

**Times of Need – An Analysis of Staffing, Deployment
And Peak Volume Issues Within
The North Ridgeville Division of Fire**

By: Gregory Robert Laborie
Lieutenant/Paramedic
North Ridgeville Division of Fire
7090 Avon/Belden Road, North Ridgeville, Ohio 44039

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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.
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ABSTRACT

In 2007, the North Ridgeville Division of Fire (NRDF) began supplementing their three-person emergency response crews with a two-person back-up unit, designated to respond to lower acuity medical calls and minor, fire related responses. The problem then arose that, due to a major increase in emergency responses, this staffing and deployment model for fire and EMS units may no longer have been the most effective and efficient use of NRDF resources, especially during the peak hours of call volume. The purpose of this descriptive study was to identify and describe the current staffing and deployment model used by the NRDF, and to evaluate its impact upon North Ridgeville's citizens, in comparison to the models of some similar fire departments.

Research questions for this study investigated the following:

- 1) What is the current staffing model of the NRDF?
- 2) What is the effect, if any, of the current staffing model on the citizens of North Ridgeville?
- 3) How do some departments similar to the NRDF staff and deploy their fire and EMS services during peak hours of operations?

A literature review was conducted, as well as data collected from the department's Emergency Reporting System (ERS) software which aided in proving a need for additional staffing for the back-up unit, at a minimum, between the hours of 0800-2200 daily. A survey of similar north east Ohio fire departments showed that seventy-three percent responded in the same manner as the NRDF and that nearly fifty-eight percent had identified peak call volume/staffing issues like those found in North Ridgeville. An interview with NRDF Chief Reese brought the author to the final recommendation that it would be most beneficial to the

public and more efficient for the department to hire three, fulltime, additional firefighter paramedics that would then allow the NRDF to have three, fully-staffed jump companies that could respond in a consistent manner at all times.

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INTRODUCTION

Statement of the Problem

In 2007 one additional person was added to each platoon of the North Ridgeville Division of Fire (NRDF) after it appeared that increasing staffing would be of benefit in order to handle an increase in call volume. With a burst in housing starts within the community (Fursdon, 2007), it became necessary for the department to increase staffing and change its existing deployment model in order to meet the needs of a growing population (Lorain County Auditor, 2006). The solution at that time called for an increase of three firefighter/paramedics (one for each of the three platoons) and a shift from in-house dispatching to joining a consolidated dispatch center (WESTCOM) along with four other local fire departments (Miller & Reese, 2008). With one staff member per shift freed from dispatch duties and an additional staff member added to each platoon, this allowed the department to field two paramedic ambulances or fire apparatus manned by three personnel each, and add a third ambulance or engine staffed with two personnel that would handle lower acuity medical calls, as well as respond to lower level fire emergencies such as odor investigations and burning complaints (WESTCOM [Westshore Communications Center] Dispatching Matrix, 2007).

For several years, this staffing method helped to alleviate many of the response issues that the department was facing. However, since 2013 it has become necessary to find a new solution that would more efficiently address the ever increasing number of calls for service that the department was receiving. With a call volume increase of over twenty percent since the end of 2013 (Reese & Gavlak, 2017), the North Ridgeville Division of Fire has once again reached a crossroads.

The problem that this research project has addressed is that the current method of staffing and deployment of fire and EMS units by the North Ridgeville Division of Fire may not be the most effective and efficient use of resources, which may have been resulting in delays in response, over utilization of mutual aid, prolonged response times, and other problems that are leading to avoidable injuries, property loss and even loss of life, especially during peak hours of call volume.

Purpose of the Study

The purpose of this descriptive study has been to identify and describe the current staffing and resource deployment model used in the daily operations of the North Ridgeville Division of Fire, the impact of this current model on the citizens of North Ridgeville, and the staffing and deployment models used daily during peak hours by similarly sized fire departments.

Research Questions

The research questions that this study has investigated are as follows:

1. What is the current staffing model of the North Ridgeville Division of Fire?
2. What is the effect, if any, of the current staffing model on the citizens of North Ridgeville?
3. How do some departments similar to the North Ridgeville Division of Fire staff and deploy their fire and EMS services during peak hours of operation?

BACKGROUND AND SIGNIFICANCE

The North Ridgeville Division of Fire has been a full time, professional fire department since 1967, and began actively providing ambulance service to the community in 1970. Since its inception as a volunteer department in 1931, the department has provided dedicated service to both the citizens of North Ridgeville and to surrounding communities through mutual aid agreements. Situated in eastern Lorain County, and bordering Cuyahoga County, North Ridgeville has a population of 33,480 and the city is currently measured at 25 square miles (Lorain County Auditor, 2017). North Ridgeville is a city that is often referred to as a highly-residential community since it is relatively light in its commercial, retail, and industrial presence, yet very heavy in its residential home footprint (Lorain County Auditor, 2017).

In 2017, the department responded to 3662 calls for emergency service from its two fire stations that are located on the north and south sides of the city respectively (Emergency Reporting System [ERS], 2018). The department is currently staffed by 37 members, with four of those being administrative in nature (the chief, two assistant chiefs, and an administrative assistant). The remaining 33 members are divided into three platoons of 11 each with up to three of those permitted to be off each shift (Ohio State Employment Relations Board, 2018), leaving, on the average day, eight line personnel to respond to all emergencies within the city. All of the department's staff members (minus the administrative assistant) are State of Ohio Level II Firefighters, and, at a minimum, a State of Ohio Licensed Paramedic, though nearly all of the staff members continue to hold their National Registry certification as Paramedics.

In 1994, the department presented a paramedic service levy to the voters of the community in order to transition their existing Basic Life Support ambulance service to an all paramedic Advanced Life Support EMS service. This levy passed favorably and helped to

solidify the relationship between the department and the public from that point forward (Lorain County Board of Elections, 1994). The levy funded the hiring of seven additional staff members who were all dual role firefighter/paramedics, and it allowed for the expenses necessary to train existing staff members to the paramedic level. Additionally, the hiring of the seven new crew members allowed for the department to finally staff their fire and EMS apparatus with three people instead of the two that it had been staffing each vehicle with since the department had become fulltime nearly 30 years earlier.

Since 1995, when the paramedic service went into effect along with the additional staffing, the NRDF has continuously improved its service to the citizenry by consistently upgrading its equipment, resources, and apparatus (Reese & Gavlak, 2018). Additionally, the department associated itself with the WESHARE (West Shore Area Rescue) organization which is a regional consortium of professional fire departments that share the same medical direction, EMS training, and medical protocols. The organization also provides reciprocating fire and EMS mutual aid to each other (WESHARE, 1986).

With WESHARE membership, the department has been called upon to render more mutual aid outside of its borders (3.1% from 1/1/2014-1/1/2018) than it receives (1.5% from 1/1/2014-1/1/2018). This gap in service four point six percent of the time resulted in either a large area of the city being left without sufficient protection, or, the city insufficiently covered by an understaffed secondary medic unit (Reese & Gavlak, 2014-2018).

For the past three years, the department has been recognized by the American Heart Association's Mission Lifeline program for providing exemplary cardiac care (AHA, 2015-2017). Additionally, the department has become only the second fire department in the State of Ohio to be recognized through the Commission on Accreditation of Ambulance Services

(CAAS, 2017) which shows the depth of commitment to the public by the department and its leadership in providing a high quality, globally recognized EMS service to their citizens (Reese & Gavlak, 2018). However, no evidence could be found that these accolades or advances in training and service have addressed the need for the department to place additional staffing in the right place at the right time in order to maintain a consistent response to the public, and here in lies the problem.

Currently, the two stations each deploy a three-person, frontline, jump company that responds on either a fire apparatus or a paramedic ambulance unit, depending upon the nature of the call received (NRFD Operations SOG, 2015, p.1-2). However, Station 1 also deploys a two-person, secondary medic unit (SMU) or “back-up” crew, that also responds in a jump company status to lower level EMS calls and fire-related emergencies such as open burning complaints and odor investigations (WESTCOM Dispatching Matrix, 2007). This unit also responds to major emergencies with the frontline crews in order to be a force-multiplier for the incident commander. This method of deployment has caused this particular unit to revert back to the method of EMS and fire delivery that the department fought to extract itself from since 1995.

The negative effect of the secondary medic unit occurs when both of the frontline companies from each station are burdened and a higher-level of emergency call is received that is outside of the existing response matrix for that back-up unit (NRFD Dispatching and Communications SOG, 2015, p. 3-5). When this occurs, only two personnel are available to respond, regardless of the nature or severity of the call. Though skillfully trained and very proficient in their jobs, the two-member secondary medic unit (SMU) can only perform a limited number of tasks, especially if they must respond to a cardiac arrest call where the EMS industries

best practices have long shown that personnel on the scene is not bad, but three is much better and more efficient.

The same can be said for a working structure fire where the two-person team would be limited to doing a scene size-up and obtaining a water supply until enough help arrives to conduct a coordinated offensive attack. Currently, any attempt to initiate an interior fire attack with only two people on the scene would not only intuitively be a high-risk life-safety violation, but it would also be a violation of departmental policy (NRFD Operations SOG, 2015), and could be considered violations of the National Fire Protection Association's NFPA 1500 (2018) and 1710 (2016) guidelines and the International Association of Fire Fighters (IAFF) Two In/Two Out recommendations and guidelines (2001). Additionally, though not adopted by the State of Ohio, this also potentially violates Occupational Safety and Health Administration (OSHA) policy 29 CFR 1910.134(g)(4)(i).

Currently, statistical data within the organization has shown that the decreased staffing on the secondary medic unit during peak call volume hours for the department has potentially denied the public an extra set of hands that could be essential in lifting and moving patients, delivering high quality patient care during transport, or in initiating fire attack operations as a first arriving apparatus (ERS, 2018). On multiple occasions it has become necessary for a mutual aid service to be dispatched in order to assist the two-person crew with their duties (ERS, 2018), potentially leaving services depleted within a neighboring community in order to deliver care within North Ridgeville's borders. However in most cases, the SMU crew carries out their mission without assistance even though it would be accomplished easier with the help of another team member (J. Reese, personal communication, November 16, 2017).

The potential impact of this descriptive research project will be to evaluate existing data from both internal and external resources in order to establish what could be the most efficient way to deliver a stronger service to the community by the North Ridgeville Division of Fire. Whether that efficiency is based in the addition of staffing to the organization, redeployment of existing assets, or the creation of a new service delivery model is yet to be seen. On the other hand, there is also the possibility that the current model may be the most suitable for the existing problem, but there most definitely is a problem in need of review and evaluation for the betterment of both the department and, more importantly, the public that they serve.

LITERATURE REVIEW

The question of how to properly staff an active suburban fire department is the one that has generally been asked for some time now, particularly since the National Fire Protection Association's release of the 2015 Edition of NFPA 1410. This edition states that "With the exception of very small communities and isolated areas, the standard response to an emergency incident on the initial alarm is generally a minimum of two engine companies and a truck company" (NFPA 1410, 2015, Section 1-2.1). This NFPA guideline defines an emergency incident as a confirmed, working structure fire.

The North Ridgeville Division of Fire has been in compliance with earlier releases of this NFPA recommendation since 2007. Responses to reported structure fires, both residential and commercial, are exactly as prescribed in NFPA 1410 (2015) with two engines being dispatched from Fire Station 1, and an aerial apparatus being dispatched from Station 2. The remainder of the on scene staffing that is recommended by the 2010 edition of NFPA 1710 is most generally provided through dispatch of surrounding mutual aid agencies.

However, NFPA 1410 (2015) additionally cites the following:

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 or 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. (NFPA 1410, 2015, Section A-3-2.5)

It is at this point where the staffing and deployment of the department does not meet the requirements of this standard.

Since the implementation of the secondary medic unit concept within the North Ridgeville Division of Fire in 2007, and the consequential hiring of additional staff, the department was able to initiate a response matrix consisting of one, three person engine, a three person aerial ladder, and a two person engine for emergency responses (WESTCOM Dispatching Matrix, 2007). With fire related responses constituting approximately seventeen percent of the departments call volume over the course of the past five years (Emergency Reporting System, 2018), the NRDF has continued to use this same form of response when dispatched to medical calls throughout the community. It is these types of calls for service that make up the remaining eighty-three percent of the departmental work load (Emergency Reporting System, 2018). With the two, three paramedic staffed ambulances responding regularly to overlapping EMS calls, it has made the mission of the two person back-up unit considerably more difficult.

The overlapping response situations occurred when two of the frontline units (ambulances or fire apparatus) were dispatched to separate locations, leaving only the two-member secondary medic unit in the station to respond to either fire or EMS emergencies within the city. The data provided through the Emergency Reporting System study (ERS 2018) showed that nearly twenty-five percent of the time, a two-member team would be the sole unit dispatched and responding to all levels of calls within the city, whether they are minor or major events.

The NRDF is experiencing these overlaps in calls primarily due to the large amount of growth that the community has encountered over the past decade. A cascading effect has taken place due to this growth, in which, the demands for service upon the organization have grown considerably with the population increase. Consequentially, it has been realized that there is a need for additional staffing in order to correct this situation and a potential way to do this is to increase the staffing of the SMU from two personnel to three personnel in order to meet the

demand, and bring that unit up to the operational level of the remainder of the NRDF's responding units.

This current form of response is not in agreement with both the NFPA (2015) recommendations, as well as the National Institute of Standards and Technology (NIST) Report on Residential Structure Fire (NIST, 2010) that states, regarding two-person crews and the 22 essential tasks of firefighting, that those tasks are "completed at an astounding thirty percent slower pace than a four or five person crew, and at least five, to seven percent slower than a three-person crew" (Appendix 4).

The April of 2010 NIST report identified 22 firefighting and rescue tasks that must be accomplished in the course of extinguishing fires and rescuing civilians from residential settings (Appendix 3). After conducting more than 60 controlled fire experiments at their Montgomery County, Maryland, training facility on a simulated 2,000 square foot, two-story structure, it became quite evident that four and five member fire crews were a whole twenty-five percent faster at accomplishing the aforementioned tasks than any three-person crews were. The normal frontline apparatus response to a reported structure fire by the North Ridgeville Division of Fire is a three-person crew deploying from their two stations.

The first due element to a reported fire will generally be an engine or ladder truck that will initially arrive on scene with three firefighters and begin carrying out the NIST tasks (NRFD Operations SOG, 2015). It should be noted that since residential home starts began to increase in North Ridgeville in 2004, that the majority of newly built homes in the city fall closely within the specifications of the NIST test settings that were contained in the report. Additionally, the added aspect of lightweight construction methods has become very prevalent in the city (Fursdon, 2012).

Under the best of circumstances when a fire is reported, a North Ridgeville resident currently has the expectation that at least eight firefighters will be showing up at his or her front step in three separate apparatus (two crews of three, and a crew of two) to begin the tasks of knocking down the fire and restoring some semblance of normalcy to the homeowners afterwards. However, it has been found that this is not always the case due to the high volume of emergency medical work that the department provides to those same citizens. An issue of “Overlapping Responses” was identified in the course of conducting this research that has, and will, continue to impact the citizens of North Ridgeville and the Division of Fire until some form of corrective measure is identified and implemented.

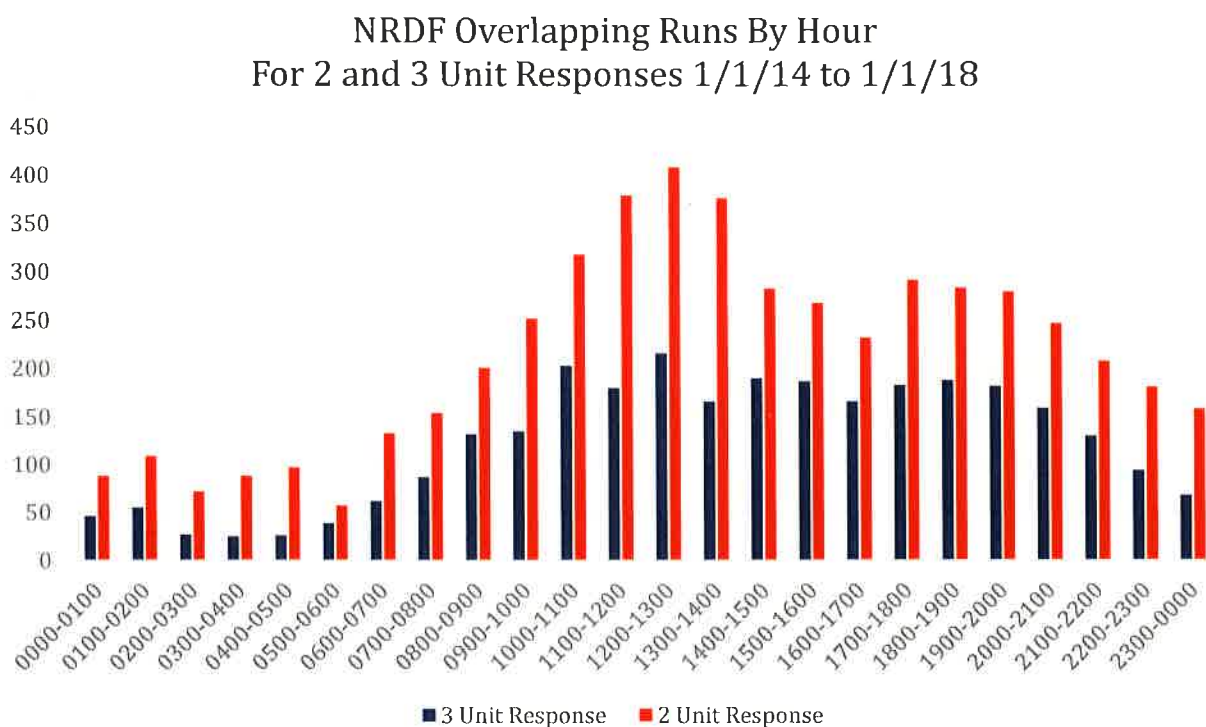


Figure 1. Overlapping Fire/EMS calls by hour for 2 and 3 unit responses by the NRDF from 1 Jan 2014 to 1 Jan 2018

While conducting research related to call volume, it was discovered that from January 1, 2014, through January 1, 2018, the department responded to a total of 12,079 calls for emergency service, and of that number, a total of 2,946 (29.39%), were what constituted an “Overlapping Response” (ERS, Overlapping Response by Unit, 2018).

Additionally, the four complete years of reviewed Emergency Reporting System data suggests that when overlapping responses had occurred and a major incident forced the back-up crew to respond to a call outside of their traditional response matrix, a mutual aid unit from at least one surrounding community had always been available and was dispatched to assist (ERS 2018). Concurrently, the WESTCOM dispatch center would also put out a call to the encumbered frontline units for status availability in the event that they might be able to respond to the situation as well (WESTCOM Policies and Procedures, 2009). Even though the back-up unit would make patient contact and render care initially, it still would take valuable time for a mutual aid crew to arrive to assist and continue the continuity of care to the patient (ERS, 2018) which could be seen as a potential risk to the public.

Olson (2006) studied not just staffing issues, but also covered the topic of a lack of a strategic staffing plan for South Kitsap Fire and Rescue, Washington. In his 2006 work, the author found a need to create from the ground, up, a method that would allow him to evaluate and legitimize the need for additional staffing within his service. The author determined that he would conduct a study reflecting nearly every aspect of what the Emergency Reporting System could provide to this writer some 12 years later in order to create a basis for his study.

Olson (2006) found that in order to get a good picture of the needs of his community, he would look at several key factors, starting with when and where the emergency calls were originating from within the community. Next, the author would evaluate where there was the

greatest need for service. With this information, the author then looked at where best to deploy the necessary assets in order to quickly reach those-in-need (Olson, 2006) and it was at this point that he saw that the problem was two-fold.

First, Olson (2006) found in his research and procedures that there was a widely accepted need for an increase in fulltime staff in order to meet the standard requirements of his service. This is very similar to North Ridgeville Fire Chief John Reese's belief that at least one additional crew member is needed per shift in order to raise the secondary medic unit up from a two-person team to a three-person, all-hazard response unit (J. Reese, personal communication, November 16, 2017). Next, Olson noted in 2006 that there were peak hours of the day in which service demands consistently escalated. In order to address this issue, Olson recommended the implementation of a peak-load-time crew that would work 12 hour shifts from 0800-2000 hours, Monday through Saturday in order to bolster the operational abilities of the department and become a force multiplier in the event of large scale emergencies within the district during those hours (Olson, 2006, Recommendations).

Sachs (1999) defined peak load contingencies as "those strategies utilized by fire and EMS services in an attempt to match ebbs and flows in service demands with an appropriate level of trained and qualified staff members" (Sachs, p.38). An evaluation of those contingencies was reflected by Mustafa (2009) in which he conducted a review of the peak load service unit within the Seminole County, Florida, Fire Department. Drawing from similar data collection methods utilized by Olson in his 2006 work, though not reported or credited for such, Mustafa was able to review and analyze the effectiveness of the department's peak load program upon call volume from 2002 through 2009.

The recommendations made in Mustafa's 2009 paper actually showed the seven year history of an effective peak load service unit that functioned within a response matrix similar to that of the North Ridgeville Division of Fire's secondary medic unit (Mustafa, 2009).

Additionally, Mustafa (2009) found that the addition of another peak load service unit deployed within another part of the county, would further relieve stress that was being placed upon the regularly responding services in that district. Additionally, the author hypothesized that the existing peak load service crew would also benefit from this addition.

According to Chief Reese (J. Reese, personal communication, November, 2017) the possibility of increasing staffing during peak hours "could potentially act as another option or opportunity to increase the staffing on the two-person back-up unit." Reese went on to say that this action could be beneficial "especially during the hours when the department is experiencing its most increased requests for service, but what about those 'off hours'? We still have emergencies in those non-peak hours as well." This raised an excellent point: Olson's (2006) strategic planning method showed a way in which to evaluate the location and needs for additional staffing support, and Mustafa's (2009) research showed a clear method for post implementation evaluation of the service once it was up and running, yet it also revisited many of the essentials that would become vital to setting up such a service if it were to ever become a reality. But neither author discussed the needs in the non-peak hour setting other than to decrease staffing at a set time period.

During the interview with Chief Reese regarding the problem of increasing the staffing of the secondary medic unit to meet the minimal requirements of both NFPA 1410 and the NIST study, (J. Reese, personal communication, November 16, 2017) it was mentioned that the NRDF has made every attempt over the past decade to meet these industry best practices whenever

possible, and that the department is not required by law to meet NFPA 1410. It was then relayed to the writer that the chief had provided the city administration with a document entitled “*A Five-Year Personnel, Apparatus and Facilities Plan*” in June of 2014 (Reese, 2014).

The document that Chief Reese produced was quite similar to that created by Olson (2006) and addressed many of the same concerns. In his report, Chief Reese had projected that by the end of 2019, the department would complete an estimated 3,527 calls for that year at an average of 9.67 responses per day (Reese, 2014, p. 3). In actuality, Reese’s projections for the North Ridgeville Division of Fire were surpassed by the end of 2017 when his department completed a record 3,662 calls for emergency service at an average of 10.03 responses per day (ERS, 2018), a full two years ahead of his estimates.

In his plan submitted in 2014, Reese also provided a cost analysis and a needs proposal for an increase in departmental staffing from the current 11 member shift strength, to a 13 member platoon that would take the line staff from 33 to 39 members (Reese, 2014, Report). This document certainly seems to follow the same general direction that Olson (2006) had taken with his research. A point of great significance found in this report is that it covered the needs of both the peak and non-peak hours of call volume within both the department and the city as a whole.

Chief Reese explained during the interview (J. Reese, personal communication, November 16, 2017) that:

“The increase in staffing, had it then been accepted by the administration, would have created three platoons of 13, with a permitted four members off per shift”. Reese went on to say that “this would have established a constant platoon of nine members that would have been able to meet the minimum accepted standard of three-members per emergency apparatus, and we (the

department) would have successfully attempted to meet both NFPA 1410 and the NIST report of 2010”.

The plan was reviewed by the city administration but they failed to take action on it due to projected losses in city revenue as a result of government fund reductions implemented at the state level, and the subsequent initiation of a major city-wide infrastructure initiative that began that same year (J. Reese, personal communication, November, 16, 2017).

The Chief then entertained a conversation regarding the topic of increasing staffing just during the peak volume hours of the day. The concept of bringing in a temporary team of workers during a specified time frame nearly each day definitely became an intriguing aspect with which to investigate. Additional questions that came up during the conversation revolved around who would be filling those roles within the department? Would they be filled by current employees working overtime or would outside, part-time staff be a more appropriate choice in this case? It was determined that, on top of the work already conducted by Olson (2006) and Mustafa (2009), that additional data would need to be found regarding the staffing of departments during peak hours of call volume.

Additional research gathered from the Emergency Reporting System (ERS, 2018) data specified the peak hours of call volume for the department over the past four complete years of record keeping. The data found in Figure 2 solidly identified a window of time between the hours of 10:00 AM and 9:00 PM where the department fielded 7,302 calls for emergency service (either fire or EMS related), with an average of 663.81 for the eleven hour window. The peak hours of requested service were topped by calls from 1200-1300 at 742 calls for service, and a block from 1700-1900 hours with 709 and 697 calls respectively.

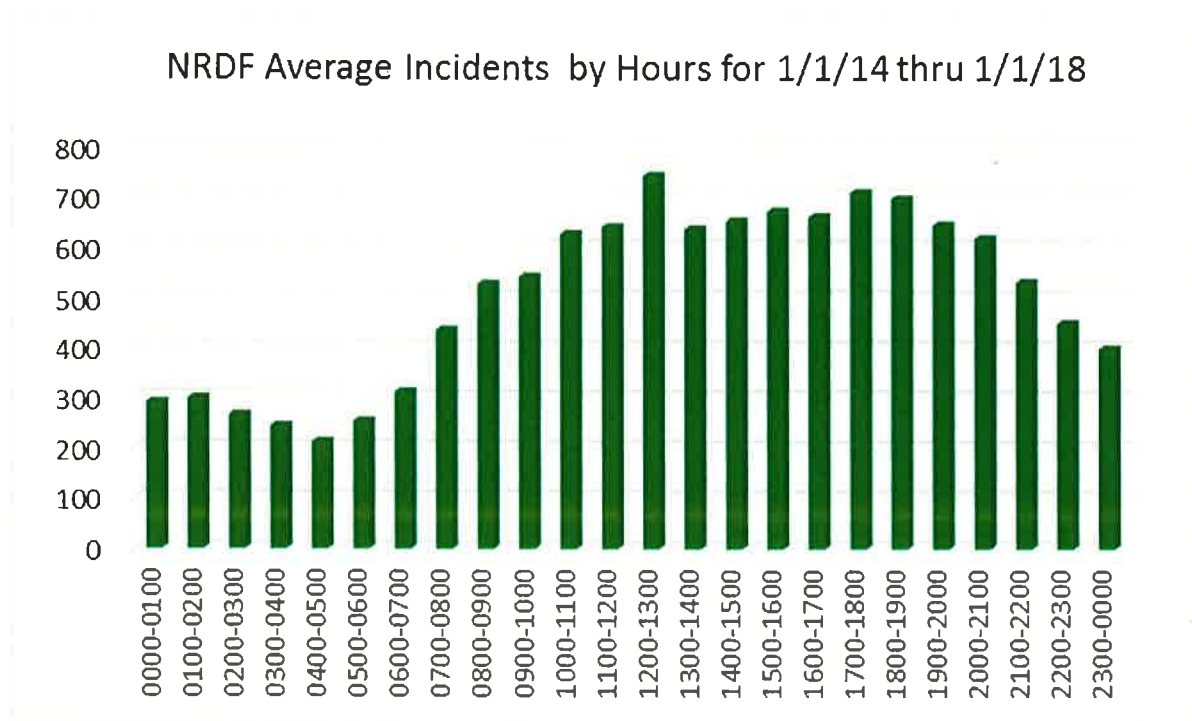


Figure 2. Average incidents by hours for the NRDF from 1 Jan 2014 to 1 Jan 2018

Curtis (2011) presented an evaluation for the need for additional peak load staffing within the then growing community of Granville Township, Ohio. The author utilized a departmental software program in order to generate information representing how an increase during specific hours of the day by just two more members would substantially influence the responses of the department as it was transitioning out of a volunteer/part-time paid department to a full time, professional paid service. Curtis hypothesized in 2011 that this action would bring about a lower reliance upon the departments diminishing volunteer pool. The author also, as part of his research, included a variety of revenue streams that could possibly fund the need for the peak volume personnel, with the most reliable option being an increase or addition to already existing fire levies within the community.

In reviewing Curtis' 2011 work, it was found that many of the methods that he utilized in order to determine the need for peak hour staffing are on par with those being conducted for this project so there was little benefit as to that point. Additionally, the fact that the Granville Township Fire Department would go back to their residents to ask for added funding in order to increase their level of service could have posed a fiscal risk for the department . This type of funding venture would be a difficult topic of discussion within the North Ridgeville Division of Fire as the department is already dependent upon two property tax levies; one for fire equipment and staffing, and a second for the provision of paramedic services, staffing, and equipment (Lorain County Auditor, 2017). Additionally, the department passed a 20 year bond issue in 2015 (Lorain County Auditor, 2017) to build a new headquarters fire station in a location that will bring about quicker responses to most calls throughout the city (Reese, 2014, pp. 9-13).

It is inevitable that alternative methods of funding would eventually need to be considered and put into effect in order to provide a peak volume response model in the future just as in the works of Curtis (2011). The question of whether to bring in part-time personnel during the peak hours of need, as in Curtis (2011), Mustafa (2009) and Olson (2006), or to hire fulltime personnel to round out the staffing of the back-up unit within the department, as in Reese (Reese, 2014, Report) has yet to be determined by the department's leadership and the city administration.

After reviewing the research materials that have been listed previously within this literature review, and correlating a large amount of data through the ERS system and the interview with Chief Reese, this writer finds that there may be an opportunity to address a staffing issue, if, in fact, one is found to exist aboard the secondary medic unit, especially during the peak hours of service within the community. With continued evaluation of the gathered

materials and ERS data, the next step was to construct a survey of fire departments within the surrounding region in order to query them regarding their staffing and deployment of services. One of the primary focuses of the survey will be to make inquiries as to whether those departments have recognized if they experience any peak times of service and if they have a specific plan or strategy in effect to handle those periods of increased requests for service.

The works of Olson (2006), who suggested the implementation of peak hour staffing for his service, and Mustafa (2009), who recommended additional assets be added to his service's existing peak hour staffing, are balanced by the works of Curtis (2011), who looked for a method to fund the peak hour staffing needed within his organization. All three of these authors have laid a ground work for the potential recommendation of peak load staffing within the North Ridgeville Division of Fire. These authors had varying view points on how best to respond to their department's need for additional staffing in order to meet the problem of increased call volumes during a specific time of the day. Additionally, each of these authors attempted to find a suitable method that would benefit both the public and department as a whole, and that mirrors the purpose of this research instrument. Added to this are the previous efforts laid out thus far by Chief Reese in order to further meet the needs of his growing community. The information gathered from each of these resources could greatly assist in pursuing this research as an initiative to solve a serious problem within the department's response capabilities.

PROCEDURES

Once the problem was identified within the North Ridgeville Division of Fire, this applied research project began by conducting several different Google and Yahoo searches with the key term being “Peak Hour Staffing”. This search proved to be too wide in its scope and finding any fire service related topics was nearly impossible. What this search did find was a great deal of research topics that related to other industries such as hospitals and healthcare, as well as industrial and manufacturing. Despite these outside resources providing various offerings of how those industries commit additional staffing during high volume hours of service, particularly those in hospital emergency department settings, they did not efficiently reflect the operational concerns confronted by the North Ridgeville Division of Fire so they were not utilized and a new search was initiated.

A more refined search was conducted with the revised key term being “Fire Service + Peak Hour Staffing” and this additional search information yielded several related products located in both the Ohio Fire Executives Program archive and the National Fire Academy Executive Fire Officer Program archive. It was found that these resources were limited in number, but fruitful in content.

In order to further assist in this project, two internal sources of research have been identified as being very beneficial in helping to create this document. The first of these was the access granted to the Reports section of the North Ridgeville Division of Fire’s Emergency Reporting System or, ERS. The ERS database provided the ability to look deep into the departments call volume history from 2014 through the present. A window of four years of solid data could be retrieved from this asset so the refined dates of January 1, 2014 through January 1, 2018, were set as the evaluation period of the study. The capability to access “Reports” allowed

the evaluation of where peak hours of need arose within the community (Figure 1. Overlapping Fire/EMS calls by hour for 2 and 3 unit responses for the NRDF), as well as when multiple apparatus were encumbered and a minimal response or mutual aid was dispatched to an emergency. Appendix 1 provides a list of all aspects from ERS that were utilized for research.

Access to the ERS software is provided to each member of the NRDF for completing daily fire and EMS reports as well as for company officers to input and update daily productivity logs, but access to the “Reports” section of the software is normally limited to administrative staff. Due to the beneficial nature of the “Reports” section as it pertains to data collection activities, NRDF Chief John Reese granted the author access to this section in order to gather essential data for this applied research project.

All of the department’s reports related to patient care and fire related emergencies are submitted and archived within this reporting system and are time marked to the second for the accurate tracking of responses and scene times. This data base provided the locations and types of calls throughout the entire city, as well as the apparatus involved and the number of staff members responding to each incident. Additionally, the ERS software provided a detailed account of mutual aid calls that were both given and received during the evaluated time frame.

Most importantly though, the ERS software provided a picture of when NRDF services were most in use during the evaluated time frame (Figure 2. Average incidents by hours for the NRDF) as well as when multiple, or overlapping, calls occurred that put a potential strain upon departmental resources (Figure 1. The number of all overlapping Fire/EMS calls recorded by the NRDF). Both of these aspects of data were found to be invaluable in determining the activity of the department.

The second internal source that was helpful in this research project was a 60 minute

personal interview conducted with Chief John C. Reese, EFO, of the North Ridgeville Division of Fire. During this interview, multiple questions were raised regarding the current staffing model of the department, potential growth of the department in relation to growth of the community, and how the department could continue to manage the ever increasing peak hour call volume growth that it is currently facing.

This interview, conducted on November 16, 2017, was essential in learning how the department's leader viewed the current staffing model that was in operation and to hear the Chief's thoughts on the topics of peak hour staffing, overall increased manning, or the maintenance of a status quo in the current staffing model. Additionally, questions were posed regarding potential revenue streams to cover the costs associated with either adjusting staffing only during peak hours, or increasing permanent additional staffing around-the-clock. A list of the questions presented in the interview can be found in Appendix 2.

The current staffing model of the NRDF (Research Question #1) was established in the Background and Significance section of this paper and it shows that the NRDF is currently working inside of a staffing model that was established over a decade ago. This model has not changed as time progressed, and the public's demand for services has increased. While the peak call volume problem identified during the research has proven difficult for the NRDF's current staffing model to absorb, the additional factor of the overlapping call volume has added a serious strain to the department's ability to respond to emergencies in a timely and appropriate manner within the community (Research Question #2).

The timeliness of the departmental responses was evaluated quite easily utilizing the data extracted from the ERS collection banks, but the second research question also addressed the key term "appropriate manner" and this required further research into the National Institute of

Standards and Technology (NIST) Report on Residential Structure Fires that was released in April of 2010. As mentioned in the Literature Review, this NIST report conducted operational testing of 22 essential fire ground tasks that should take place when attending to a low-hazard structure fire (Appendix 3). In this study, NIST evaluated the abilities of two, three, four, and five-person fire crews to complete these assigned tasks and mitigate the standardized scenarios.

When evaluating the NIST study and how it related to the NRDF staffing issue, particularly keeping in mind the peak call volumes and the overlapping incidents that occurred daily, the author utilized collected data that was related to the evaluations of the two and three-person crews only. Since the two frontline fire apparatus of the NRDF are both staffed with three personnel daily, and the back-up engine is only staffed with two crew members, the NIST study presented a realistic look at the operational capabilities of a 2-vs-3 member first arriving apparatus. The NIST study provided an excellent minute-by-minute comparison of the 22 tasks as they were being accomplished by all four different crew levels in the study, and an overall scene time comparison between the two and three-person apparatus can be found in Appendix 4.

In an effort to evaluate how departments similar to the North Ridgeville Division of Fire staff and deploy their fire and EMS services during their peak hours of operation (Research Question #3) a survey would be sent out via Survey Monkey. The list of email recipients for the survey was acquired from the Northeast Ohio Fire Chief's Association (NEOFCA) and it consisted of 89 email addresses of its members (M. Carroll, personal communication, June 26, 2018). Of these 89 members, it was determined that 14 of these were either from combination fire departments or fulltime departments that did not provide a transporting EMS service, so they were eliminated from the survey recipients. Additionally, if there were two members from a single department on the Northeast Ohio Chief's roster, then a survey was only sent to the

highest ranking member of that department.

Once these initial cuts were made, it left 75 departments to be surveyed. Then, the North Ridgeville Division of Fire was removed from the list as their information was the basis for the research project. This left a total of 74 fulltime fire departments that employ between 25-45 members and provide a transporting EMS service to their citizens left for the survey, making them similar in size and capabilities to the NRDF.

A preparatory email was sent to all 74 recipients to inform them that a survey would be forthcoming and a 15 question survey was prepared and submitted. The survey was sent out via email on June 28, 2018 and immediately, two surveys were declined via the “Opt Out” option, leaving a potential 72 surveys to be returned. The survey would be left open for a total of three weeks due to it being sent out during the peak summer vacation period.

The first week of the survey generated 40 responses so a reminder email was sent out during the second week of the survey to those recipients that had not yet responded. Five additional responses were received prior to the survey closing and those surveys were evaluated to ensure that the replies were complete and consistent with the information received from the earlier respondents, which they were. When the survey closed on July 19, 2018, 45 of the 72 surveys sent had been completed and received, generating a composite return score of sixty-two point five percent. A compilation of the final results of the survey can be found in Appendix 5.

Definition of Terms

AHA. American Heart Association is a non-profit organization in the United States that fosters appropriate cardiac care in an effort to reduce disability and deaths caused by cardiovascular disease and stroke.

CAAS. Commission on Accreditation of Ambulance Services encourages and promotes quality patient care in America's medical transportation system. CAAS is an independent Commission that has established a comprehensive series of standards for the ambulance service industry. CAAS is considered to be the "gold standard" of the industry.

Combination Fire Department. A combination fire department consists of at least two forms of employees in order to make up its membership. This could be a combination of any two or more of the following personnel: full time, part time, or volunteer firefighting staff.

ERS. Emergency Reporting System is an electronic patient care reporting system that is linked into both the National Fire Incident Reporting System as well as the National Emergency Medical Services Incident System. ERS also allows for the user to record daily activities, training, fire prevention, and maintenance activities as well as providing the ability to conduct data gathering and statistical analysis capabilities.

IAFF. International Association of Fire Fighters is a labor union representing professional fire fighters and emergency medical services personnel in the United States and Canada. Fire fighters and company officers of the North Ridgeville Division of Fire belong to IAFF Local 2129.

Jump Company. The term "Jump Company" refers to a staffing configuration in which the personnel assigned to a frontline/first out fire engine are also assigned to a frontline/first out EMS ambulance. Depending on whether a fire call or EMS call is dispatched, the "Jump Company" crew responds on the appropriate apparatus to the emergency.

NFPA. National Fire Protection Association is a United States trade association, with some international members, that creates and maintains private, copyrighted standards and codes for use and adoption by local governments.

NIST. National Institute of Standards and Technology is a physical sciences laboratory, and non-regulatory agency of the United States Department of Commerce. The mission of NIST is to promote innovation, industrial competitiveness, and help set industry standards.

OSHA. Occupational Safety and Health Administration is an agency of the U.S. Department of Labor. This agency was established to “assure safe and healthy working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education, and assistance” according to “About OSHA”.

Overlapping Responses. An Overlapping Incident is a term that refers to situations where multiple emergency calls, either fire or EMS related, are taking place simultaneously and the end result of which is most generally a taxing of the emergency service assets during that period. With regards to the NRDF, this occurs when two or more of the department’s fire or EMS medical units are dispatched to either separate or same locations to render service.

Peak Hour Staffing. Peak Hour Staffing is an employment management model where a temporary increase in staffing is brought in to bolster the organization’s existing workforce from a specific start time to a specific end time. These times are usually established based on market research that defines a window of time where the organization’s services are in the highest demand.

SERB. State Employee Relations Board acts as a neutral party in carrying out Ohio’s collective bargaining laws as they pertain to public employers and employees. The Collective Bargaining Agreement of the North Ridgeville, Ohio, Firefighters IAFF Local 2129 can be found in SERB’s archived collective bargaining agreements.

SMU. Secondary Medic Unit, sometimes also identified as the back-up unit, is a term utilized within the North Ridgeville Division of Fire to refer to the second paramedic ambulance responding out of NRDF Station #1 that is staffed by only two personnel at any given time. The SMU is supposed to be relegated to responding to lower level EMS calls due to their staffing level but often times are responding to more serious emergencies due to all of the departments other assets being encumbered on other emergencies.

SOG. Standard Operating Guidelines are standard methods, procedures, or rules in which an emergency service operates in order to perform a routine function. These guidelines are most generally produced and disseminated in written form for all members of the organization to adhere to.

WESHARE. The West Shore Area Rescue organization is a consortium of five professional fire/EMS departments that share joint medical direction from two major hospital systems, shared EMS patient protocols, and reciprocating mutual aid for emergency responses. The organization was formed in the late 1970's and its membership has ebbed-and-flowed over the years since then. Currently, WESHARE is made up of the Avon Lake, Bay Village, North Ridgeville, Rocky River, and Westlake Fire Departments.

WESTCOM. The Westshore Communications Center is an Association of Public Safety Communications Officials-International (APCO) certified dispatching center housed in the City of Westlake, Ohio, and providing 24/7 dispatching services to the Bay Village, Fairview Park, North Ridgeville, Rocky River, and Westlake Fire Departments.

Limitations of the Study

There were several limitations that need to be noted regarding this research project with the first being that the study of peak hour staffing was limited to only the fire service in this

document. The initial search for the literature review subjects yielded industries that were far outside of the confines of fire service operations and staffing. Most of the subjects that were found were in healthcare, manufacturing and industrial settings. These subjects might be useful if a researcher were to conduct a much broader, wider ranging research paper regarding peak hour staffing, but the author determined that it would be best to limit the research for this paper to the confines of the fire service.

Next, it should be noted that the four-year window of data retrieved from the North Ridgeville Emergency Reporting System was the best available for the research being conducted. Previous year's data was not nearly as in depth, defined, or broken down for study as the ERS information found between the years of 2014-2017. Other electronic reporting software products that currently exist on the market such as Sansio, Sundance, and EMS Charts are capable of providing similar types of data collection aspects to their users, but often times, these come at a monetary cost to the department utilizing the software. In the case of the North Ridgeville Division of Fire, the equivalent of a premium ERS package had been purchased and put into use by the department, thus allowing the in-depth collection of the data found within this document.

Previous years of information were recorded by hand within the department so the data was not found to be highly reliable for research. It would have been ideal to go back to the 2007 benchmark of when the NRDF first implemented their two-person, secondary medic unit, but the data on-hand could not be relied upon for accuracy, whereas the ERS data was significantly more reliable.

With regards to the evaluation and use of the NIST Report on Residential Structure Fires, it should be noted that there is a tremendous wealth of data contained within the document and it could be extremely useful for anyone conducting a comparison study of the effectiveness of two,

three, four, and five-person first arriving fire apparatus. Despite the strong evidence that four and five-person engine companies should be the industry standard for structural firefighting, the limitation here was that this was not a realistic expectation for this research project since the NRDF only responds with two and three-person apparatus. The full contents of the NIST report were significantly trimmed down to only mirror the response capabilities of the North Ridgeville Division of Fire.

Finally, the survey that was sent out was limited in scope to the departments that fit the following fire service categories:

- a) The department was within northeastern Ohio, thus limiting the survey to fire departments within the same professional market as the NRDF.
- b) The department being surveyed had to be staffed completely by fulltime line personnel, and not a combination or volunteer organization. This would meet the employment level of the NRDF.
- c) The department had to have an overall staff level between 25-45 members, meeting the employee level of the NRDF.
- d) The department had to provide an EMS service with patient transport capabilities, just as the NRDF does.

These caveats narrowed down the field of recipients for the survey but it did provide a focused look at fire departments located in the same region as the North Ridgeville Division of Fire. This was a mere snapshot of departments when compared to the number of surveys that could be sent out on a state or national level, but it was felt that keeping the focus of this study on the same economic region as the NRDF would be much more beneficial when seeking to find solutions to the research questions set forth in this product.

Finally, it must be noted that in July of 2018, the North Ridgeville Division of Fire withdrew its membership from the WESHARE organization after 23 years of membership. The department's resignation from the group resulted in a change in medical direction to a single hospital system, versus the two hospital systems that have been the basis for WESHARE. The reciprocating mutual aid agreements with surrounding communities for emergency responses are still in effect however, as is continued membership in the WESTCOM regional dispatch center. Though this is technically not a limitation of this study, as the membership of the department in this organization had no bearing on the research being conducted, the author felt it was essential to divulge this information for anyone conducting further research related to this topic.

RESULTS

The purpose of this study was to search out answers to three specific questions related to the North Ridgeville Division of Fire. Those three questions were: 1) What is the current staffing model of the North Ridgeville Division of Fire? 2) What is the effect, if any, of the current staffing model on the citizens of North Ridgeville? 3) How do some departments similar to the North Ridgeville Division of Fire staff and deploy their fire and EMS services during peak hours of operation?

To answer the first question, it has been established throughout this document that the North Ridgeville Division of Fire has worked within the same staffing model for over a decade, which is to say that since 2007, the department's three shifts have had a compliment of 11 personnel each. Each shift consists of a captain and two lieutenants making up the command group, with the senior of the lieutenants in command of fire station two. The shift is then filled-out with eight dual-role firefighter/paramedics, bringing each shift's strength to a total of 11. However, three staff members are permitted to be off each duty day (Ohio SERB, 2018) thus bringing the daily staffing model down to eight personnel (two officers and six fire/medics) 96% of the time during the four-year window of this study (ERS, 2014-18). Of these eight remaining staff members on-duty at the beginning of each shift, three of them (one officer and two fire/medics) are assigned to fire station two, thus causing the staffing at fire station one to fall to a minimum of five personnel (one officer [the captain or a lieutenant] and four fire/medics).

Once crews have been posted to their appropriate stations, the company officers assign these personnel to conduct their duties while working within a jump company configuration (NRDF Operations SOG, 2015, p. 1-2), with station one providing either a frontline/first-out fire apparatus or paramedic ambulance staffed by three personnel, and a secondary medic unit

(SMU)/back-up engine crew of two personnel, meant to respond to lower acuity EMS patients and fire-related situations such as odor investigations and open burning complaints (WESTCOM, 2007). The remaining three shift members located at station two also work in the jump company configuration, splitting their duties between staffing another frontline/first-out paramedic ambulance, or the department's sole aerial apparatus.

In regards to question two, it was found through the course of the research that the current staffing model of the North Ridgeville Division of Fire has had an effect upon the citizens of North Ridgeville. The level of response by elements of the department to the cities growing population (Lorain County Auditor, 2017) and the increasing demands for emergency services by that population (ERS, 2014-2018) has shown that overlapping call volume has become a major obstacle to the current staffing model utilized by the department. With nearly twenty-five percent of the departments emergency call volume occurring simultaneously (ERS, Overlapping Responses by Unit, 2018) it has become necessary for the two-person SMU/back-up engine to respond numerous times outside of the designated roles that were set forth for it (WESTCOM Dispatching Matrix, 2007) when this concept was initially put into service in 2007.

The issue of the two-person crews responding to higher acuity medical emergencies has been complicated by this team awaiting the arrival of a distant frontline/first-out ambulance from station two, or a mutual aid EMS unit's arrival to either assist with care or to transport the patient after the back-up unit has initiated patient contact. As for moderate-to-major level fire emergencies specifically, a two-person response has been evaluated in the National Institute of Standards and Technology (NIST) Report on Residential Structure Fire (NIST, 2010) which has established 22 essential tasks that need to be completed upon arrival at a residential structure fire. This study has shown that a two-person engine crew has been found to work five, to seven

percent slower in accomplishing these 22 tasks than a three-person engine crew, and a whole thirty percent slower than a four or five-person compliment on an engine.

In order to gain a better perspective on the possibility that the current departmental staffing model could potentially have an effect on the citizens of North Ridgeville, an interview took place with NRDF Chief John C. Reese, EFO, regarding such dangers (J. Reese, personal communication, November, 16, 2017). The questions utilized for this interview can be found in Appendix 2 of this document.

The interview question that most related to this specific research question was interview question six where Chief Reese was posed the following:

Fortunately, there have not been any recorded incidents to date where the two-person crew is the sole responding unit to a major structure fire or incident within the city. The data from ERS shows that either frontline units were able to get into service quick enough to respond, or a mutual aid department has been available to assist. With this in mind, have you ever felt that when these instances arise, that the department is essentially “rolling-the-dice” so-to-speak, in hoping that support will be responding to assist the back-up crew when it responds to a large-scale incident?

Chief Reese replied with the following statement (J. Reese, personal communication, November 16, 2017):

“There have been an awful lot of what I would classify as ‘near-miss’ events over the course of the past three or four years where we have literally ‘dodged a bullet’ by having our frontline units engaged in operations elsewhere when a higher level emergency call comes in that we are only sending the SMU/Back-up unit to. We have been fortunate that the frontlines (first out fire or EMS units) have been able to clear from their scenes quick enough to respond with the

SMU/back-up so that we would have enough staffing at that latest event in order to handle that emergency, and when our people were not available, our neighboring departments have been able to assist with mutual aid responses”.

Reese continued to say that:

“The problem we are facing comes from us testing our luck continuously with this current staffing model. I sincerely hope that we can avoid any such event that jeopardizes our citizens by sending a minimally staffed unit to their emergency, but until I can get the administrations cooperation, we are still going to have to respond in this manner”.

With the information that has been gathered from multiple resources and industry best practices, it can be interpreted through the research conducted that there has been an increased risk to the citizens of North Ridgeville over the past several years due to the department’s current staffing model.

Research question number three was established in order to ask how departments similar in size to the North Ridgeville Division of Fire staff and deploy their fire and EMS services during peak hours of operation. In order to answer this question, a survey was compiled and sent out to the members of the Northeast Ohio Fire Chief’s Association. The method by which these recipients for the survey were chosen has been explained in detail in the Procedures and Limitations sections of this instrument, and the full results of the survey can be found in Appendix 5.

To summarize the focus group of the survey, 45 respondents participated from departments within northeastern Ohio. Each of the departments consisted of only fulltime line personnel ranging in size from 25-45 members. Additionally, each department had to provide an EMS service with patient transport capabilities. With all of these caveats in place, the respondent

group mirrored the operational and staffing capabilities of the NRDF.

With five respondents stating that they staffed in the same manner as the NRDF (Appendix 5), and another five respondents answering that they responded to approximately the same volume of calls as the North Ridgeville Division of Fire (Appendix 5), it was then established that 24 of the respondents (53.33%) replied that they staff frontline/first due emergency response apparatus such as EMS ambulances and fire engines with three personnel, just as the NRDF does (Appendix 5), yet the results of survey question six showed that despite the three member responses mentioned above, 41 respondents (91.11%) still had some units responding to emergencies with only two personnel onboard them (Appendix 5).

Surprisingly, it was found from survey question seven that 33 of the 45 respondents (74.33%) utilize the jump company configuration model that the NRDF uses daily for their response model. Additionally, it was found that 26 respondents (51.78%) realized that their department has recognized an issue regarding their response to emergencies during their peak hours of call volume, just as the NRDF has, but only four departments have managed to staff their services with additional personnel during those recognized time frames (Appendix 5).

This survey shed a great deal of light upon the fact that many services located within the same geographical arena as the North Ridgeville Division of Fire, respond to both EMS and fire related emergencies in similar manners. The survey also brought to light the fact that many of these departments have recognized that they too are facing issues regarding their staffing models during their peak hours of call volume, yet less than ten percent have managed to staff their services with more personnel during those identified periods of time throughout the day.

DISCUSSION

The information gathered during the course of this research project indicates that the North Ridgeville Division of Fire is in need of a reconfiguration of its current staffing model in order to better meet the ever increasing demands for service that have been placed upon it by the community. The true question appeared to be how to best meet those needs for service appropriately, and possible solutions for this can be found in the Recommendations section of this product.

The literature review provided a great deal of information in that it established a commonality between the NRDF's peak hour staffing issue with those of the referenced resources. Starting with the works of Olson (2006), a pathway was shown regarding the implementation of a peak hour staffing model, and how such a measure could be of use in providing a third crew member to the NRDF's secondary medic unit/back-up engine so that the recommendations of both the NIST Report of 2010 and NFPA 1410 (2015) could more effectively be met, at least during the department's recognized hours of increased call volume.

With the works of Mustafa (2009) it was learned that the Seminole County, Florida, Fire Department, had already addressed their peak hour staffing problem in a successful manner, and that they were in the process of reevaluating the program. The expectation of Mustafa's work (2009) revolved around expanding that service into other districts in order to meet the additional demands for service throughout that county. This reference applied directly to the NRDF in the sense that it showed a program that had not only been established based upon similarly recognized staffing and deployment problems, but that it gave a direction in which to add staff in order to meet the needs of a growing population during those hours in which requests for service were at their peak, and staffing was at a premium.

Additionally, Mustafa (2009) went on to show that it was a necessity to continually reevaluate the response area of the department and the success or failure of the current deployment model in order to learn how the service needed to make adjustments. By becoming more flexible concerning the deployment of the peak hour staffing units, the changing needs of the community could be better met. The North Ridgeville Division of Fire has already taken this theory into account by adopting a method for service response evaluation by regularly tracking this data through the Emergency Reporting System (ERS) which has proven indispensable not only to the department, but throughout this research project. However, unlike Mustafa's work (2009) the NRDF has not yet been able to make any adjustments to their current staffing model thus far.

The data that has been culled through the ERS software for the period of this study (ERS, 2014-2018) has shown that the NRDF is facing an ever increasing need to place an additional three-person crew into the frontline/first due service role in order to provide a consistent response to emergencies within the community. In much the same way that Curtis (2011) utilized his department's Firehouse software to delve into the data for the Granville Township Fire Department, this author was able to retrieve a great deal of information from ERS that established the time frames in which the NRDF's emergency responses were most susceptible to compromise. It was through this data collection that the problem of overlapping call volume was recognized and investigated further.

As stated in the literature review regarding overlapping calls, it was found that the department's two, frontline/first due three-person jump companies were encumbered on emergency calls simultaneously seventy-five percent of the time, leaving the two-person secondary medic unit/back-up engine to respond to all levels of emergency calls throughout the

city twenty-five percent of the time. This form of two member response provides the basis for a possible reconfiguration as it does not follow those recommendations set forth in the NIST Report (2010) or NFPA 1410 (2015) that were studied. Additionally, by responding to all levels of emergencies with this two-person unit, the data has shown that there becomes a lack of consistency in the level of service that a North Ridgeville citizen receives by one-third when compared to the citizen who benefits from the three-person response crew.

Additionally, it was found that when the two-person crew was dispatched to an emergency that was outside of their normal response guidelines (WESTCOM Dispatching Matrix, 2007), a mutual aid unit from a surrounding community had always been available for dispatch in order to support them, placing a burden upon North Ridgeville's surrounding communities and draining those communities of their resources. Though this is, of course, the purpose of reciprocating mutual aid agreements between communities, this author's survey of the Northeast Ohio Fire Chief's Association (NEOFCA) (Appendix 5) showed that over ninety-three percent of the respondents were quick to utilize mutual aid when all of their assets were encumbered, proving that there is a reliance throughout this region upon outside assistance to mitigate this problem.

The one person responsible for finding the best solutions to the recognized problems of peak hour responses and overlapping call volumes for the North Ridgeville Division of Fire is Fire Chief John Reese (EFO). During the interview this author conducted with the Chief (J. Reese, personal communication, November 16, 2017) it was established that bringing personnel on-board to staff during peak hours of the day could be a method to correct the current needs of the department in the short term, but it would not be the long term solution that he believes the department is in need of. Reese's request for a staffing level increase from the current 11 crew

members, to 13 personnel per shift, (Reese, Report, 2014) leveraged his understanding of the response model issues within the department against the continued rise in calls for service. The addition of those crew members would have provided the department with three complete jump company crews staffed by three personnel each day, around-the-clock, establishing consistent responses to all dispatched emergencies, and further meeting the needs of the community.

In summary, the results of this research project have shown that the North Ridgeville Division of Fire has reason for concern regarding its current model of staffing and deployment to emergencies within the community. Though the department competently provides an adequate response to the citizens of North Ridgeville, there still exists a gap in providing consistent levels of service on every response at all hours, every day. With nearly fifty-eight percent of the NEOFCA survey respondents stating that they have recognized similar peak volume trends within their departments (Appendix 5), the NRDF has arrived at a point where some form of action should be evaluated in order to make changes that are lasting, rather than temporary in nature.

RECOMMENDATIONS

The effectiveness and efficiency of the North Ridgeville Division of Fire's staffing and deployment, especially in the face of ever increasing peak hour call volume and overlapping responses, has been a subject lying in the back of the minds of all of the department's leadership and members for at least the past five years. The research conducted throughout this study has, in effect, now moved this topic to the forefront of everyone's thinking as an issue in need of a positive and responsible solution that best fits the needs of the NRDF, the citizens of North Ridgeville, and the surrounding communities that are affected by this issue.

With the research found in the literature review, the departmental data collected through the ERS system, and a productive conversation with the Chief of the department, this author has arrived at four possible recommendations. Hopefully, one or more of these solutions may be beneficial in helping the NRDF to solve the current problem of finding the most effective and efficient use of their resources in order to prevent delays in response, over utilization of mutual aid, prolonged response times, and other problems that are leading to avoidable injuries, property loss and even loss of life, especially during peak hours of call volume. The following recommendations are listed in order of what this author believes to be of the least benefit to the department in solving their problem, to the most beneficial.

1. The NRDF could do nothing at this time in order to adjust their current staffing model for the secondary medic unit and back-up engine either during peak hours of demand, or around-the-clock. If this choice was to be made, the department should, at the very least, continue to monitor and reevaluate this issue in the future. This reevaluation could potentially be conducted under a further research initiative, but minimally

should be a subject that is reevaluated annually. This recommendation is cited as the least beneficial as it does little, to nothing-at-all, to actually correct the current staffing model which has already been proven to be problematic to the NRDF and the citizens that they are sworn to protect, as shown though this study.

2. The department could provide an additional firefighter/paramedic to the staff solely during the peak hours of demand recognized in this study which are 0800-2200 hours daily. This additional fire/medic would be assigned to the secondary medic unit and back-up engine jump-company exclusively, rounding those units out as three-person crews during those designated hours.

The method of providing this fire/medic could come in the form of part-time employees that would be on duty during the designated hours of volume. These personnel could fill the vacant, third-crewmember position on the existing two-person units. However, in order for this recommendation to occur, serious discussions would first need to take place between the department's management team, the city administration, and the membership of the IAFF Local 2129 that represents the current fulltime line staff of the department since part-time employees are not provided for in the current CBA.

Additionally, these part time employees would have to be trained and brought up to the department's standards of patient care and be familiarized with NRDF fire ground operations in order to fully function as a member of the team. This effort could, unfortunately, take valuable time to complete. The benefit however, is that over the course of time, this action could provide for the closure of the peak hour/overlapping call volume service gaps that currently exist. Also, once the part time personnel are

functioning efficiently and effectively, they could receive preferential consideration for future vacant fulltime positions within the department upon fulfilling North Ridgeville Civil Service requirements.

3. The third potential recommendation is that the department could utilize currently employed fire/medic's that would work overtime to fill the vacant third-crewmember position on the back-up engine and SMU during the recognized hours of peak volume. This option provides a fully trained employee that can be immediately utilized and who is familiar with all departmental protocols and operations, thusly creating an effective and efficient three-person jump company during the recognized period of need. The only foreseeable problems with this recommendation revolve around the potential cost that the department would incur in order to correct the staffing and deployment problem that has been noted in this study, and the potential "burn-out" from staff members working a continuous and necessary, overtime loop.
4. This recommendation is what has been found to be the optimal solution to the staffing and deployment problem recognized by the NRDF, as it addresses both the peak hour call volume issue, as well as the department's ability to dispatch appropriately staffed apparatus to fire and EMS emergencies in a consistent manner. Additionally, this recommendation meets Chief Reese's desire to staff the back-up units with three personnel at all times in order to provide around-the-clock coverage to the city, instead of coverage during a limited window of time.

This recommendation suggests that the City of North Ridgeville look into the feasibility of hiring three additional fulltime firefighter/paramedics to the department, and to send one of them to each of the three shifts thus bringing the daily minimum

staffing up to nine personnel, and creating three, fully functioning, fire and EMS jump companies 24 hours-a-day, each and every day of the year.

As a final action, the SMU/Back-Up Engine response plan that currently exists in the WESTCOM dispatching response matrix could be eliminated in its entirety and an addendum could be added reflecting the addition of another fully-staffed jump company for emergency responses.

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**APPENDIX 1 – EMERGENCY REPORTING SYSTEM REPORT MODULES
UTILIZED FOR RESEARCH**

- 1) Top 20 Reports
 - a) Breakdown of Major Incident Types or Date Range
 - b) Incident Statistics
 - 1) Incidents per Hour for Incident Range for Date Range
 - c) Incident Count for All Calls (All Statuses) for Agency for Date Range
 - d) Incidents per Zone for Date Range
 - e) Incidents by Year for Year Range
- 2) Incidents
 - a) Aid
 - 1) Count of Aid Given and Received for Incidents for Date Range
 - b) Call Volume
 - c) EMS
 - d) Fire
 - e) Incident Types
 - 1) Incidents per Hour for Date Range
 - 2) Count of Overlapping Incidents for Station by Date Range
 - f) Response Times

APPENDIX 2 – INTERVIEW QUESTIONS FOR CHIEF REESE, 11/16/2017

1) When the NRDF went to a centralized dispatch center in 2007, and three more personnel were hired allowing for the implementation of the two-person back-up unit, was there a long term plan at that time to reevaluate this initiative in the future for effectiveness, and if so, what were the results?

2) Did you anticipate the rapid population growth and building construction across the city that has occurred over the past decade and how it might affect the department operationally?

3) Are you satisfied with the way that the secondary medic unit/back-up engine concept has performed since it was put into operation in 2007?

4) Has the drastic climb in calls for service been a surprise to you, or did you anticipate a certain percentage of growth for each year?

5) What are your thoughts on the fact that the two-person back-up crew is responding to more and more calls that are intended for the frontline units due to the increased demand for service within the community and by neighboring community's fire services?

6) Fortunately, there have not been any recorded incidents to date where the two-person crew is the sole responding unit to a major structure fire or incident within the city. The data from ERS shows that either frontline units were able to get into service quick enough to respond, or a mutual aid department has been available to assist. With this in mind, have you ever felt that when these instances arise, that the department is essentially "rolling the dice" so-to-speak, in hoping that support will be responding to assist the back-up crew when it responds to a large-scale incident?

7) ERS data has shown that there are peak hours of service daily where nearly all of the department's assets are out providing service to the public. This window of time is roughly 10-12 hours in duration. With this information, have you considered implementing peak hour staffing on the back-up units during these windows of time?

8) Naturally, your preference to solve the staffing issue for the SMU/back-up unit is to increase staffing on each shift by one person (for a total of three) around the clock in order to create three full companies at all times. Could you tell me what you believe are the positives and negatives of hiring fulltime personnel as opposed to peak hour staffing personnel?

9) In your time as Chief, you have placed an emphasis on shift personnel being "task oriented" when on any emergency in order to be more efficient with the resources on hand. Additionally, you have directed the training division to focus on the 22 tasks of firefighting set forth in the NIST report and NFPA 1410. With NRDF crews working as efficiently as possible, whenever possible, have you addressed the need for additional staffing with the city administration, and if so, what has their reaction been?

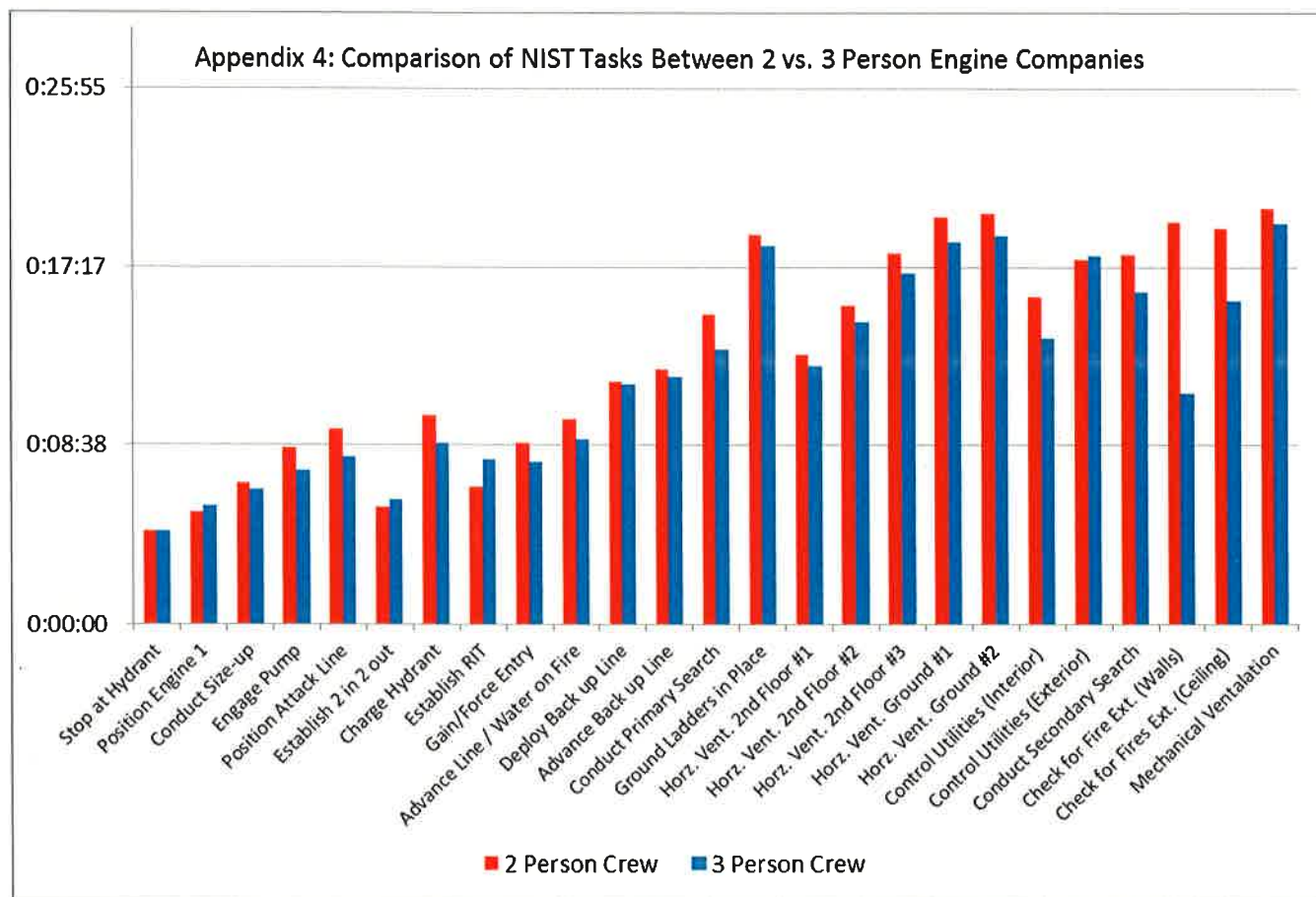
10) If you were able to correct the current staffing issue as it relates to the two-person crew through either peak hour staffing or fulltime personnel, how long do you believe it would take before the department's three, three-person crews would not be able to efficiently handle future increased demands for service?

11) Finally, what is the "big picture" plan for the future staffing and growth of the NRDF as you see it now?

APPENDIX 3 – NIST 22 ESSENTIAL FIREGROUND TASKS

- 1) Stop apparatus at hydrant and wrap hose for layout
- 2) Position Engine #1
- 3) Conduct Size-Up: 360 Degree lap, transmit report, and establish command
- 4) Engage pump on Engine #1
- 5) Position attack line
- 6) Establish 2-in/2-out
- 7) Charge hydrant and supply Engine #1 (attack engine)
- 8) Establish RTT
- 9) Gain/Force Entry
- 10) Advance line / Put water on fire
- 11) Deploy back-up line
- 12) Advance back-up line to interior (stairwell or hallway)
- 13) Conduct primary search
- 14) Put ground ladders in place
- 15) Horizontal ventilation (Division 1)
- 16) Horizontal ventilation (Division 2)
- 17) Control utilities (interior)
- 18) Control utilities (exterior)
- 19) Conduct secondary search
- 20) Check for fire extension (walls)
- 21) Check for fire extension (ceilings)
- 22) Mechanical ventilation

APPENDIX 4 – NIST TASK COMPARISON OF 2-VS-3 PERSON ENGINE COMPANIES

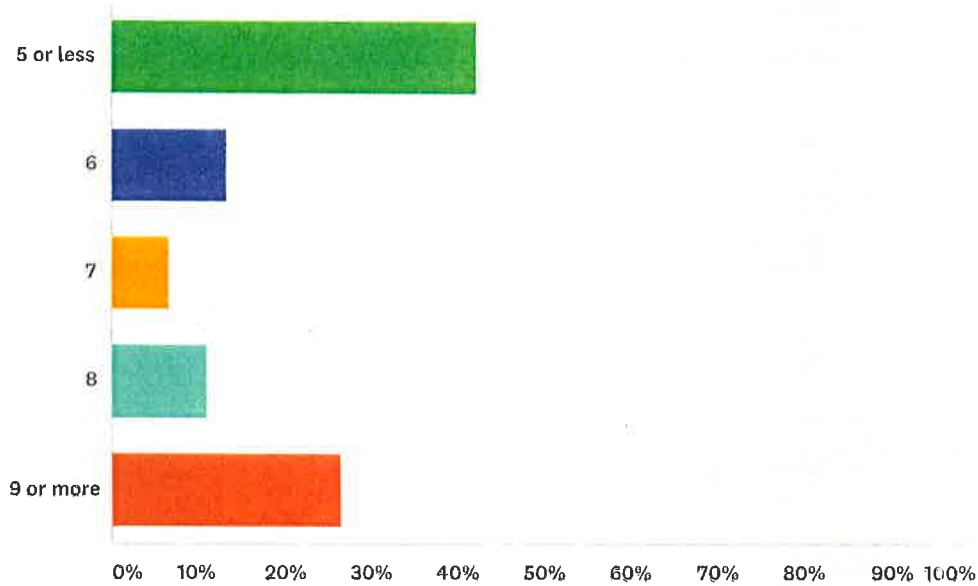


APPENDIX 5 – RESULTS OF STAFFING AND DEPLOYMENT SURVEY

The following 15 pages show the entire survey, question-by-question, with corresponding results. Where a reply option was provided, the replies are listed below the survey results.

Q1 What is the minimum number of people that are assigned to emergency response positions within your fire/EMS service during a 24 hour shift?

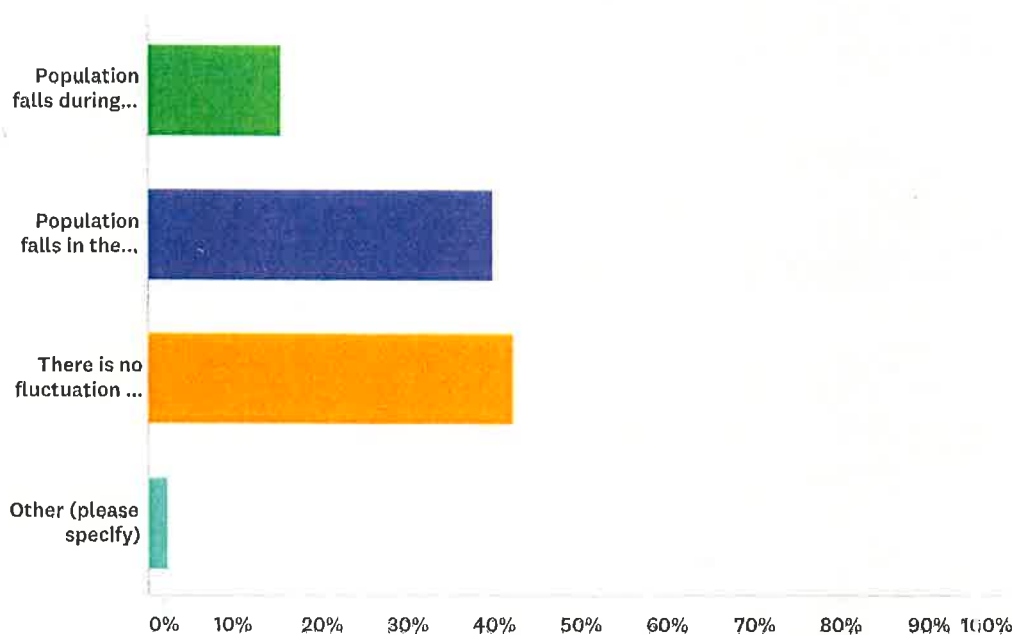
Answered: 45 Skipped: 0



ANSWER CHOICES	RESPONSES	
5 or less	42.22%	19
6	13.33%	6
7	6.67%	3
8	11.11%	5
9 or more	26.67%	12
TOTAL		45

Q2 The population size of a community can rise and fall with its residents commuting to-and-from work or school daily. Which of the following best describes your service area?

Answered: 45 Skipped: 0



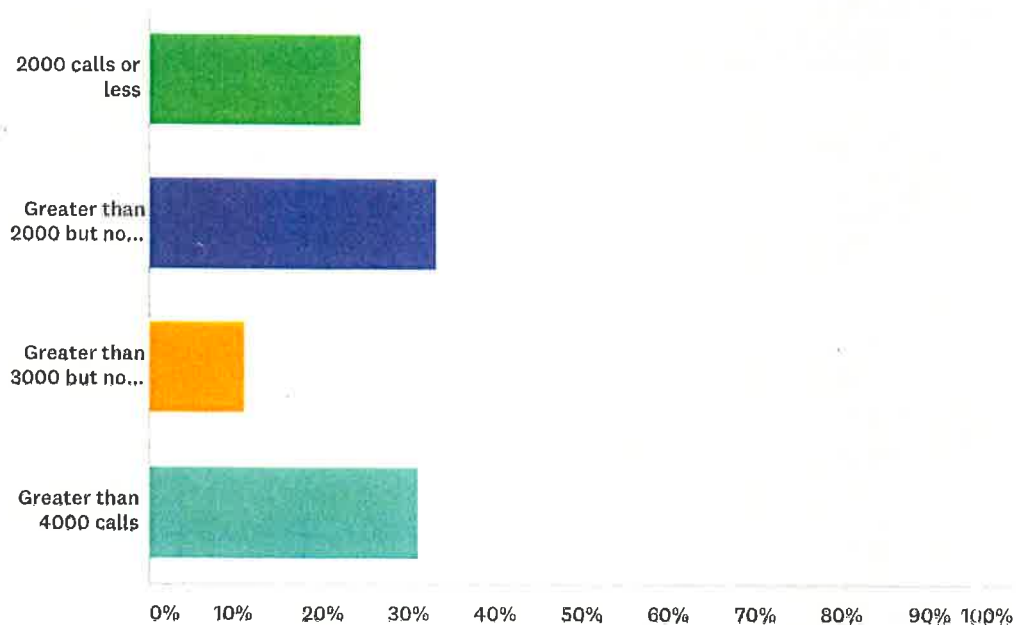
ANSWER CHOICES

RESPONSES

Population falls during the day but rises in the evening	15.56%	7
Population falls in the evening but rises during the day	40.00%	18
There is no fluctuation in the daily population	42.22%	19
Other (please specify)	2.22%	1
TOTAL		45

Q3 Counting only 911 fire and EMS responses, what was the average call volume each year for the last four years (2014, 2015, 2016, and 2017) of your service?

Answered: 45 Skipped: 0



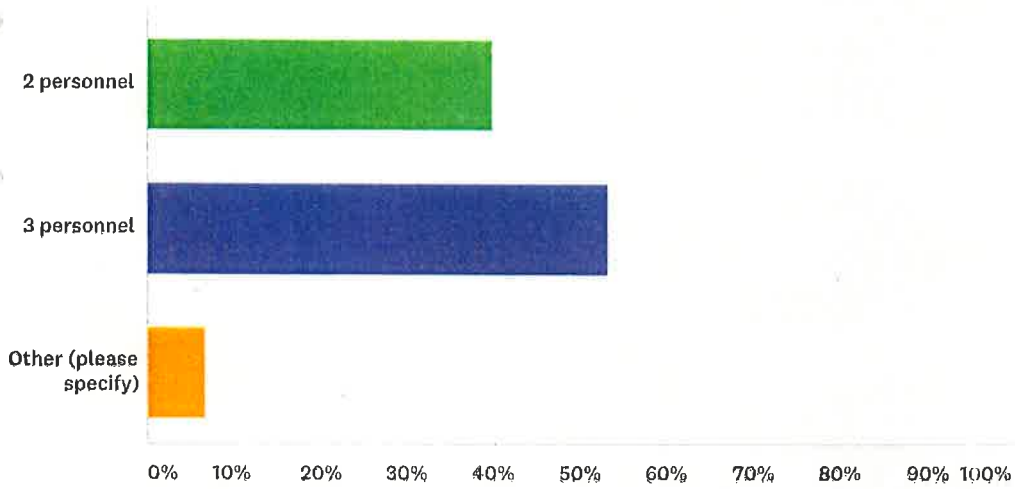
ANSWER CHOICES

RESPONSES

2000 calls or less	24.44%	11
Greater than 2000 but no more than 3000 calls	33.33%	15
Greater than 3000 but no more than 4000 calls	11.11%	5
Greater than 4000 calls	31.11%	14
TOTAL		45

Q4 How many personnel typically respond on a frontline/first out ALS ambulance when it is dispatched?

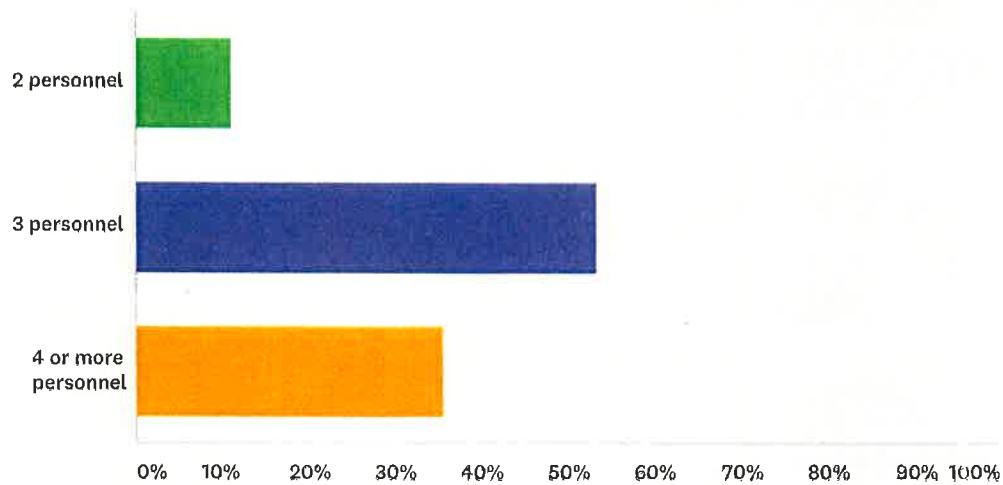
Answered: 45 Skipped: 0



ANSWER CHOICES	RESPONSES	
2 personnel	40.00%	18
3 personnel	53.33%	24
Other (please specify)	6.67%	3
TOTAL		45

Q5 How many personnel typically respond on a frontline/first out fire engine when it is dispatched?

Answered: 45 Skipped: 0



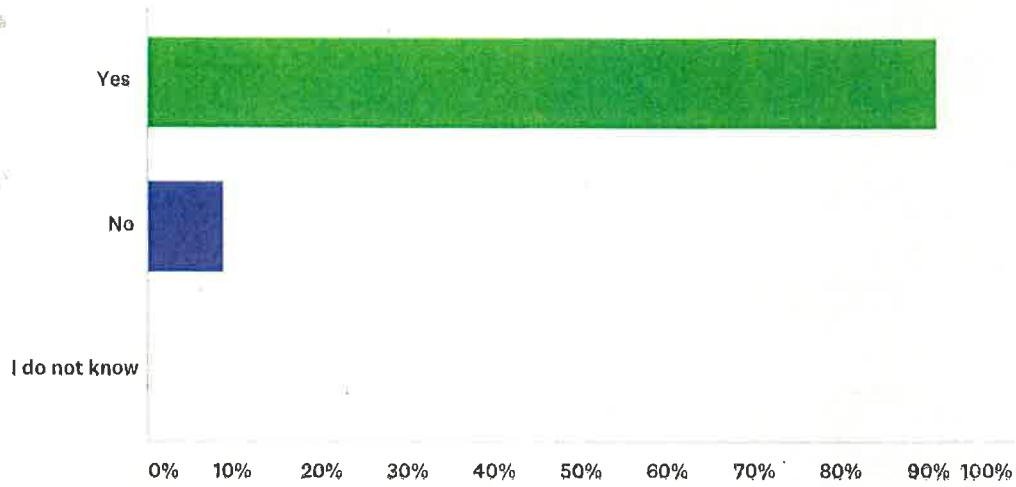
ANSWER CHOICES

RESPONSES

2 personnel	11.11%	5
3 personnel	53.33%	24
4 or more personnel	35.56%	16
TOTAL		45

Q6 Does your service ever respond with only two (2) personnel on an apparatus to any 911 emergency call?

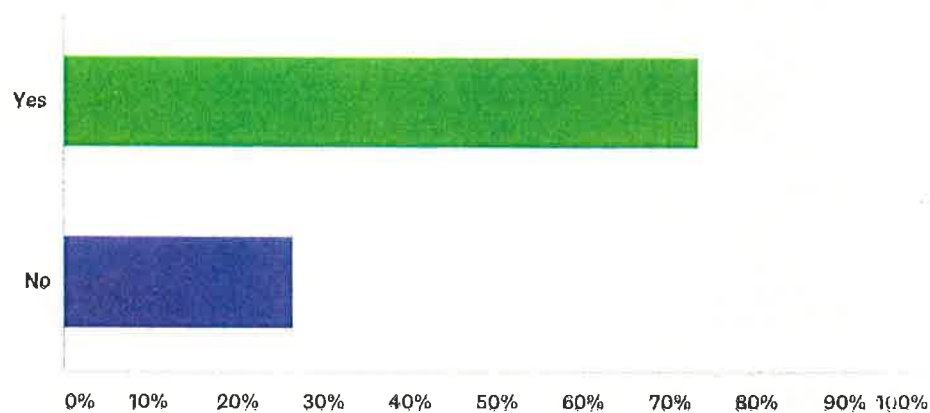
Answered: 45 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	91.11%	41
No	8.89%	4
I do not know	0.00%	0
TOTAL		45

Q7 The term "Jump Company" refers to a staffing configuration in which the personnel assigned to the frontline/first out fire engine are also assigned to the frontline/first out EMS ambulance. Depending on whether a fire call or EMS call is dispatched, the "Jump Company" crew responds on the appropriate apparatus to the emergency. Does your service deploy any frontline/first out assets in a "Jump Company" configuration?

Answered: 45 Skipped: 0



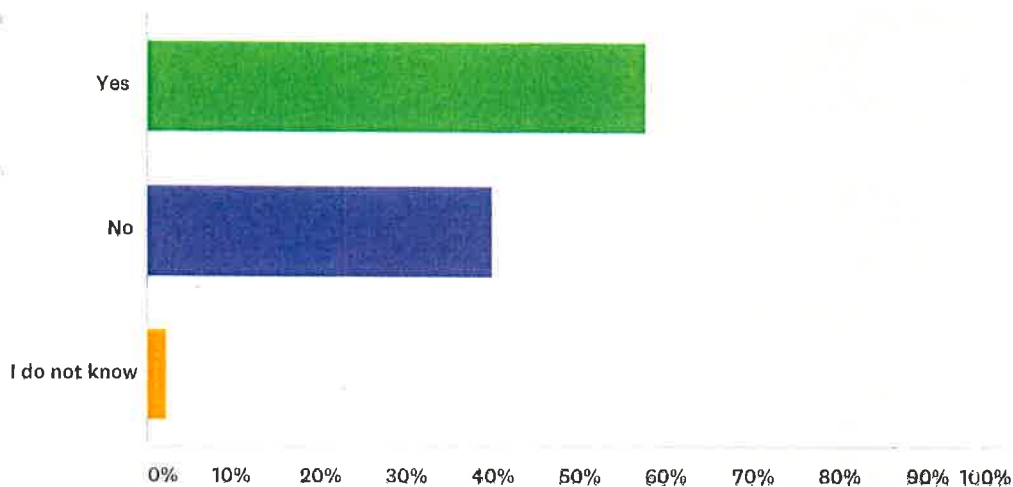
ANSWER CHOICES

RESPONSES

Yes	73.33%	33
No	26.67%	12
TOTAL		45

Q8 Has your fire & EMS service identified any peak volume or high volume trends over the past four years?

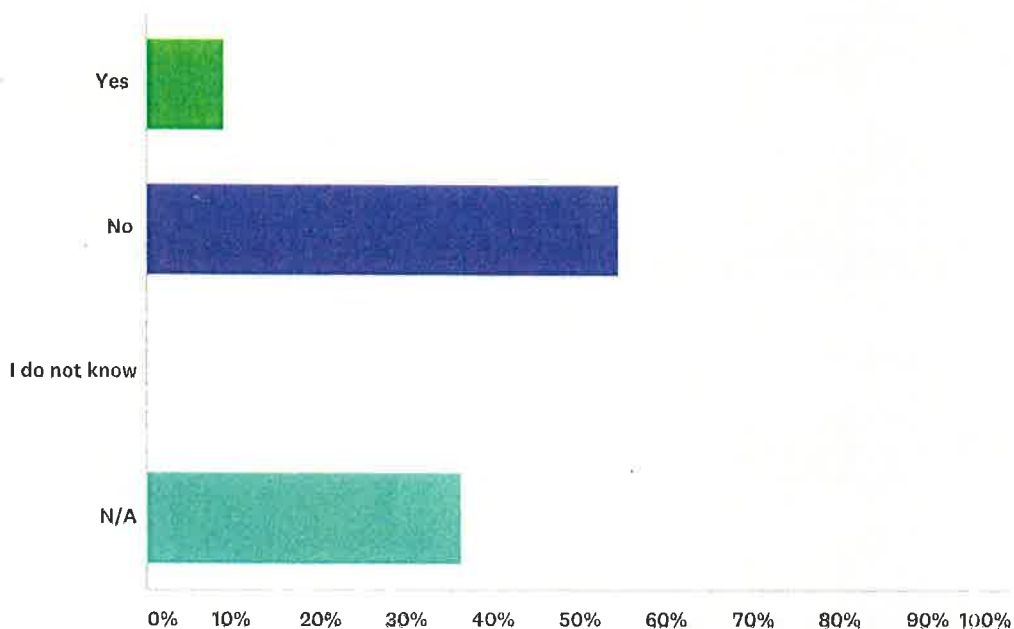
Answered: 45 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	57.78%	26
No	40.00%	18
I do not know	2.22%	1
TOTAL		45

Q9 If you answered "Yes" to Question 8, does your fire & EMS service modify its apparatus staffing during the high volume (busiest) times of the day to meet those needs? If you answered "No" to Question 8, please mark "N/A" below.

Answered: 44 Skipped: 1



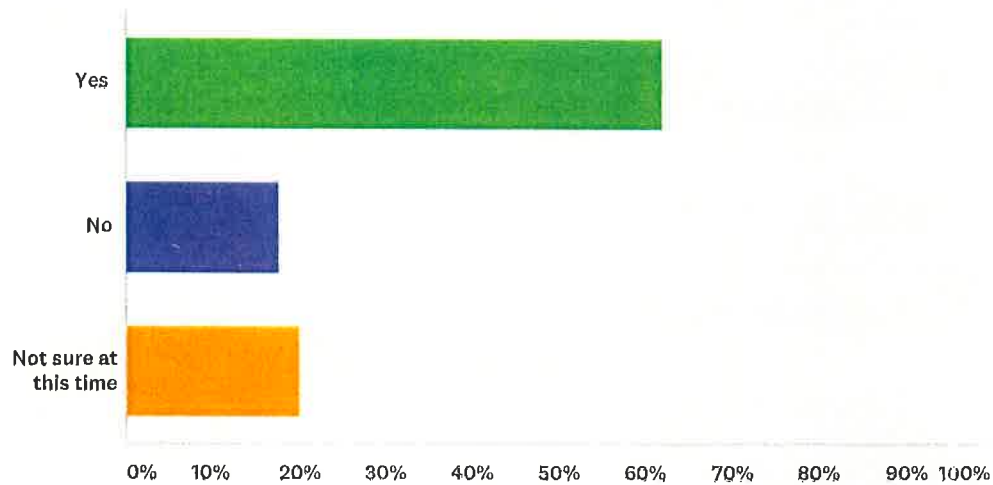
ANSWER CHOICES

RESPONSES

Yes	9.09%	4
No	54.55%	24
I do not know	0.00%	0
N/A	36.36%	16
TOTAL		44

Q10 Could there be a benefit to your department's response to emergencies by increasing staffing during peak or high call volume periods?

Answered: 45 Skipped: 0



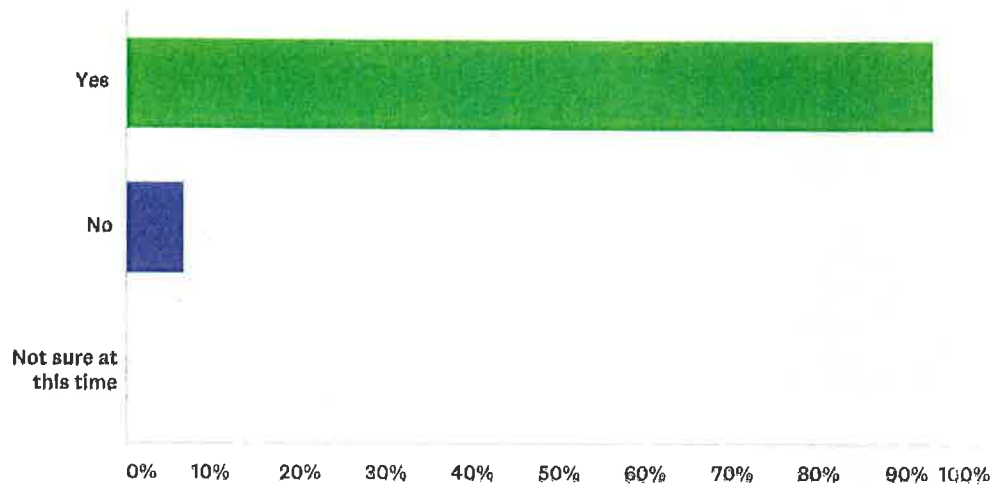
ANSWER CHOICES

RESPONSES

Yes	62.22%	28
No	17.78%	8
Not sure at this time	20.00%	9
TOTAL		45

Q11 Does your agency rely upon mutual aid when all of your on-duty crews are out on emergency calls?

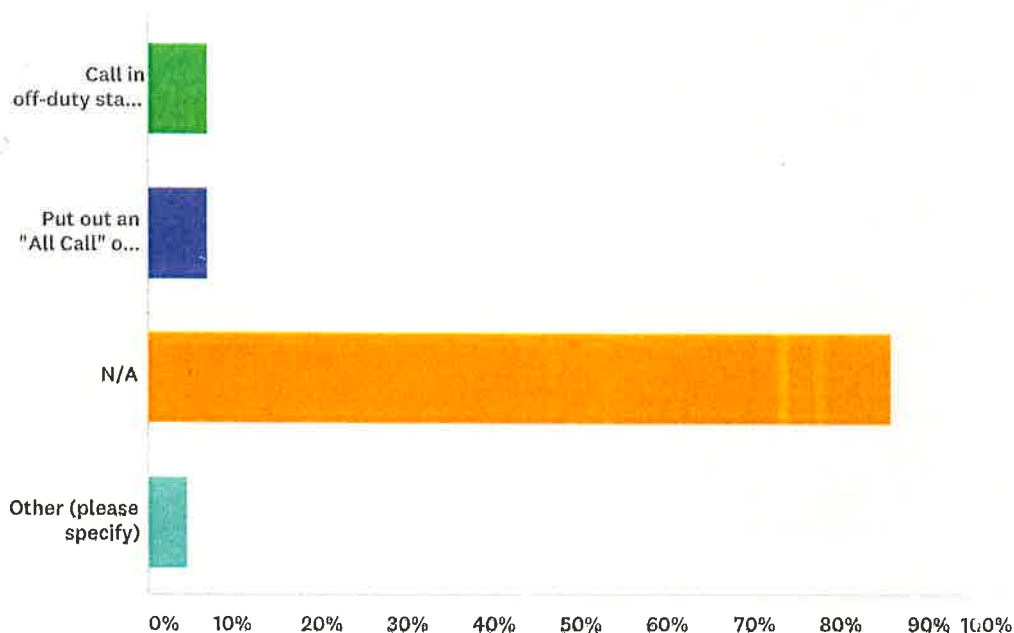
Answered: 45 Skipped: 0

**ANSWER CHOICES****RESPONSES**

Yes	93.33%	42
No	6.67%	3
Not sure at this time	0.00%	0
TOTAL		45

Q12 If you answered "No" to Question 11, what does your organization do to staff for the next possible emergency call(s) (check all that apply)?
If you answered "Yes", please mark "N/A" below

Answered: 43 Skipped: 2



ANSWER CHOICES

Call in off-duty staff from home

Put out an "All Call" or "General Alarm" for staffing

N/A

Other (please specify)

Total Respondents: 43

RESPONSES

6.98% 3

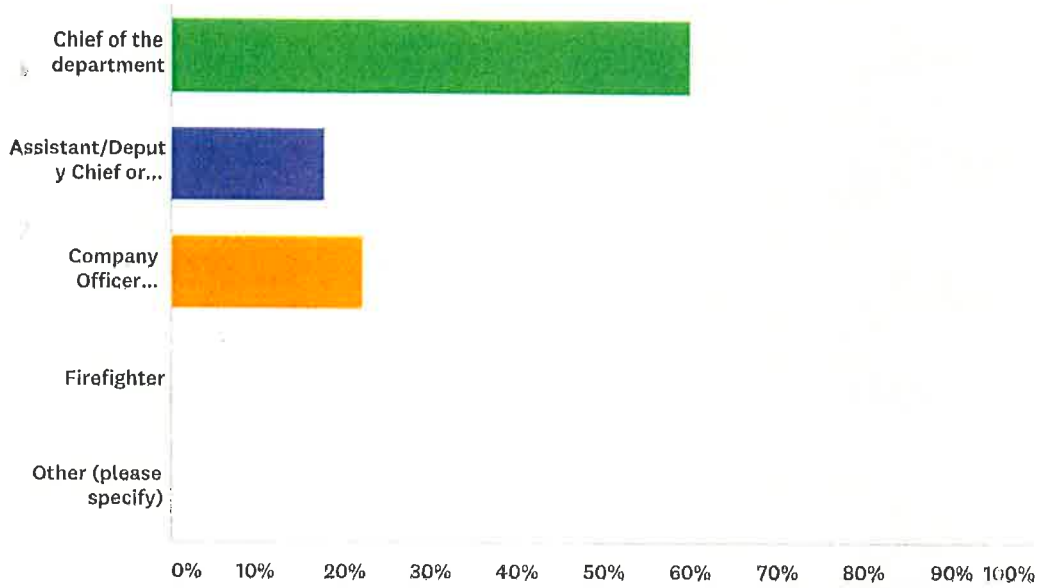
6.98% 3

86.05% 37

4.65% 2

Q13 What is your rank within your organization?

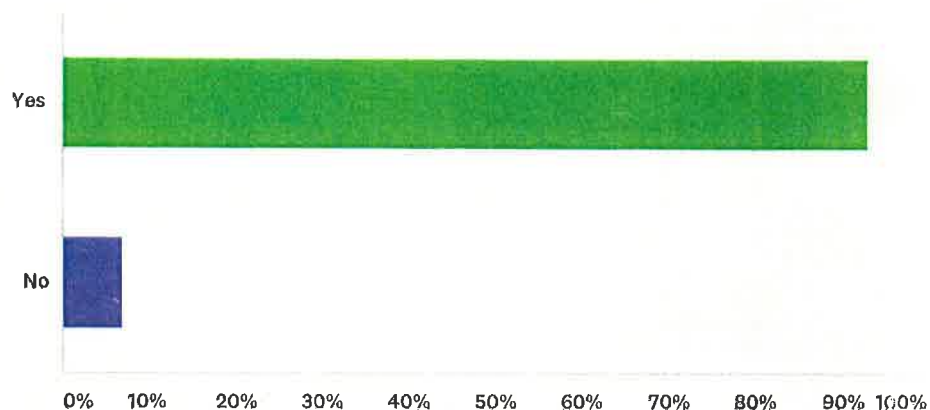
Answered: 45 Skipped: 0



ANSWER CHOICES	RESPONSES	
Chief of the department	60.00%	27
Assistant/Deputy Chief or Battalion Chief	17.78%	8
Company Officer (Captain or Lieutenant)	22.22%	10
Firefighter	0.00%	0
Other (please specify)	0.00%	0
TOTAL		45

Q14 If I have questions regarding your survey responses, may I contact you?

Answered: 44 Skipped: 1



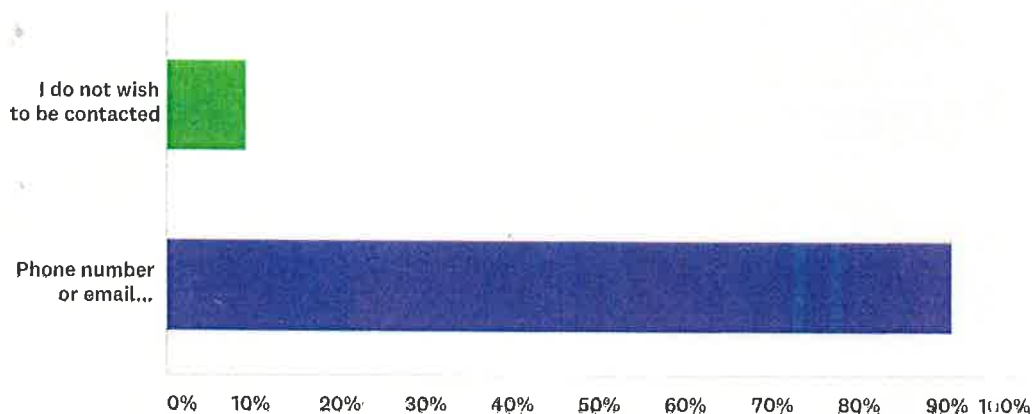
ANSWER CHOICES

RESPONSES

Yes	93.18%	41
No	6.82%	3
TOTAL		44

Q15 If "Yes" to Question 14, please provide an email address. If you answered "No", please select that you do not wish to be contacted.

Answered: 43 Skipped: 2



ANSWER CHOICES

RESPONSES

I do not wish to be contacted	9.30%	4
Phone number or email address:	90.70%	39
TOTAL		43