

Determining the Appropriate Staffing Levels to Serve the Community of Fairfield

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A proposed research project submitted to the Ohio Fire Executive Program

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CERTIFICATION STATEMENT

I hereby certify that the following statements are true:

1. 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.

2. I have affirmed the use of proper spelling and grammar in this document by using the spell and grammar check functions of a word processing software program and correcting the errors as suggested by the program.

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ABSTRACT

Over the past five years the City of Fairfield has experienced an increase in emergency medical service runs that have affected the number of available personnel for fire and rescue emergency calls when needed. The problem this study addressed was the reduction in personnel to respond to emergency calls due to the increasing frequency of EMS calls.

The purpose of this study was to describe and identify a staffing level for delivery of emergency services to the City of Fairfield.

An evaluative research process was used to answer the following questions:

1. What local, state, and national standards or criteria are applicable to the City Of Fairfield?
2. What are normal and minimum staffing levels of similarly sized departments that serve a community with the same, or near the same, population and run volume?
3. What are other fire departments doing in order to meet the increasing number of EMS calls while at the same time maintaining an appropriate level of fire protection?

Relative to question #1; based on the literature review and fire department staffing records it was determined the department is not providing an appropriate number of personnel to meet the demand of emergency calls.

Question #2 and #3 were answered by surveying departments of equal size across the United States, and neighboring departments. Sixty Three percent of the departments surveyed reported they maintain a minimum of three personnel on fire apparatus. In comparison, the City of Fairfield provides two personnel.

A critical task analysis report was completed based on the department's current response guidelines. The research showed that the department does not consistently provide adequate staffing for the tasks that were recognized within this study.

The research shows that if the fire department would implement the recommendations suggested, an appropriate number of firefighters could be assembled on emergency scenes in a timelier manner. This would create a safer environment for the firefighters on scene and could reduce the loss of life and property for its citizens.

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INTRODUCTION

Statement of the Problem

The City of Fairfield Fire Department has encountered a 20.6% increase in emergency medical service calls from January 2005 to December 2009. Across the United States these statistics are common within all fire departments. More individuals, including the indigent, the working uninsured, and the underinsured, rely on pre-hospital emergency medical care which is increasing the number of EMS runs. This increase in EMS runs is also affecting the availability of personnel for emergency calls when needed. In addition to the increase of EMS calls, there has been a 104% increase in fire apparatus responses during the same time period due to EMS assist calls. The problem this study will address is the reduction in available suppression personnel due to the dramatic increase in emergency medical service calls within the City of Fairfield.

Purpose of the Study

The purpose of this study is to describe and identify a staffing level for delivery of emergency services to the City of Fairfield. This research will determine whether the City of Fairfield fire department is under staffed, sufficiently staffed, or over staffed in comparison to other cities and fire departments. National standards will be researched as well as governmental and national practices. At the conclusion of this research the results could be used by the fire department and city administration for decision-making concerning current and future staffing levels. If this research reveals insufficiencies with the current staffing level and corrective

actions are deemed necessary by the city administration, department members, residents of the city, and visitors to Fairfield would benefit the most.

Research Questions

An evaluative research method was used to answer the following questions:

1. What local, state, and national standards or criteria are applicable to the City Of Fairfield?
2. What are normal and minimum staffing levels of similarly sized departments that serve a community with the same, or near the same, population and run volume?
3. What are other fire departments doing in order to meet the increasing number of EMS calls while at the same time maintaining an appropriate level of fire protection?

BACKGROUND AND SIGNIFICANCE

The City of Fairfield is located in Butler County which is in the southwest corner of the State of Ohio. The city is 21 square miles and services a population of 42,555 residents. The fire department for the city has always provided fire and EMS services for its citizens and visitors. During the 1950s through 1980 the department was composed of all volunteer firefighter/EMTs. In the mid-1980s the increase in emergency calls and a sharp decrease in volunteers resulted in the city hiring a full-time fire chief, and part-time employees. These part-time employees were first used during the day but as emergency calls increased provisions were made to provide four part-time personnel 24 hours a day out of the city's two firehouses. In 1993 three full-time captains were hired and the department's staffing was increased to six which allowed a previously closed fire station to be reopened. Each fire station was staffed with two personnel that responded in a way known as "first emergency first." In other words if a fire run was dispatched the two personnel responded in the fire apparatus and left the squad unmanned at the station and vice versa if an EMS call was dispatched first.

In 1999 the Fire Department hired its first full-time Firefighter/Paramedics in addition to the current part-time staffing. Staffing was increased to nine personnel 24 hours a day, seven days a week between the three firehouses. Since 1999 fifteen additional full-time firefighter/paramedics have been hired, bringing the current staffing level to fifteen personnel per day.

In the mid-1980s, the city entered into a contract with a private paramedic service that provided service to the city from 1984 until 2006. In the beginning the contract service provided two paramedics 24 hours a day, seven days a week. These paramedics responded in addition to a life squad in a non-transport unit. In 1995, in order to meet the increase in emergency medical

calls the contract was renegotiated and four paramedics were provided 24 hours a day, seven days a week in non-transport units. The contract with the private medic service was terminated in 2006 and the Fire Department took over full responsibility for providing ALS care to its citizens and visitors. When the contract with the private paramedic service was not renewed in 2006 the city again hired additional full-time Firefighter/Paramedics to make up for the loss in personnel. However, there were only six personnel hired which actually lowered the total number of personnel available to respond to emergency responses from sixteen personnel to fifteen. In 2006 alone there was an 11.23% increase in EMS runs and an additional 4% increase over the next three years.

The City of Fairfield prides itself in the services it provides to the citizens and visitors of the City of Fairfield. The department provides many other services other than fire protection and emergency medical services such as fire prevention programs in the schools, CPR classes, child seat installation, "Movies in the Park," Honor Guard, Bike Medic Program, MRDD Special Olympics, and several other activities. At times some of these programs require a person to be pulled off a fire apparatus in order to complete these details.

Due to the relatively small size of the City of Fairfield Fire Department and the fact that the on-duty staff is often engaged in emergency medical service runs the amount of time when adequate fire protection is not available for the community has increased.

The City of Fairfield Fire Department is a combination department with part-time and full-time personnel. The career personnel work a traditional 24-hour on-duty shift followed by 48 hours off duty. Part-time personnel either work a 12-hour shift every third day or a 24-hour shift every sixth day.

Current manning levels provide for fifteen personnel on duty 24 hours a day between the

city's three fire stations: Station 31, Station 32, and Station 33. The minimum manning level for the department is twelve personnel. Stations 31 and 32 are equipped with a paramedic unit and a primary fire apparatus. Station 33 is equipped with a paramedic unit, a primary fire apparatus, and a rescue truck. Two personnel at each station are assigned to the paramedic unit which leaves three personnel assigned to the district fire apparatus when manning is at fifteen. No personnel are specifically assigned to the rescue truck stationed at Station 33. When manning is at twelve, only two personnel are assigned to the district fire apparatus. Typically when manning is at twelve the two on-duty lieutenants have to move off the district fire apparatus and staff the district medic unit. This results in not only two personnel on the district fire apparatus; it frequently results in a part-time employee with minimal experience riding in the right front seat of the primary fire apparatus and being expected to perform at the level of the district lieutenant. This has occurred to employees within their first week of employment with the department.

In 1999 a staffing analysis was completed by Kramer & Associates for the City of Fairfield Fire Department that compared the fire department to national staffing trends at the time. The analysis found that at the time of the study manning should be 18.8 personnel including the private paramedic service. Since 1999 when the study was completed the run volume has increased by 43% and the current staffing level is fifteen.

In addition to the increase of EMS responses, there are several details such as retrieving EMS equipment from area hospitals, portable radio and minitor pager repair, and delivery of vehicles to area garages for new equipment installation or repair. These details require a firefighter to leave not only the station, but also the city which further reduces the number of available personnel.

In an attempt to assemble an appropriate number of firefighters on single apparatus emergency responses, Standard Operating Procedures were created that state any time a fire apparatus is staffed with less than three personnel, the nearest district fire apparatus will respond with the originally dispatched fire unit. Although this procedure addresses the number of firefighters assembled on a scene, it does not address the timeliness of assembling the firefighters. This also places additional apparatus on the street responding emergency to calls which increases the risk of being involved in an accident.

Effective January 1, 2011 a new policy was enacted within the department that prevents part time personnel from picking up shifts outside their normally assigned shifts until after May 1st in an attempt to improve the daily staffing levels during the spring and summer months. Although this is expected to improve the staffing level during that time, it does not address the many shifts that the department is operating at the minimum manning level from January through April. Data collected from the Fire Department's scheduling software shows that out of a total of 240 shifts during the period of January 1, 2009 through April 30, 2009, 182 of those shifts were covered with fourteen or less personnel on duty. Per the department's emergency reporting database Twenty-Eight of the Seventy-Five structural responses reported in 2009 occurred within the first four months of the year.

LITERATURE REVIEW

The purpose of this literature review is to examine existing documentation relative to the staffing levels of not only EMS calls but remaining staffing and their availability within the City of Fairfield. Several applied research papers from the Learning Resource Center of the National Fire Academy were reviewed for this project. Numerous journal articles, periodicals, books and published standards were utilized to provide additional information to answer the research questions.

The National Fire Protection Association (NFPA) 1710 Standard for the Organization and Development of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments states that Fire companies whose primary job functions are to pump and deliver water, perform basic fire fighting at fires, including search and rescue shall be known as engine companies. These companies shall be staffed with a minimum of four on-duty personnel (NFPA 1710, 2001, p. 1710-8).

Occupational Safety and Health Administration (OSHA) regulation 29 CFR 1910.143 (g) (4) refers to personnel using respirators or self contained breathing apparatus (SCBA). This regulation states that at least two employees enter the IDLH (immediately dangerous to life and health) atmosphere and remain in visual or voice contact with one another at all times. The regulation further states at least two employees are to be located outside the IDLH atmosphere.

OSHA regulates the minimal standards in regards to how many rescuers or teams must be in place to rescue potential downed firefighters. OSHA states that when two firefighters enter a structure on fire, two firefighters must be in place to rescue them. The only exception to this rule is when there is a known life hazard (OSHA, 2008, p.1236).

In November 2008 the National Institute for Occupational Safety and Health (NIOSH) published a report as the result of a study entitled NIOSH Firefighter Fatality Study and Prevention Program. The report is the summary of 1,286 recommendations made by NIOSH in the 335 firefighter fatality investigations it conducted from 1998 through 2005. In the report, NIOSH makes the following recommendations with regard to staffing:

- Ensure that at least four firefighters are on the scene before initiating interior firefighting operations at a structure fire: two in and two out.
- Ensure that adequate fire control forces and fire suppression equipment are on scene and available for deployment for fire control activities.
- Ensure that adequate staffing is available to immediately respond to emergency incidents.
- Maintain team continuity

(National Institute for Occupational Safety and Health (NIOSH), 2008, p 30).

National Institute of Standards and Technology (April 2010) *Report on Residential Fire ground Field Experiments* (NIST Technical Note 1661) reviewed and documented the effectiveness of one-person, two-person, three-person, four-person and five-person engine companies as they completed twenty-two various fire ground tasks at a low hazard residential structure fire. The study revealed that a four-person engine company completed the twenty-two various fire ground task seven minutes – or thirty percent – faster than a two-person engine company. The four-person crews completed the same number of tasks five minutes – or 25 percent – faster than a three-person crew (NIST, Report on Residential Fire ground Field Experiments, 2010, p. 35).

In the Fire Engineering Magazine article titled Fire Department Staffing: A Need Not A Want, August 1, 2009. Author K. Wilson mentioned that in 1990 the Providence (RI) Fire Department conducted a study that showed that the only nationally recognized staffing standard at that time was from the NFPA. It recommended a minimum of four firefighters responding on or with each apparatus. The NFPA reported at that time a 71-percent decrease in time lost because of injury using four-person staffing when compared with three-person staffing. Even though the study is more than 18 years old it shows that the staffing level today throughout the United States is an issue that still has not been resolved.

In the Firehouse Magazine article titled Staffing, It's all about the people, February 2001. The author, Harry Carter describes how leaders direct or misdirect the capability levels within their departments. "We need to begin operating within our capability levels. The leaders of the fire service need to harness and better direct the enthusiastic response of our fire service personnel. It is truly a control issue. We must learn to be more realistic in what we promise to our politicians and to our citizens. If we can only provide six people's worth of labor, then our politicians and administrators need to know that this is all that they can expect from us." (p. 2)

A Fire Protection Staffing Analysis completed by Kramer & Associates (October 1999) for the City of Fairfield recognized that the staffing level was not adequate at the time of the report. Several options were presented in the report to improve the staffing level taking into consideration the fiscal responsibility of the city administration. The report recognized in 1999 that sixteen personnel were needed for a typical residential structure fire which included a four person exterior rescue team. Currently the department is staffed with fifteen personnel which does not meet the recommendation set forth eleven years ago, and the run volume has increased by 43%.

The International City Management Association (ICMA) states in “Managing Fire Services” that at least four and often eight or more firefighters, each under the supervision of an officer, “should respond to fire suppression operations”. Further it says, “If about 16 trained firefighters are not operating at the scene of a working fire within the critical time period then dollar loss and injuries are significantly increased as is fire spread”. It has found five-person companies 100-percent effective, four-person companies 65-percent effective, and three-person companies 38-percent effective.

The City of Fairfield was reevaluated by the Insurance Services Office in the summer of 2010 in an attempt to improve the current ISO rating of a three to a two. The review of the fire department accounts for 50% of the total classification. ISO focuses on the fire department’s first alarm response and initial attack to minimize potential loss. Such items as engine companies, ladder or service companies, distribution of fire stations, fire companies, equipment carried on the apparatus, pumping capacity, reserve apparatus, department personnel, and training were reviewed within the fire department. The city scored a total of 72.24 credit points out of a possible 100 which did not meet the minimum credit points in order to receive a higher Public Protection Classification Number. In the area of Receiving and Handling Fire Alarms the city was credited 8.21 points out of 10 possible. The Fire Department received 31.77 points out of a possible 50 points. Within the Fire Department evaluation the area that scored the lowest was Credit for Company Personnel. In the area of Water Supply the city scored very well, receiving 39.10 credit points out of a possible 40 points. (Public Protection Summary Report; Fairfield, Ohio Prepared by Insurance Services Office, Inc. (August 2010)

PROCEDURES

The goal of this research project is to review ways the City of Fairfield can address the increasing percentage of time when fire suppression crews are drastically reduced due to the increased frequency of multiple EMS runs at the same time. To put this into perspective; if the fire department is staffed with twelve personnel (minimal manning level) and three EMS calls are dispatched at approximately the same time, for the next hour the amount of fire suppression personnel is reduced to six between three fire apparatus.

In order to accomplish this, the increasing demand of EMS and fire responses year to year within the city was researched and documented. Additional data for calendar year 2009 was collected, such as the number of personnel on duty for each shift and the number of simultaneous EMS runs and there frequency. The total number of structure fires in 2009 was also looked at along with the number of personnel responding to each. This data was collected from the fire department's computer database (Firehouse Software).

In order to answer question one of the research, a review of national, regional and local standards were looked at to see if they were applicable to the City of Fairfield. This was done by reviewing many articles and research papers from the National Fire Academy and on the internet. Information was also reviewed from the International City Management Association, National Institute of Standards and Technology, and the National Fire Protection Association.

A critical task capabilities report was completed and analyzed by the author of this research paper based on emergency incidents that could occur within the City of Fairfield. This report was completed by utilizing the Fire Department's current standard operating and response procedures guide which dictates the number of personnel to be assembled on the various types of emergency runs faced by the department.

Obviously no fire department can staff according to every emergency that could possibly occur within their jurisdiction. However, by completing a task analysis of the most potential emergencies that occur within the jurisdiction we will be able to identify the number of personnel that need to be readily available to stop the threat to life or property.

In order to compare the City of Fairfield Fire Department with other fire departments across the country; a survey was sent to departments that were recognized in the 2008 ICMA study as being in close comparison with the City of Fairfield Fire Department. The survey was also sent to area fire departments in close proximity to the City of Fairfield that are in similar size to the City of Fairfield by population, coverage area, or emergency run volume. The survey was created by the author of this research paper and all data collected from the completed surveys were automatically analyzed by the Survey Monkey website. Phone calls were made to the department representatives to explain the reason for the survey and the importance of completing the survey in a timely manner. An e-mail with the survey link was sent to the selected departments on November 10, 2010 with a notice that the surveys were due by November 19, 2010. Fifteen of the Twenty-Six fire departments that were asked to complete the survey did so.

In addition to the surveys all of the neighboring fire departments around the City of Fairfield regardless of population, department size, and budget were examined to see how the current staffing level of the City of Fairfield compared to local practices of those departments.

The financial status of the fire levy and projected cost for the operation of the fire department over the next several years was also researched and included within this research. This information was obtained from the City of Fairfield's Finance Manager

Definition of Terms

ALS. “A level of care provided by prehospital emergency medical services. Advanced life support consists of invasive life-saving procedures including the placement of advanced airway adjuncts, intravenous infusions, manual defibrillation, electrocardiogram interpretation, and much more.” (Dictionary for Nursing, 2008)

Quint. “Fire apparatus with a permanently mounted fire pump, a water tank, a hose storage area, an aerial ladder or elevating platform with a permanently mounted waterway, and a complement of ground ladders.” (NFPA 1901, 2004)

IDLH. “Is an acronym for Immediately Dangerous to Life or Health. This refers to a concentration, formally specified by a regulatory value, and defined as the maximum exposure concentration of a given chemical in the workplace from which one could escape within 30 minutes without any escape-impairing symptoms or any irreversible health effects.” (NIOSH Publication, 1994)

SOP. “Is an acronym for Standard Operating Procedure, which is a written document or instructions detailing all steps or procedures to perform in reaction to a given event.” (American Heritage Dictionary, 2009)

Limitations of the Study

One of the most difficult tasks for this research project was accumulating accurate data from the Fire Department's database. The City of Fairfield Fire Department uses Firehouse incident reporting software. One of the problems is the inaccuracy of consistent entries being made into the database by employees. The department is currently undergoing standardizing entries into the system so that reports can be generated that will produce more accurate data.

The majority of the data collected for this research was retrieved from the Firehouse database by going through each emergency response and daily schedule for the calendar year 2009.

Another limitation of the study was not getting complete participation of all the fire departments that the survey was sent to. Of the twenty-six fire departments that were contacted twelve completed the survey right away. An additional e-mail was sent to the departments that had not responded to the survey request by November 16th. This resulted in four additional fire departments completing the survey.

RESULTS

A review of the department's database clearly shows a significant increase in emergency responses from 2005 through 2009. In 2005, the City of Fairfield Fire Department responded to 1062 fire calls. In 2009, that number increased to 2162 fire calls. Table 1 and Table 2 below show the annual totals of EMS and fire responses for the years 2005 through 2009.

Table 1: Yearly Emergency Medical Service Run Totals

Year	Number of Runs	Yearly Percentage Increase
2005	3818	
2006	4247	11.23
2007	4338	2.14
2008	4684	7.97
2009	4367	- 6.70

Table 2:

Yearly Fire Run Totals

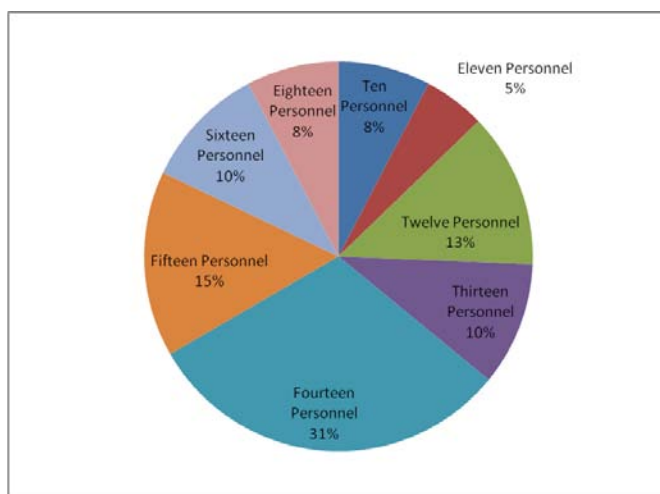
Year	Number of Runs	Yearly Percentage Increase
2005	1062	
2006	1766	66.3
2007	2165	22.6
2008	2366	9.3
2009	2162	- 9.4

During 2009 there were 563 occurrences of two or more medic units on EMS calls simultaneously. When this occurs on days the department is operating at the minimum staffing level of twelve, available personnel for fire or rescue calls is drastically reduced.

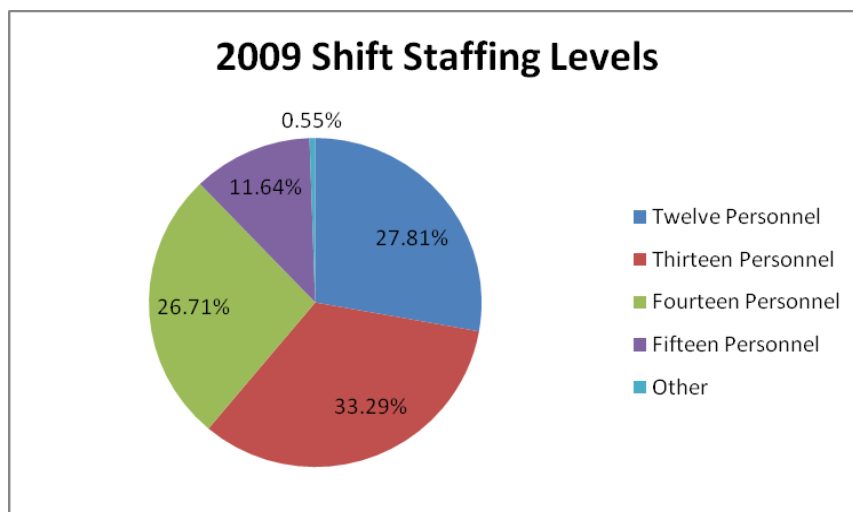
In 2009 there were 39 structure fires per the Fire Department's reporting database. Table 3 below

shows the percentage of fire fighting personnel that responded to those structure fires. During 2009, 67% of the structure fires had fourteen or less personnel on scene within ten minutes of the initial dispatch.

Table 3: On-Scene Personnel for 2009 Structure Fires



Due to employee leave time such as vacation, personal, and injury leave, the department routinely runs at less than the approved staffing level of fifteen. During the spring and summer months the department routinely operates at the minimum manning level. During 2009 the Fire Department operated at the designated manning level of fifteen 11.6% of the time. In comparison the department operated at the minimum staffing level of twelve 27.8% of the time. Table 4 below illustrates the total shifts for 2009 and the percentage of time they were covered by the various amounts of personnel.

Table 4: 2009 Shift Staffing Levels

In order for the Fire Department to be effective within the community it must be able to arrive within a reasonable time frame with the appropriate equipment and properly trained personnel in order to mitigate the emergency at hand.

In order to answer question #1 an extensive literature review was completed. It was determined that the City of Fairfield does not meet the recommendations of NFPA or NIOSH alone. In order to meet the required number of firefighters operating on an emergency scene the department must rely on mutual aid units. Although this does address assembling an appropriate number of firefighters on scene, it does not address the timeliness of assembling them.

Although there are no local regulations concerning staffing levels, the neighboring departments of Fairfield maintain a staffing level of four personnel per primary apparatus, and three personnel when at minimum manning.

In order to effectively determine the Fire Department's ability to ensure effective service delivery while maintaining a safe working environment a critical task analysis was completed as part of this research. A critical task analysis is the process of matching the fire department resource deployment to each type of risk. A critical task analysis identifies the necessary staffing level required to safely

perform each task and successfully mitigate each risk. Five risks the city could be faced with were identified along with the required amount of personnel to mitigate these risks. These risks were selected due to the frequency of the calls already occurring within the city, or an increased likelihood this type of call could occur. The department's Standard Operating Procedure and Response Guide was referenced in order to determine the number of personnel needed for the various emergency calls.

Table 5 below illustrates the number of personnel required for a single family residential structure fire. A single family residential structure fire was selected for the critical task analysis due to the high frequency of occurrence compared to multi-family or sprinkler protected buildings within the City of Fairfield. Nearly seventy percent of the reported structure fires in 2009 occurred in single family residential homes.

Table 5: Structural Firefighting Operations (Single Family Residence)

Task	Number of Personnel
Attack hose line	2
Backup hose line	2
Search and Rescue	2
Ventilation/Utility Control	2
EMS Personnel	2
Rapid Intervention Team	2
Apparatus Operator	1
Safety Officer	1
Incident Command	1
Total	15

Attack Line: A minimum of two firefighters are required to advance a hand line for the purpose of locating, confining, and extinguishing a fire inside a structure. The number of personnel can vary depending on the size of the line to be deployed, the distance to the seat of the fire, and the size of the fire.

Back up Line: A minimum of two personnel are required to deploy and advance a second hand line into a structure in order to provide protection for the initial entry team in the event the fire blocks there means of egress from the structure. The additional line can also be used for additional suppression support, or if needed replace the initial attack line. As with the attack line, the number of personnel required to deploy and advance the line can vary.

Search and Rescue: This crew is comprised of a minimum of two firefighters and is assigned to search for living victims and removing them from the structure. Depending on the size of the structure, the number of search and rescue crews can increase especially when dealing with a multi story structure or structures containing non-ambulatory victims.

Ventilation Crew: Ventilation is a vital task that must be completed on the fire ground. Ventilation removes heated smoke and dangerous gases from the structure which improves the air quality for trapped victims, improves the visibility within the structure for the search and rescue teams, and reduces the threat of a flash over occurring. A minimum of two personnel should be assigned to the task of ventilation. Ventilation of a multi-story building or ventilating a building vertically may require more than two personnel.

Rapid Intervention Team (RIT): Rapid Intervention Teams were formed in response to OSHA's ruling of "two in and two out". This regulation specifies that anytime firefighters are working in an IDLH atmosphere a team of two firefighters must be assembled outside the structure in full turnout gear ready to rescue a firefighter if they were to become disabled.

Emergency Medical Crew: Department SOP's state that an EMS transport unit is to be on scene and staffed with two Paramedics which will provide care to any injured occupants of the structure fire or any firefighter that is injured. The EMS crew is also assigned the task of personnel accountability.

Apparatus Operator: One person must be assigned as the apparatus operator. This person's responsibilities include the initial charging and maintaining of the fire lines being used by fire crews. The pump operator also has to complete the hydrant connection to the pump and in some cases make the connection to the hydrant also. If a quint is the primary apparatus at the scene of a fire the operator may be responsible to position the ladder in addition to operating the pump.

Safety Officer: A senior firefighter or officer is to be assigned to the position of Safety Officer and will work in conjunction with the Incident Commander. The Safety Officer's responsibilities include monitoring the fire ground for situations that could injure or kill a firefighter operating on the scene.

Incident Commander: One person, usually an officer is assigned to the position of Incident Command. It is the responsibility of the Incident Commander to size up the scene, establish goals to be achieved, and assign task to the responding units. The Incident Commander must reevaluate scene conditions, change the plan as needed, and call for additional resources as needed.

The City of Fairfield Fire Department has always taken pride in itself for performing an aggressive interior fire attack whenever the scene conditions allow. However, there is an inherent risk to structural firefighting and as with all fire departments across the nation the City of Fairfield Fire Department has limitations to what they are willing to risk in order to save a life or property. The City of Fairfield Fire Department will commit its resources at an elevated risk to save a life; and a moderate risk to save property. However, the department will not risk anything for property or life that is already lost.

MVA with Entrapment

Per Department Standard Operating Procedures the standard response for a motor vehicle accident with entrapment is a medic unit with two Paramedics, the district fire apparatus, and Rescue 33 each staffed with two or three personnel depending on the manning level that day, and the Unit Day Captain. Once the first unit arrives on scene and completes their size up, additional units may be

requested depending on the severity of the accident and the number of victims.

Table 6 below illustrates the required number of personnel required for an MVA with entrapment of one victim in a vehicle.

Table 6: Motor Vehicle Accident with Entrapment

Task	Number of Personnel
Command/Safety	1
Helicopter Landing Zone	1
Extrication Personnel	4
Pump Operator/Hose line	1
EMS Personnel	2
Total	9

Water or Ice Rescue

The City of Fairfield has many water hazards within its jurisdiction. Along with several ponds and lakes, the Great Miami River makes up the west border of the city. Many of the lakes and ponds are situated near apartment complexes and neighborhoods that are easily accessible to children.

In the event of an ice rescue, the district medic unit responds with two paramedics. The district fire apparatus and Rescue-33 respond with two or three personnel depending on the staffing level that day and the Unit Day Captain. Table 7 below illustrates the required number of personnel in order to carry out an Ice Rescue involving one victim.

Table 7: Ice Rescue (One victim)

Task	Number of Personnel
Rescuer	1
Backup Rescuer	1
Rope Handlers	2
Operations Officer	1
EMS Personnel	2
Incident Command	1
Total	8

Rescuer: This person will be responsible for going out onto the ice and performing the rescue.

Back up Rescuer: This person will be responsible for donning an ice rescue suit and will be ready to back up the first rescuer in the event something happened to them, or if they need assistance with the rescue.

Rope Handler: A rope handler is assigned to each rescuer involved with the ice rescue. This includes the rescuer assigned to going out on the ice, and the backup rescuer.

Operations Officer: This position is generally filled by an officer within the department or a senior firefighter. This person is responsible for sizing up the situation, assigning personnel to the various rescue positions and oversees the actual rescue of the victim.

EMS Personnel: A minimum of two Paramedics are assigned to victim care once the victim is safely on the shore. Due to the cold water conditions, pt. treatment and transport will be required for the victim.

Incident Commander: One person, usually an officer is assigned to the position of Incident Command. It is the responsibility of the Incident Commander to size up the scene, and assign task to the responding units. The Incident Commander must reevaluate scene conditions, change the plan as needed, and call for additional resources if needed.

Confined Space Rescue

Confined spaces can be found in industrial settings and the water treatment plants within the City of Fairfield. There is also a considerable amount of work done by various companies in the cities sub grade utility right of ways. In the event of a confined space rescue a minimum of nine personnel will be needed to initiate the rescue. Once the confined space rescue is confirmed by first arriving personnel additional resources will be needed to respond. The number of personnel needed to respond will also be determined by the number of victims. Table 8 below illustrates the number of personnel needed to perform a confined space rescue for one victim.

Table 8: Confined Space Rescue (One Victim)

Task	Number of Personnel
Operations Officer	1
Safety Officer/Air Sampling	1
Entry Attendant	1
Rescuers	2
Back Up Rescuers	2
Rope/Air Line Handlers	2
Additional Personnel	4
Rig Master	1
Incident Command	1
Total	15

Emergency Medical Services

As with all fire departments in the United States that provide Fire and EMS services, the City of Fairfield Fire Department has experienced a steady increase in EMS calls annually. The department responds on a wide variety of EMS calls with the majority of calls being injuries from falls, MVA's, difficulty breathing, and chest pain.

Department Standard Operating Procedures and the nature of the call dictate the response of

personnel. A Medic unit is sent on all EMS calls which are staffed with two Paramedics and the equipment needed to provide advanced life support care. The majority of EMS calls within the city are handled by a Medic unit only. However, some calls such as MVA's, unresponsive patients, and cardiac arrest calls require the response of the district fire apparatus also. The district fire apparatus also responds as a first responder when the medic unit is already on another call. The number of personnel responding on a primary fire apparatus varies depending on the staffing level for the day.

Most EMS responses include diagnosis, treatment, collection of the patient's medical history, and transport of the patient to an appropriate hospital. City of Fairfield Standard Operating Procedures and the Southwest Ohio Paramedic Protocol allow the medic crew to transport a patient to a broad range of area hospitals per the patient's request as long as the patient's condition allows. Some of these hospitals are 15 to 20 miles outside the city limits of Fairfield which increases the out of service time of the Medic units.

In order to answer question number two; *What are normal and minimum staffing levels of similarly sized departments that serve a community with the same or near the same population and run volume?* A survey was sent to 26 fire departments across the United States including neighboring departments of the City of Fairfield. Sixteen of those departments completed the survey.

The main focus of the survey was to select departments of equal size to the City of Fairfield Fire Department from across the United States and compare staffing levels to see if Fairfield was comparable to those departments. Neighboring fire departments to Fairfield were also surveyed to see how Fairfield compared on a local level.

The first section of the survey focused on the demographics of the departments surveyed to ensure appropriate departments were selected. Of the departments surveyed nearly 94% provided the same services as the City of Fairfield Fire Department. 75% of the departments serve the same or less

population. Emergency response call volume was also very similar. 81% of the departments responded to the same or less fire service calls, and nearly 88% of the departments responded to the same or less emergency medical service calls.

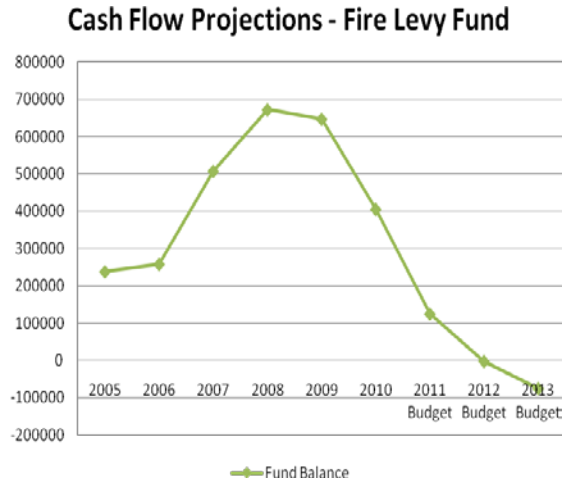
Question Twelve of the survey asked the departments if they were able to staff primary fire apparatus with four personnel as recommended by NFPA 1710. Nearly 44% (7) departments reported that when at the maximum daily staffing level they were able to staff front line apparatus with four personnel. Six of these seven departments are neighboring departments with the City of Fairfield Fire Department. Currently the City of Fairfield Fire Department staffs three personnel on primary apparatus when at maximum staffing.

Question fourteen of the survey asked the departments what the minimum manning level was for primary fire apparatus. 43.8% (7) of the departments reported a minimum manning level of three personnel per apparatus, and 18.8% (3) departments reported a minimum manning level of four personnel. The six neighboring departments to Fairfield all maintain a minimum manning level of three personnel. Currently the City of Fairfield staffs two personnel on primary fire apparatus when the daily staffing level is at the minimum level of twelve.

Question 19 of the survey; *Across the country, Fire Departments are being forced to deal with an increase in EMS responses which are taking away from the number of personnel available to respond to fire or rescue calls. What, if anything has your Fire Department done in order to meet this increasing demand? (Please explain)* This question created some very interesting options that the department should evaluate in order to address the current situation. Responses varied from: nothing being done, additional personnel hired due to passage of a fire levy or SAFER grant. Dropping personnel from a medic unit and relying on mutual aid if needed. The most common answer of the departments surveyed was to rely on automatic or mutual aid. The City of Fairfield Fire Dept. relies on mutual aid but does not

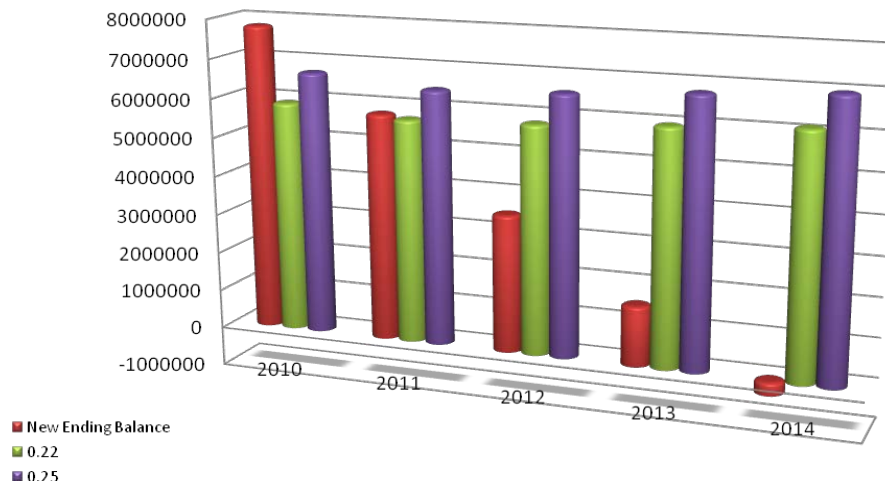
have any automatic aid agreements with neighboring departments. This is further explained in the Discussion section and modifications to our current policy are included in the Recommendation section that could be immediately implemented.

As with cities across the United States, the City of Fairfield is no different and is currently faced with doing more with less due to the economic crisis throughout the country. The city's finance manager was contacted and the following information was received pertaining to the city's current financial status and projections for the future. Table 1 below of the city's financial analysis shows the fund balance of the fire levy from 2005 through 2013.



In addition to the declining revenue being collected by the fire levy, the city's general fund is also hemorrhaging and the fire department cannot expect the general fund to support its current operations in the future. Table 2 below of the city's financial analysis shows the cash flow projection through 2014.

Cash Flow Projection - General Fund



DISCUSSION

The research conducted clearly shows that the City of Fairfield Fire Department is functioning at capacity when at the daily staffing level of fifteen. When staffing is at fifteen the department is able to staff three ALS medic units with two personnel and three front line fire apparatus with three personnel. When at the budgeted staffing level of fifteen, the City of Fairfield does not consistently meet the requirement of four personnel per fire apparatus as recommended by (NFPA 1710, 2001 p. 1710-8).

The research shows the department routinely operates with a daily staffing level less than fifteen. In 2009 the department operated at the budgeted level of fifteen personnel less than 12% of the time. During the same time frame the department operated at a daily staffing level of thirteen or less 61% of the time. When this occurs fire apparatus staffing is reduced to two personnel and in some circumstances, one person due to daily details that require personnel to leave the city and unavailable to respond to emergency responses in a timely manner.

The results of the survey clearly show that the City of Fairfield Fire Department is not comparably staffed as those departments of similar size across the United States or neighboring departments. Sixty-Three percent of the departments surveyed maintain a minimum manning level of three or more personnel per primary fire apparatus. In addition, the seven neighboring departments to the City of Fairfield all maintain a normal staffing level of four personnel and a minimum manning level of three personnel per fire apparatus.

A Fire Protection Staffing Analysis completed by Kramer & Associates (October 1999) recognized a deficiency in staffing within the department and recommended a staffing level of 18.8 personnel based on the number of service calls at the time. Since then the number of fire

and EMS calls has increased 43% and the current staffing level is still below the recommended level of the 1999 study.

The department has SOP's in place that dictate when mutual aid can be called into the city for structure fires. As the SOP's read now, mutual aid can and should be called upon when the first fire apparatus arrives on scene and verifies an actual fire requiring the advancement of a hand line. Mutual aid can also be requested if credible information is being received by the city's dispatch center prior to arrival of the first apparatus. In order for mutual aid to be received, Fairfield's dispatch center must call another dispatch center and request the assigned mutual aid unit. This obviously takes additional time and on average results in on scene times of mutual aid units in excess of 15 minutes.

The critical task capabilities report that was completed within this research and the data collected showing the number of firefighters on structure fire scenes in 2009 clearly reveals the department is not able to assemble the required number of firefighters to mitigate the threat to life and property. Important to mention is the task capability report for a structure fire was based on a low hazard, single family residential structure.

In order to meet the requirement of the task capabilities report for a structure fire the daily staffing level would have to be at fifteen, and at the time of the dispatch all personnel would need to be available. As the research clearly revealed, the incidence of personnel being on EMS service calls and unavailable to respond to fire calls has increased drastically. In 2009 there were 563 instances of two or more EMS units being on simultaneous calls and unavailable to respond to a fire service call.

When looking at the city's current financial situation it becomes apparent that simply adding personnel in order to increase the daily staffing level is not an option. The data clearly shows that both the fire levy and the city's general fund are both lacking revenue.

Due to home foreclosures within the City of Fairfield and a reduction in property values over the past several years, less money is being generated by the fire levy. In addition, income tax collection has also been reduced due to a decrease in jobs within the city which affects the general budget of the city.

The only way to increase the daily staffing level would be to ask the citizens of the community for an increase in fire millage. Given the current economical climate at local, state, and federal levels, the passage of a new fire levy would be challenging to say the least. A lot of time would need to be devoted to educating the public in hopes of obtaining their understanding and ultimately, the passage of a new fire levy.

There are changes that could be made to the current standard operating policy in regards to requesting mutual aid that could assemble the required number of firefighters on scene in a timely manner. These changes could be implemented without incurring additional cost.

RECOMMENDATIONS

The following recommendations are made in order to address the current staffing situation within the City of Fairfield.

Staffing:

- 1) Begin the process of educating the public and city leaders concerning the current financial budget of the fire department and the impact it has on the staffing level within the department.

- 2) In May of 2012, place a fire levy on the ballot asking for an increase in funds in order to increase the daily staffing level to eighteen personnel which will provide four personnel per primary fire apparatus while still maintaining two personnel on the department's three medic units. The minimum manning number would then be increased from twelve to fifteen personnel.
- 3) In addition to the fire levy, additional ways to collect new revenue such as SAFER grants or fire service billing should be researched.
- 4) Develop a pool of qualified PRN personnel that can fill open slots in the schedule. Other than the cost of hiring these personnel, no additional cost would be incurred by the department. This recommendation could be implemented immediately.

Operations

- 1) Establish an effective means of communication with the dispatch center concerning the daily staffing level. This can be accomplished by implementing the following changes and would not incur any additional cost to the department.
 - a. Train all dispatchers on the importance of assembling an adequate number of firefighters on scene in a timely manner in order to accomplish the vital tasks that must be completed within the early stages of structural firefighting.
 - b. Provide dispatch with a daily roster of personnel and their vehicle assignments so the dispatch center can recognize when staffing is reduced due to employee leave time and/or multiple calls throughout the shift. This will allow them to aggressively call for mutual aid for structural responses in order to assemble the appropriate number of firefighters on scene in a timely manner.

- c. Make the needed changes to the department's current policy to allow the dispatch center to call for mutual aid when manning is reduced.

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APPENDIX 1 – STAFFING SURVEY RESULTS

What is the name of your Fire Department?	
Answer Options	Response Count
	16
<i>answered question</i>	16
<i>skipped question</i>	0

What is your rank and name?	
Answer Options	Response Count
	16
<i>answered question</i>	16
<i>skipped question</i>	0

What is the population of your city or the area that your Fire Department protects?		
Answer Options	Response Percent	Response Count
10,000 - 20,000	12.5%	2
20,000 - 30,000	12.5%	2
30,000 - 40,000	31.3%	5
40,000 - 50,000	18.8%	3
50,000 - 60,000	0.0%	0
Above 60,000	25.0%	4
	<i>answered question</i>	16
	<i>skipped question</i>	0

How many square miles are covered by your Fire Department?		
Answer Options	Response Percent	Response Count
1 - 10	18.8%	3
11 - 15	12.5%	2
16 - 20	12.5%	2
21 - 25	12.5%	2
26 - 30	12.5%	2
31 or more	31.3%	5
	<i>answered question</i>	16
	<i>skipped question</i>	0

How many stations does your Fire Department have?		
Answer Options	Response Percent	Response Count
a. 1 - 2	37.5%	6
b. 3 - 4	43.8%	7
c. 5 - 6	12.5%	2
d. 6 or more	6.3%	1
<i>answered question</i>		16
<i>skipped question</i>		0

Is your Fire Department?		
Answer Options	Response Percent	Response Count
Career	31.3%	5
Combination	68.8%	11
<i>answered question</i>		16
<i>skipped question</i>		0

What is the total annual budget of your Fire Department?		
Answer Options	Response Percent	Response Count
\$500,000 - \$1,000,000	0.0%	0
\$1,001,000 - \$1,500,000	0.0%	0
\$1,501,000 - \$2,000,000	0.0%	0
\$2,001,000 - \$2,500,000	6.3%	1
\$2,501,000 - \$3,000,000	6.3%	1
\$3,001,000 - \$3,500,000	6.3%	1
\$3,501,000 - \$4,000,000	0.0%	0
\$4,001,000 - \$4,500,000	12.5%	2
\$4,501,000 - \$5,000,000	0.0%	0
\$5,001,000 and above	68.8%	11
<i>answered question</i>		16
<i>skipped question</i>		0

What services does your Fire Department provide?

Answer Options	Response Percent	Response Count
Fire only	0.0%	0
Fire and Rescue (ex. Extrication)	0.0%	0
Fire, Rescue, and EMS First Responder (No transport)	6.3%	1
Fire, Rescue, EMS First Responder, and BLS transport	0.0%	0
Fire, Rescue, EMS First Responder, and ALS transport	93.8%	15
<i>answered question</i>		16
<i>skipped question</i>		0

How many emergency responses does your Fire Department make annually? (Fire and EMS)

Answer Options	Response Percent	Response Count
1,000 - 2,000	6.3%	1
2,000 - 3,000	12.5%	2
3,000 - 4,000	12.5%	2
4,000 - 5,000	12.5%	2
5,000 - 6,000	25.0%	4
6,000 - 7,000	18.8%	3
7,000 - 8,000	0.0%	0
8,000 or more	12.5%	2
<i>answered question</i>		16
<i>skipped question</i>		0

How many emergency medical service calls does your Fire Department respond to annually?

Answer Options	Response Percent	Response Count
Less than 1,000	0.0%	0
1,000 - 2,000	18.8%	3
2,000 - 3,000	18.8%	3
3,000 - 4,000	31.3%	5
4,000 - 5,000	18.8%	3
5,000 - 6,000	0.0%	0
6,000 - 7,000	6.3%	1
7,000 or more	6.3%	1
<i>answered question</i>		16
<i>skipped question</i>		0

How many fire calls, including EMS First Responder calls does your Fire Department respond too annually?

Answer Options	Response Percent	Response Count
Less than 500	0.0%	0
500 - 1000	25.0%	4
1000 - 2000	31.3%	5
2000 - 3000	25.0%	4
3000 - 4000	6.3%	1
4000 or more	12.5%	2
<i>answered question</i>		16
<i>skipped question</i>		0

When fully staffed, is your Fire Department able to staff all primary fire apparatus with four personnel as recommended by NFPA 1710?

Answer Options	Response Percent	Response Count
Yes	43.8%	7
No	56.3%	9
<i>answered question</i>		16
<i>skipped question</i>		0

If your Fire Department is not currently staffing primary fire apparatus with four personnel as recommended by NFPA 1710; are there plans to one day achieve this?

Answer Options	Response Percent	Response Count
Yes	8.3%	1
No	91.7%	11
<i>answered question</i>		12
<i>skipped question</i>		4

What is the total number of staff within your Fire Department? Including First Line and Administrative personnel.

Answer Options	Response Count
	16
<i>answered question</i>	16
<i>skipped question</i>	0

What is the maximum daily staffing level for your Fire Department? Only include Administrative personnel if they respond to fire, rescue, or EMS calls.

Answer Options	Response Percent	Response Count
5 - 7	0.0%	0
8 - 10	12.5%	2
11 - 13	6.3%	1
14 - 16	37.5%	6
17 - 20	25.0%	4
21 - 23	6.3%	1
23 or more	12.5%	2
<i>answered question</i>		16
<i>skipped question</i>		0

What is the minimum daily staffing level for your Fire Department? Only include Administrative personnel if they respond to fire, rescue, or EMS calls.

Answer Options	Response Percent	Response Count
5 - 7	6.3%	1
8 - 10	18.8%	3
11 - 13	37.5%	6
14 - 16	12.5%	2
17 - 20	6.3%	1
21 or more	18.8%	3
<i>answered question</i>		16
<i>skipped question</i>		0

What is the minimum staffing level for a primary fire apparatus, whether it is an engine or a quint?

Answer Options	Response Percent	Response Count
1	0.0%	0
2	37.5%	6
3	43.8%	7
4	18.8%	3
5	0.0%	0
<i>answered question</i>		16
<i>skipped question</i>		0

If your Fire Department provides EMS transport, what is the minimum staffing level per ambulance?

Answer Options	Response Percent	Response Count
2	93.8%	15
3	0.0%	0
4	0.0%	0
N/A	6.3%	1
<i>answered question</i>		16
<i>skipped question</i>		0

Across the country, Fire Departments are being forced to deal with an increase in EMS responses which are taking away from the number of personnel available to respond to Fire or Rescue calls. What, if anything has your Fire Department done in order to meet this increasing demand? Please explain

Answer Options	Response Count
	16
<i>answered question</i>	16
<i>skipped question</i>	0

Thank you for completing this survey. I want to offer the opportunity for your department to receive a copy of the final results from this research project. Would you like for me to send you a copy?

Answer Options	Response Percent	Response Count
Yes	81.3%	13
No	18.8%	3
<i>answered question</i>		16
<i>skipped question</i>		0

If you answered YES to question 20, please provide your e-mail below.

Answer Options	Response Count
	13
<i>answered question</i>	13
<i>skipped question</i>	3

