPA 1561, *Standard on Emergency Service Incident Management Systems* (NFPA, 2002) says, “In the initial stages of an incident where only one crew is operating in the hazardous area at a working structure fire, a minimum of four individuals is required ...” (appendix C). As part of Appendix C, NFPA (2002) offers the following recommendations as far as working out the staffing of the four firefighters on the scene:

- (1) The team leader and one firefighter could advance a fire-fighting hoseline into the IDLH atmosphere, and one firefighter and the pump operator become the stand-by members.
- (2) The team leader could designate the pump operator to be the incident commander. The team leader and one firefighter enter the IDLH atmosphere, and one firefighter and the pump operator remain outside as the stand-by members.
- (3) The two firefighters could advance the hoseline in the IDLH atmosphere, and the team leader and pump operator remain on the outside as stand-by members (Appendix C).

NFPA 1720 has developed a chart to insure compliance with the standard. In chapter 4 of NFPA 1720 the chart illustrates::

“4.3.2* Table 4.3.2 shall be used by the Authority Having Jurisdiction (AHJ) to determine staffing and response time capabilities, and the fractal accomplishment of that for reporting purposes as required in chapter 4.

Table 4.3.2 Staffing and Response Time

Deemed Zone	Demographics	Staffing and Response Time	Percentage
Special Risks	AHJ	AHJ	90
Urban	1000 people/1 sq. mile	15/9	90
Suburban	500–1000 people/1 sq. mile	10/10	80
Rural	Less than 500 people/ sq. mile	6/14	80
Remote*	Less than or equal to travel distance of 8 miles	4	90

*Upon assembling the necessary resources at the emergency scene, the fire department should have the capacity to safely initiate an initial attack with 2 minutes 90 percent of the time.” (NFPA 1720, 2004, p.16)

Table 1

By using this standard table, Jefferson City falls under the urban demand zone, and need 15 personnel on the scene within nine minutes, ninety percent of the time. Although situated in a suburban area of East Tennessee, the population density in Jefferson City matches that of a larger city. This is undoubtedly the result of the private four-year college located in the heart of the City. However, this is only part of the problem. The City experiences a large population shift in the daytime hours as workers gather at their places of employee in the City’s industrial park, school age and adult learner attend places of both elementary and higher education and numerous commuters navigate the City’s major highway between the cities of Knoxville and Morristown, Tennessee.

Amazingly, the federal government has very little to say or few guidelines for fire departments to follow in regard to staffing. “The Occupational Safety and Health Administration (OSHA) creates and enforces regulations to protect the safety the American workforce. Current OSHA regulations that apply to firefighters include 29 CFR 1910.134, Respiratory Protection” (Jakubowski & Morton, 2001, p. 37). Jakubowski & Morton (2001) further state, “... if firefighter must enter an IDLH atmosphere, at least two must enter together...” and “In addition, at least two properly equipped and trained firefighters must be positioned outside the IDLH atmosphere, must account for the interior teams and must remain capable of rapid rescue of the interior teams” (p. 37). Since the State of Tennessee is a non-OSHA state, the Tennessee Occupational Safety and Health Administration (TOSHA), a division of the Department of Labor and Workforce Development is responsible for insuring compliance with federal OSHA standards, which have been adopted by the State as minimum standards. In adopting 24 CFR 1910.134, *Respiratory Protection Standard*, Tennessee requires two properly trained and equipped firefighters to be positioned outside the IDLH atmosphere (OSHA1910.134, Section G, paragraph 4, 1998).

Although not necessarily considered national standard, fire departments, public administrators and business/homeowners have long used the Insurance Service Office’s Grading Schedule for Fire Departments as an evaluation tool for the fire department to determine their abilities at controlling structure fires and an evaluation of how the department is completing its mission. The ISO provides a classification to a City based upon a 1 to 10 scale, with 10 being essential no fire protection to a 1 representing the best ranking a department can receive. The ISO assesses the City’s water system capacity for

fighting fire, the equipment, training and staffing of the fire department and the fire department's ability to dispatch and receive alarms and calls for service. The Jefferson City Fire Department was last evaluated by the ISO in January 1992. The City received an insurance classification of five as a result of the evaluation. In the Classification Details Report of the evaluation, the Department received a grade of 2.67 points out of the possible 15+ category of "Credit for Company Personnel" (ISO, 1992, p. 3). Further, ISO provides suggestions for improving classifications in the Improvement Statements section of the report. ISO stated,

An increase in the on-duty personnel by one person will increase the fire department credit by .63 and an increase in the response by other fire department members by one person will increase the fire department credit by .21 (ISO, 1992, p. 6).

Hickey (2002) suggests that no other section of the fire department grading section is as important as staffing. Over fifteen percent of the actual fire department grade can be achieved through proper staffing of fire department resources. He notes that fire chiefs and city administrators have more influence over the staffing grade than any other issue (p. 139).

NFPA 1720's Fire Suppression Operations Section require that the use and implementation of an incident Commander, who is responsible for the overall control and coordination of all activities during the incident. It also deals with personal accountability and chain of command topics including that all orders shall be transferred from command to units through the company officer (NFPA, 2004, Section 4.2.1).

Brunacini (2004) states:

How the incident commander manages the safety of the troops, who conduct hazard zone operations, is a major challenge which occurs at every incident. The command system calls upon the IC to manage and control strategic level of both operations and safety.

Klaene (2000) details the importance of establishing command to supplement and improve firefighter safety. The need for a strong command presence sets the stage for the overall fire suppression operations and the anticipated outcome of the fire event. As part of this, fireground command should be announced so that all responders on the scene know and understand who is ultimately in charge and directing operations for the incident.

Coleman (1997) also summarizes the importance of the role of the initial incident commander. He stipulates that command must initially handle safety of fire operations, liaison with other responding agencies and provide accurate up to the minute updates to citizens through the media. However, these duties must and should be passed on the others as the needs of the incident grows and the initial incident commander to relieved or command is transferred or as the incident grows in size and complexity.

NFPA (2004) further stipulates the standards and operational objectives for initial attack on a structure fire (Section 4.2.2). It states, "Upon assembling the necessary resources at the emergency scene, the fire department shall have the capacity to safely initiate an initial attack within two minutes, ninety percent of the time" (NFPA, 2004, Section 4.2.2.1).

Carter (2002) summarizes the requirements to be met by NFPA 1720 as lengthy and requiring constant vigilance to adequately address. Some of the areas needing addressing include requirements of written rules, regulations, standard operating procedures and administrative guidelines. Further, fire departments are required to address their place in a 'community risk plan' and have a chain of command with a succession plan. Fire departments are also required to have a standard incident report and procedures to regulate response, mutual aid and dispatching of incidents.

NFPA (2001) stipulates that departments wishing to comply with NFPA 1720 shall have systems in place referring to health and safety, training, communications and pre-incident planning.

NFPA 1001, 2002 Edition of *Firefighter Professional Standard* provides fire departments with guidance for training of firefighters. The Department uses this standard in developing departmental training standards. JCFD SOG 402, *Departmental Training* states, "Career firefighters employed with JCFD are required to attend a 240 Basic Firefighter Recruit School within six months of full-time employment" (JCFD, 2005, p. 56). Also, the SOG addressing the position of department training officer and requirements of training for reserve firefighters. "Reserve firefighters are required to complete a minimum of the Department's Basic Reserve Firefighter Recruit School, TFACA's Live Firefighting Class and the Department's Interior Operations Check-off prior to actively participating in interior firefighting operations", states the Departmental SOG.

In summary to question one, it appears that there are numerous national standards and guideline for staffing fire departments and the apparatus they respond with, however

it is strictly a local decision to implement which, if any, of the standards. The research found that the average staffing for first due fire apparatus should be at least four, with more in specialized or high hazard areas.

Next, does the Jefferson City Fire Department currently meet the fire suppression and operational objectives of NFPA 1720? The literature review focused upon a thorough review of the City of Jefferson City and JCFD's operational guidelines and procedures. For the sake of reviewing compliance with NFPA 1720 within the Jefferson City Fire Department, the author determined the most appropriate model was the International Association of Fire Chief's Matrix to determine a department's present position in meeting NFPA 1720. Used in conjunction with the Standard Operating Guidelines of the Department as well as a close review of actual operations within the Department, a good overall picture was created. The City of Jefferson City, Tennessee Emergency Operations Plan provides a structured response guideline for all emergency operations occurring within the City of Jefferson City. The Jefferson City EOP (2006) states that an annual review of the plan and risk assessment shall be conducted annually. Salvia (2001) states;

These minimum criteria are aimed at effectiveness and efficiency. Effectiveness refers to the manner in which things are done: meeting an objective fully and correctly the first time. Efficiency is really an economic term referring accomplishing an objective at the lowest cost. Cost is a function of resources, direct financial cost and time. These two are not always compatible.

NFPA 1720 requires the fire department to be involved in community risk management planning (Section 4.1.1). The City of Jefferson City Emergency Operations

Plan squarely places the responsibility for emergency management and operations on the Fire Department. Section 1.5 states, “The JCFD is responsible for annual updates and improvement statements of this publication and its related appendices” (Jefferson City EOP, 2006, P. 4). NFPA 1720 also states that responding firefighters be into “company units or response teams” and have adequate apparatus and equipment to respond. JCFD SOG 301.12 states, “Firefighters (career and reserve) will be organized into companies. The number of companies assigned will be based upon the number of active career and reserve firefighters on the department in order to keep a span of command of five to seven firefighters per company”. FEMA (2001) clarifies the importance of this in its Basic Incident Command Course by stated appropriate span of control is five to seven firefighters per company to insure safety and close coordination and control of all on-scene responders. Brunacini (2002) also notes the essential skill of managing firefighters at the incident is essentially easier to do and better managed when firefighters are kept in groups of five to seven members.

A close review of the Annual Report for the Jefferson City Fire Department – 2006 that in 2006 the average staffing was 1.75 firefighters on the first due apparatus and nine firefighters on scene within nine minutes of the call 65% of the time (JCFD, 2006 Annual Report, p. 6).

As stated earlier, department members are guided in response operations by standard operating guidelines. JCFD (2006) Standard Operating Guideline #408, *Interior Structural Fire Attack Policy*, states that interior operations shall not be implemented with less than five firefighters on scene (Section 408.02). Further, it states that all fire

suppression operations shall be overseen by an incident commander who is responsible for the overall coordination of scene operations (Section 408.03).

When referring to the medical requirements of the standard, the City of Jefferson City's Personnel Policy Manual states, "All employees of the City of Jefferson City must meet the physical requirements for the position which they have been employed for upon the first day of employment. This is determined through a post employment physical issued by a contract physician chosen by the City" (City of Jefferson City, 1996, P. 12).

JCFD SOG 402, *Departmental Training* states, "Career firefighters employed with JCFD are required to attend a 240 Basic Firefighter Recruit School within six months of full-time employment" (JCFD, 2005, p. 56). Also, the SOG addressing the position of department training officer and requirements of training for reserve firefighters. "Reserve firefighters are required to complete a minimum of the Department's Basic Reserve Firefighter Recruit School, TFACA's Live Firefighting Class and the Department's Interior Operations Check-off prior to actively participating in interior firefighting operations", states the Departmental SOG.

Finally, based upon the findings of the research, what efforts should the Jefferson City Fire Department enact to meet and assure compliance in the future? As part of completing the IAFC Matrix, IAFC (2002) states:

Compliance assessments are simple and straight forward. They are meant to assist departments in understanding and initiating the review process to determine key areas requiring action by the department. Many of these components can be achieved in a variety of ways. It is up to each individual agency to determine how achievement is measured (p.2)

While evaluating the compliance with the essential components of NFPA 1720 and the effect on daily operations and emergency response their presence or absence has, the author could not overestimate the value of ensuring that fire departments have strong guidelines and rules for everyday operations and emergency response. Most of the key components of fire department operations and NFPA 1720 focus squarely on safety.

The 2006 SAFER Grant Program Guidance Document states, “The program’s goal is to enhance the local fire departments’ ability to attain and maintain 24-hour staffing, thus assuring their communities have adequate protection from fire and fire-related hazards”. As part of this mandate, the JCFD must make a positive attempt to achieve this on a continuous basis in order to meet the requirements of the grant performance requirements.

Summary

In conclusion, the literature review makes it evident that in order for a department to meet the suppression and operational objectives of NFPA 1720, that careful coordination, planning and even recruitment of supplemental suppression forces must be carefully planned and implemented. The literature review also demonstrates that even a combination fire department with a majority career staff struggles to meet the objectives.

PROCEDURES

The purpose of this research project was to determine if the Jefferson City Fire Department is meeting the suppression and operational objectives of NFPA 1720. The procedures used in preparing this report began with a comprehensive literature review at the National Emergency Training Center’s (NETC) Learning Resource Center (LRC) in Emmitsburg, Maryland in late September, 2006. This was done in part to determine what research already existed to relation to the requirements of meeting these components. Additional materials were requested and received through the U.S. Mail in

October 2006. Additional literature review was completed at, and training resources were reviewed at the department library of the Jefferson City Fire Department in the months between October 2006 and September 2007.

Descriptive and historical research mythologies were used in the research to determine what has occurred in the past and what is occurring presently in order to begin to prepare for the future.

Question Specific Procedures

Research Question 1. As NFPA 1720 states, “Fire suppression operations shall be organized to ensure the fire department’s fire suppression capability includes sufficient personnel, equipment and other resources to efficiently, effectively, and safely deploy fire suppression resources” (NFPA, 2004), a review of various materials was conducted in order to determine what defines the minimum accepted levels for the staffing of a combination fire department. NFPA 1720 places the responsibility for determining appropriate staffing levels on the local authority having jurisdiction (AHJ). As such, the researcher conducted research into current accepted levels of staffing in other NFPA standards, periodicals federal and state standards and other sources.

Research Question 2. An extensive search of response records, staffing reports and annual reports and the Standard Operating Guidelines of the Jefferson City Fire Department was conducted to determine if the Department was currently meeting the standards and if not, how far off the mark the Department was. . Also, the researcher completed an International Fire Chief’s Association’s (IAFC) evaluation tool for determining compliance with NFPA 1720 (Appendix B).

Research Question 3. Upon review of the results of the research, the identified deficiencies were compared with current documents pertaining to response guidelines that existed within the Department's operational plans. An exhaustive search for a plan which the data could be compared with was made. By the very nature or design of this research, the Jefferson City Fire Department is searching for the proper steps to achieve full compliance and to maintain this compliance of NFPA 1720. By closely examining the results of the compliance matrix, a very competent comparison could be made.

Definition of Terms

Authority Having Jurisdiction is a term defining the local political subdivision a fire department operates under, usually a municipal or county government.

Combination Fire Department: a type of fire department which has both career (paid) firefighters and volunteer firefighters who provide fire protection to a population.

ICS refers to the Incident Command System, a system of organizing resources which is used in a variety of settings, from non-emergency events to emergency response and disasters.

IDLH Atmosphere: refers to an area where the atmosphere will not support life, an atmosphere which is immediately dangerous to life and health.

NFPA refers to the National Fire Protection Association, a private, not for profit association which develops consensus standards for use in the fire service.

Occupational Safety and Health Administration (OSHA) is the federal or state administration responsible for safety in the workplace.

SOG is a standard operating guideline or a suggested method of correcting a problems and guidance statement on the handling of a specific situation.

TFACA refers to the Tennessee Fire and Codes Academy

Assumptions and Limitations

An assumption was made prior to conducting this research that the Jefferson City Fire Department was extremely close to compliance with NFPA 1720. Another assumption was that adequate resources existed to insure compliance of the noted standard.

RESULTS

The results of this applied research project were determined through careful review of national consensus standards, periodical articles, textbooks, federal and state standards and interviews. Research questions are listed with the results of the findings and listed in clear and concise narrative form.

What are the requirements for meeting compliance with the fire suppression and operational objectives of NFPA 1720? The research indicated that there are no less than four operational objectives referring to fire suppression operations and no less than five systems which must be addressing in compliance with the standard. Chapters found include: Chapter 4.1 *Fire Suppression Organization*, Chapter 4.2 *Fire Suppression Operations*, Chapter 4.2.2 *Initial Attack*, and Chapter 4.3 *Intercommunity Organization*. NFPA is rather open ended when dealing with combination and volunteer staffing and operational standards. As such, the research determines that the minimal staffing level can be as low as four firefighters and as high as eighteen. Jefferson city Firefighters are required to have five firefighters on scene before consideration of interior fire attack operations. Current staffing has three firefighters assigned per shift and still relies heavily on response of off-duty and reserve firefighters to fill the other required positions. The Department currently has no minimum staffing requirements regarding to minimum

on-duty personnel. The number of suggested response personnel is determined by pre-fire planning and risk assessment operations on a bi-annual basis.

The Department does have guidelines in place referring to establishing of an incident command system and an incident commander on all operating incidents. Departmental Standard Operating Guideline 632 “Incident Command/Management Systems” addresses the issue of ICS operations on the incident scene. JCFD (2004) provides the guidance to members by requiring one incident commander to take charge, establish assignments and coordinate and control operations on the scene. Further, a clear chain of command is reported and all communication is required to go to supervisors and then to subordinates.

Does the Jefferson City Fire Department currently meet NFPA 1720’s objectives for suppression and operations? Through the research project, it has been determined that currently, the department does not fully meet the components of NFPA 1720. When reviewing the components it was found that although the Department does have a lot of the critical infrastructure in place to implement the full standard, one area the Department is still lacking in the area of staffing and on-scene personnel response.

Another area identified improvement is needed is in future planning in the JCFD. The research found no succession plan or training in succession planning. This may be due to the lack of department strategic planning. Wallace (1998) defines strategy as “a pattern of purposes, policies, programs, actions, decisions or resource allocations that define what an organization is, what it does and why it does it”. Further, Wallace clarifies that departments without a strategic plan often do not understand or have a clear picture of where they are, where they need to be, or where there going. Grant (1994)

further states that planning is an essential function that fire departments often either do not participate in or do not see the importance in completing. By not participating, fire departments often involuntarily reduce their scope and purpose in the community they are attempting to serve. Finally, planning is something which departments must look at more off the incident scene and start placing emphasis on during future operational planning areas.

One identified portion of the standard requires compliant department operations to establish an incident commander and insure that all decisions are facilitated or made through the IC. Klaene (2000) advised that fire department incident commanders should work through one of three operational modes to mitigate the incident. These modes are identified as fast attack, investigative, and command modes. JCFD (2007) notes that all structure fires will have an incident commander and will operate in one of these three operational modes. The JCFD is lacking in its ability to maintain sustained operations beyond initial operations. Upon reviewing Department response records and payroll summaries, it was found that on average, fifty-four percent of on-scene responders were actually off-duty career firefighters returning to cover the call out. Currently, the Department relies on mutual aid responders from other departments outside the City to supplement and cover on that out of thirteen working fires for 2006, mutual aid was requested and received all thirteen times. The mutual aid responses were to supplement operations at the scene or to provide coverage to JCFD first due during suppression operations.

In summary, the Department was specifically found lacking in staffing, available responders initially on scene, succession planning, the ability sustain operations beyond the initial action period and an inadequate firefighter (reserve) health and safety program.

Based upon the findings of the research, what actions should the Jefferson City Fire Department enact to meet and assure compliance in the future? First, the JCFD has taken the most essential step in current and future compliance by identifying the areas we currently are lacking in. NFPA (2004) advises that the local Authority Having Jurisdiction is responsible for determining and assuring compliance with the Standard. Simply stated, it is the JCFD who is responsible for determining the requirements (based upon sound research) how the standard is to be met and assuring that they are met.

DISCUSSION

The need of a combination fire department to meet the components of NFPA 1720 is an issue that has not only safety considerations, but also planning, financial and legal implications as well. The importance of compliance is made more clear when it is established as a performance criteria for federal and state grants. When comparing current department policy and operations with the consensus standard, the Jefferson City Fire Department appears not to be fully compliant. However, the research indicated that the department is moving closer to compliance. By going from one firefighter on duty to an average of three firefighters on duty, a large accomplishment has already been realized. Further, the hiring of the additional five firefighters has increased off-duty response by 25% and total personnel on scene by 30% (JCFD, 2006 Annual Report, P. 4). NFPA (2004) states, “fire suppression operations shall be organized to include sufficient personnel, equipment and other resources to efficiently, effectively, and safely deploy

fireground resources”. This is one of the keys the JCFD must clearly understand to meet future compliance. How the determination is realized is through the local interpretation of the code. This has to be done through careful consideration and research of appropriate resources.

Loflin and Sanders (2002) state:

...if a fire department is to serve the community effectively and provide competent and effective services, the fire chief has to initiate a strategic planning process. The goal of the process is to ensure that adequate levels of resources, including staffing, are allocated to meet the community’s need for the services delivered by the fire department (p.39).

This is clearly one of the identified areas the JCFD is lacking. No such plan is currently in place nor does one exist at this time. Grant (1994) states, “...planning delineates a variety of line and staff activities to lead the fire department to operate at a higher level.”(p.317).

RECOMMENDATIONS

Upon completion of the compliance matrix, The Jefferson City Fire Department now has a clear understanding of the areas where the department is both compliant and non-compliant. Based upon the research conducted in this ARP, the Jefferson City Fire Department should implement the following recommendations to insure compliance with NFPA 1720’s suppression and operational objectives.

1. The Jefferson City Fire Department should develop a minimum staffing policy, which would include guidance in the areas of minimal number of active on-duty career firefighters per shift and how this number will be maintained. Overtime

- pay issues and coverage should be researched and thoroughly thought out using fire department personnel, City of Jefferson City Human Resources Office personnel and the City Attorney's Office.
2. The JCFD should research and develop a plan for the use of on-duty reserve firefighters to substitute on-duty career staffing . These firefighters should be scheduled and required to pull a set amount of station duty per month. The plan should determine what, if any compensation the reserve firefighters should receive for their duty shift.
 3. The JCFD should conduct further research on increased staffing and seek a long range solution to problem of low initial staffing on the scene of working incidents. Additional budget funding should be sought to increase staffing during high need days and times.
 4. The JCFD must develop a succession plan to assist and support department operations should key stakeholders be absent or become incapacitated during operations. The need to provide a clear plan for succession in very important and its importance can not be overlooked in order to provide for smooth department operations during both emergency and non-emergency incidents and operations.
 5. The JCFD must improve its ability to provide sustained operations and services to our citizens. Based upon current staffing and membership, the ability of the JCFD to sustain operations through a initial twelve hour operation period, much less multiple operational periods, is doubtful at best. JCFD must look at insuring mutual aid responders covering incidents in the City have at least the same training and abilities as JCFD to provide adequate coverage to our citizens.

6. The JCFD should adopt a program requiring its reserve firefighters to receive post employment offer physical exams based on NFPA 1621. Currently, the Department requires career employees to successfully complete this prior to assignment in the department.

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Appendix A

NFPA 1720 Self Assessment Matrix

	NFPA 1720 Component	Currently Meet	Partially Meet	Fail to Meet
4.1	Suppression Operations, adequate personnel, equipment, sufficient/effective resources.		X	
4.1.1	Organization, Operations, Deployment, Written R&R, SOP's, Orders	X		
4.1.2	Develop Community Risk Management Plan (Storage, Use and Transportation of Hazardous Materials)	X		
4.1.3	Procedures clearly state succession of command responsibility		X	
4.1.4	Organized into company units on response teams and have appropriate apparatus and equipment	X		
4.1.5	Identify minimum staffing required for safe and effective operations	X		
4.1.6	Maintain standard reports for responses; including locations, nature of incident and operations performed, members responding	X		
4.1.7	Mutual aid response and agreements; predetermined locations, regulate the dispatch of companies, response groups, command to fires and other groups	X		
4.1.8	Number and types of units assigned to respond by risk analysis and pre-fire plans		X	
4.2.1	Incident Commander assignments		X	
4.2.1.1	Assumption and Identification communicated to all responding units	X		
4.2.1.2	Incident command shall be responsible for coordination and direction of all activities	X		
4.2.1.3	Incident Commander ensures accountability system is used immediately	X		
4.2.1.4	Company officer/crew leader aware of identify , location, and activity of the company officer/crew leader	X		
4.2.1.5	Each member of the company/crew aware of the company officer/crew leader	X		
4.2.1.6	Orders to members, verbal at incident transmitted through company officer/crew leader	X		

	NFPA 1720 Component	Currently Meet	Partially Meet	Fail to Meet
4.2.2.1	Upon assembling necessary resources, shall have the capacity to safely initiate attack within 2 minutes, 90% of the time	X		
4.2.2.2	Initial attack operations shall be organized that at least 4 members are assembled before an interior attack is made	X		
4.2.2.2.1	Hazardous materials incidents shall have two people work as a team.	X		
4.2.2.2.2	Outside hazardous materials area, two people present for assistance on rescue, one person may be engaged in other activities		X	
4.2.2.2.3	No assignment can be made if abandoning the critical tasks of rescue	X		
4.2.2.3	Initial attack can occur if life-threatening situation is imminent.	X		
4.2.2.4	Fire Department has capacity for sustained operations, suppression, search, rescue, forcible entry, ventilation, preservation of property, accountability, rapid intervention team, support activities.		X	
4.3.1	Mutual aid, automatic aid, fire protection agreements in writing, liability issues, injury, death, retirement, cost and authorization for support services	X		
4.3.2	Procedures for training for personnel within all agreements for response and support	X		
4.3.3	Companies responding to mutual aid incidents shall be equipped with communications equipment to communicate with various officers.	X		
4.4.1	EMS Capacity (people, equipment, resources) initially on arrival; automatic or mutual aid	X		
4.4.1.1	Do you deliver emergency medical services?	X		
4.4.1.2	Maintain clear documentation of rules, responsibilities, function and objectives for delivering EMS	X		
4.4.2	Basic treatment levels within system			
	- First Responder	X		
	- Basic Life Support	X		
	- Advanced Life Support	X		

4.4.3.1	Five Basic Functions 1. ___ First Responder with AED 2. ___ Basic Life Support 3. ___ ALS Response 4. ___ Patient Transport 5. ___ Assurance of Response Quality Assurance	X X X N/A X		
4.4.3.2	Department shall be involved in any or all functions identified in 4.4.3.1 through 4.4.3.1.5	X		
4.5.1	Fire Department has a quality management program	X		
4.5.2	All responders and basic life support programs are reviewed and documented	X		
4.5.3	Advanced life support system provides immediate communication with supervisor and medical oversight	N/A		
4.6.1	Special Operations consist of: ___ sufficient people ___ equipment ___ resources initial deployment and subsequent deployments	N/A		
4.6.1.1.	Involved in special operations response	N/A		
4.6.2	Have adopted plan for operations response specifying role and responsibilities for hazardous materials and trained to NFPA 472	X		
4.6.3	All members who respond beyond first responder level for hazardous materials are trained to NFPA 472	X		
4.6.4	Fire Department shall have the capacity to implement rapid intervention crew during all special operations to meet NFPA 1500	X		
4.6.5	If higher level emergency response is needed beyond department, department has determined availability and capacity of other responses	X		
5.1	Health and safety provided in accordance with NFPA 1500.		X	

	NFPA 1720 Component	Currently Meet	Partially Meet	Fail to Meet
5.2.1	Incident Management System provided in accordance with NFPA 1561	X		
5.2.2	Use of Incident Command designed for structures, wildland, hazardous materials, EMS ad other types of incidents	X		
5.3	Department has training program for competency; effective, efficient and safe			
5.4.1	Department has reliable communication system to facilitate prompt delivery of suppression, EMS and special operations	X		
5.4.2	All communication facilities, equipment, staffing and operating procedures comply with NFPA 1221		X	
5.4.3	Radio communications have standard protocols and terminology	X		
5.4.3.1	Radio terminology is in compliance with NFPA 1561	X		
5.5	Department does pre-incident planning and especially for target hazards	X		