Determining Proper Response To Fire Alarms

Eugene Stoddart

Lodi Fire Department, Lodi, California

Certification Statement

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: 

Abstract

The City of Lodi Fire Department just changed their responses to fire alarms without any research and input from staff and is awaiting information to make an appropriate response model. The problem is the Lodi Fire Department cannot decide what resources should initially respond to fire alarms. The purpose of this paper is to decide what the proper response for fire alarms is. Descriptive mythology was used to answer the following research questions:

1. What are the problems associated with fire alarm responses?
2. What do other fire department's dispatch to fire alarms?
3. What dispatching alternatives are available to fire alarms?
4. Should the Lodi Fire Department alter their current response to fire alarms?

The procedures section included literature review and a survey that would assist in answering the research questions. The results found that the newly imposed call stacking for fire alarms was substantiated by comparing the risks of "Code 3" & "Code 2" driving vs. fire loss and the lowered risks to firefighters and citizens of Lodi. The recommendations to the Lodi Fire Department was to keep its current call stacking and for the NFPA and USFA to see the need of recommendations to assist in proper fire alarm response.

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Introduction

The City of Lodi Fire Department (LFD) is currently changing from police based dispatchers to full time fire dispatchers. During this transition the LFD is setting up the call stacking through the Computer Aided Dispatch (CAD). Call stacking allows the computer to automatically assign the proper equipment and personnel to emergency/non-emergency calls without the dispatcher needing to memorize what the fire department's needs are on scene. One concern that brought up much deliberation was, "How many fire department units need to respond to a fire alarm?" There were many great reasons to send what we currently do, and there were many great reasons why we should drop the amounts of units to fire alarms. The problem is that the LFD cannot decide what resources should initially respond to fire alarms. The purpose of this ARP is to decide what is the proper response for fire alarms.

Descriptive methodology will be used to answer the following research questions:

1. What are the problems associated with fire alarm responses?
2. What do other fire department's dispatch to fire alarms?
3. What dispatching alternatives are available to fire alarms?
4. Should the LFD alter their current response to fire alarms?

Background and Significance

The Lodi Fire Department (LFD) is currently staffed by 54 employees; 52 of them sworn. The LFD has four fire stations with each station staffing an engine; one station has a truck in addition to the engine. Throughout the department they currently keep one hazardous materials unit, heavy rescue trailer, public education safety trailer, and one brush truck. One major highway, one moderately loaded highway, union pacific railway, and one ten inch Kinder

Morgan fuel pipeline runs through the City of Lodi. The LFD has a group of special teams that are able to handle specialized incidents such as: hazardous materials spills, earthquakes, floods, and arson suspected fires. All of these skills are required to meet the citizen's need for any potential emergency that emerges within our average annual call volume of 6000. The City of Lodi is nestled within San Joaquin County and surrounded by grape vineyards and many other agricultural crops/orchards. A visit to Lodi would find a community that boasts over 70 wineries and a tourism industry that supports a tribute to wine. Located south of Sacramento and north of Stockton makes Lodi a nice location for many commuters, and those that want to live in a less populated city.

The background of this problem has arisen because of the high amount of fire alarms, the high percentage of fire alarms being false alarms, the risk to the public and firefighters driving code three, and the high cost of responding fire department apparatus. This study is significant to the LFD because many lives are put at risk each time the fire department responds to emergency calls. Other significant issues that arise when changing the call stacking is compliance with NFPA 1710 and the effect to the LFD Insurance Service Organization (ISO) rating. The importance of this problem has far reaching possibilities, but the research between NFPA 1710, ISO rating, and life safety will guide us towards an educated way to comply with all stakeholders. Lives (risks associated with response), property (possible delays of arriving apparatus), and the business environment (ISO rating affecting insurance rates) are at stake by the decisions that arise from this research.

This research project is related to the Executive Analysis of Fire Service Operations in Emergency Management (EAFSOEM) class because it correlates with the functions necessary to effectively manage the operational component of a fire/rescue department.

This study relates to the United States Fire Administration (USFA) goal number one, "Reduce risk at the local level through prevention and mitigation" by looking at ways to prevent unnecessary risk to the citizens and firefighters while weighing the possibilities of additional fire loss.

Literature Review

The literature review included many hours of research at the Learning Resource Center (LRC) located at the National Fire Academy (NFA) in Emmitsburg, Maryland during attendance of the Executive Development course in January/February 2015. Additional research and literature review continued post attendance through material obtained from the LFD library, Internet searches which provided additional up-to-date information throughout the research, and through information gathered through the results of surveys that were sent out.

The first electric fire sensors for use in commercial buildings was designed by William B. Watkins. Mr. Watkins developed a remotely monitored fire alarm system using heat detectors which were installed in 1873 by the Boston Automatic Fire Alarm Company. This fire alarm system sent the signal directly to the fire department and gave the location, which included the building and the floor (Moore, 2006).

The problem with false alarms became a storyline in the 1970's when people would activate call boxes when there was no fire, typically by juveniles in large urban areas. Out of these problems came public education messages, stakeouts, and greater use of voice-communication boxes, and then the removal of the call boxes. All of these acts began to subside because of the efforts of the cities actions. Beginning in the 1980's the rates of false alarms changed from malicious activations being the leading cause to the nuisance activation of automatic detection systems (Karter, 2013).

Statistics given by the NFPA since 1980 has shown the overall reported fire department calls through the National Fire Incident Reporting System (NFIRS) range from over 10 million calls per year in 1980, to a high of 16.1 million in 2012. Of these calls, false alarms have ranged from four to ten percent of total calls reported through NFIRS annually. Reported false alarms are broken down further under NFIRS by: Unintentional, Malfunctions, Malicious, and Other. Unintentional is when a device is tripped accidentally which accounts for 45% of false alarm calls, Malfunctions are when the device fails which accounts for 32%, and malicious is when an alarm is set off with intent setting an alarm when there is no actual alarm constitutes 8% of false alarms, and finally, other false alarms come in at 15%. One thing to note is that when a report of smoke, steam, or odor of a fire is reported, this is not a false alarm, rather, a good intent call (Karter, 2013). The LFD over the last five years has been very consistent averaging 5.5% of calls are false alarms.

Problems associated with fire alarms responses has been an ongoing issue within the fire service for decades. Over the past 10 years, 14 firefighter deaths have resulted from false calls, including malicious false alarms and alarm malfunctions. Looking at statistics since 1977, 17% of firefighter deaths were responding to or returning from alarms. (Fahy, LeBlanc, & Molis, 2015). Other problems associated with responding to fire alarms are units not being available for other emergencies and the costs of running emergency equipment. Battalion Chief Bennet from Harrisonburg Fire Department stated that the costs to the tax payer are anywhere from $300 to $600 per false alarm (Escobar, 2013). If the LFD were to use these costs for responding to false alarms, the annual costs would average between $83,000 and $165,000.

Apparatus are most likely to be involved in a collision when running “Code 3”, and with the statistics that such a high number of fire alarms are false, every response is not a true

emergency. By reducing emergency rate responses, we reduce the risk of collision (IAFF, 2010). Response to fire alarms varies greatly across United States fire departments. The biggest differences of response are mostly tied to the staffing level of the local jurisdiction. Common calls stacking for fire alarms range from no response until a confirmed call of an actual fire or smoke exist, to a full structure fire response. NFPA 1710 is the standard for the organization and deployment of fire suppression operations. The purpose of this standard is to specify the minimum criteria addressing the effectiveness and efficiency of the career public fire suppression operations, emergency medical service, and special operations delivery in protecting the citizens of the jurisdiction and the occupational safety and health of fire department employees. For structure fires NFPA 1710 allows four minutes or less for the first arriving engine company and/or eight minutes or less for the deployment of a full first alarm assignment at the fire incident (NFPA, 2010). NFPA 1710 does not require any fire department adopt if they implement the recommendation and there are no federal or state laws that mandate automatic local adoption of 1710.

NFPA does not specifically state what to respond to a fire alarm, only responding to what may be a fire. Alexander Lobeto brings up what standards does your department have for determining what type and how many fire apparatus should be sent to sites with activated fire alarms? A consideration of what to respond should include the ISO rating platform. Mr. Lobeto's fire department responds with a minimum of four personnel, which translates into two engines, thus, fulfilling an acceptable ISO response according to them (Lobeto, 1996).

A personal phone interview with Marsha Smith, an employee of ISO for 40 years shed light on what they currently inquire about when conducting a fire department inspection (M. Smith, personal communication, September 10, 2015). ISO has many areas of the fire

department that they look into for the establishment of a final ISO rating. The ISO system for coming up with a final rating is based on the following areas: Emergency communications (deals primarily with dispatching), Fire Department (staffing, equipment, training, and deployment), Water Supply (Hydrants, water mains supply, including maintenance on this system) and Community Risk Reduction (prevention, public safety education, and emergency communication). Some areas have a higher relevance in the rating such as: water supply, available apparatus/equipment, and personnel.

When asked how the ISO rating would be affected by what is dispatched to a fire alarm, her response was that one engine with three personnel would attain maximum points for a fire alarm response. Research from earlier papers/articles showed that ISO had different requirements. Mrs. Smith noted that about ten years ago the minimum requirements changed to what it is now.

There is really no standard of what fire departments respond to fire alarms. Anaheim fire department currently responds one engine to automatic fire alarms (Anaheim, 2013). Henderson fire department joined Las Vegas fire department in not responding to fire alarms until there is "visual verification of a fire". The department still responds to alarms at schools, health care facilities and government buildings (Trask, 2008). The Fresno fire department sends a structure fire response to fire alarms (3 engine, truck, battalion chief). The LFD response model has changed over the years, but with no statistics to make the changes. Ten years ago the LFD responded two engines, one truck, and a battalion chief, with the closest engine responding "Code 3" and all remaining responding "Code 2". Today, the LFD responds one engine to residential and commercial fire alarms "Code 2", and for target hazards (hospital, care facilities,

etc.) they respond with one engine “Code 3”, and one truck and battalion chief “Code 2”. Luckily, the LFD has had no accidents responding to fire alarm in the last 20 years.

The Fire Industry Association (FIA) noted that the Department for Communities and Local Government annual report that looks at “Optimal response to Automatic Fire Alarms Calls” has recommendations for response. They suggest one engine at day and night time alarm calls and two engines for night time sleeping risk alarms. This would mean that all day time alarms, regardless of occupancy would be one engine, and any night time where people are, or could be sleeping would respond two engines (Graham, 2012).

One radical possible solution by Denver Fire Department Chief Gonzalez is “no” response to fire alarms. “We get well over 10,000 false alarm calls a year, who said we have to go out on everything”. Denver Fire conducted a survey and 100 percent of the times they got alarms with no confirming calls, they were false alarms. Every time they got a confirming phone call, it was a real fire (Hershfired, 1995). That type of radical solution would defeat the purpose of having an alarm system. The primary advantage of having an automatic fire alarm is that it provides early detection of fire condition so corrective action may be taken before substantial damage occurs. One of the most significant factors in the development of large loss fires is a delay of fire response (Finley, 2001).

The history of fire alarms has come a long way, but as time and technology have evolved, just as many problems have arisen in which fire departments have adjusted to. There are many problems associated with fire alarms: death, injury, high cost of responding, lack of resources to respond to other emergencies, and complacency. Determining the level of risk is of great concern when deciding what type of response a fire department wants to allocate to fire alarms. Information to decide on call stacking includes: ISO grading system, NFPA requirements,

firefighter safety, public safety, and acceptable fire loss potential. Sometimes it is easy to look at the problem of the many false alarms, but forget to realize that this same technology that has become a burden is also responsible for saving lives, property, and the environment.

Procedures

Research for this ARP spanned over three months beginning at the National Fire Academy during the third year EAFSOEM class last February. Generous amounts of information were gathered at the Learning Resource Center and through networking with colleagues, as well as the ideas that were generated through the class. Upon return from the NFA additional research was conducted at the City of Lodi Library, LFD library, Internet, and through networking events at fire prevention association meetings.

The problem with fire alarm responses was looked at by searching the history of fire alarms, the problems since inception of fire alarms and how that affected fire department response, and how lives vs. property is considered in fire alarm response. A survey was sent to 44 different fire departments throughout the U.S.A. that resembled the LFD through a fire prevention networking group. This survey was to determine what other fire departments dispatched to fire alarms and what some alternatives are. The determination for a fire department to alter their current response could be based on a fire departments current size, staffing, and the way NFPA 1710 and ISO is interpreted.

Finding information for the LFD in responses to all types of calls for service was attained through our electronic database (Fire House), in which the last five years numbers were looked into. Multiple journals and past research papers were looked at to find information regarding firefighter fatalities while responding to false alarms and what are other problems associated

with fire alarm response. This research at the NFA revealed additional information that was included such as: costs associated with false alarms, how response to fire alarms has been looked at through the years, is the ISO rating affected due to different responses, is NFPA 1710 a consideration when determining response, USFA statistics, NFPA statistics, and what are the current trends in fire department response to fire alarms.

The survey sent out asked the following questions: 1. What does your department respond to a fire alarm for a residential occupancy? 2. What does your department respond to a fire alarm for a commercial occupancy? Responders were given the option of one unit, two units, or three or more units. These questions would answer what other departments dispatch to fire alarms. Question 3: Do all unit(s) respond “Code 2” or “Code 3”? Answers could be all units “Code 2”, all units “Code 3”, or some Code 2 and Code 3. Question 4: Does your department have a different response from the above questions where there is a target hazard involved? Answers could be: Yes, No, or Depends (with comment). Question 5: Do you have any alternatives to fire alarm response that is unique? The answers to this were either “yes” or “no” with comments required. Question 6: What is the basis for your department’s response to fire alarms? Choices for this question were: has been that way as long as I know, there was some analogy and using statistics to determine response, and I think we respond too much or too little equipment to fire alarms (all with comments). These questions would assist in answering what dispatching alternatives are available to fire alarms and what are some ideas the LFD could look at to determine what options are out there in determining their response model.

The fire departments selected for this survey was determined to mimic the LFD in size of population and their current staffing. All departments were similar to the LFD citizen population between 50,000 and 99,000 and a staffing between 40 and 74 personnel.

The limitations of this research were an obstacle. The survey responses were disappointing with only 18 of the 44 (41%) sent out being returned. The responses were slow to come in, even after two reminders (two weeks apart), three weeks after initial send out. Also, finding those to survey with characteristics similar to the LFD was limited. This research could not utilize volunteer fire departments, staffing below 40, and paid/call agencies due to lack of available responding units for initial dispatch, this information would skew the intent of what should respond to fire alarms on initial dispatch based on the LFD current staffing model. Additional limitations were due to outdated sources on the subject as well as little to no information on how fire departments have come up with their current dispatching protocols.

Results

What are the problems associated with fire alarm responses?

Statistics given by the NFPA since 1980 has shown that fire department calls range from over 10 million in 1980, to a high of 16.1 million in 2012. Of these calls, false alarms have ranged from four to ten percent of total calls annually. Over the past 10 years, 14 firefighter deaths have resulted from false calls, and since 1977, 17% of all firefighter deaths were responding to or returning from alarms (Fahy, LeBlanc, & Molis 2015). Costs to the taxpayer can range from $300 to $600 per false alarm (Escobar, 2013). Utilizing these costs the LFD can expect to pay from $83,000 to $165,000 annually based on past false alarm responses. Apparatus are most likely to be involved in a collision when running “Code 3”, by reducing emergency responses we reduce the risk of collision (IAFF, 2010).

What do other fire department’s dispatch to fire alarms?

The results from the survey, searching the internet, and reading NFPA 1710 found that there is no common response to fire alarms. Some fire departments do not respond until a confirmed call of actual fire or smoke exists, while some will send a full structure fire response to all fire alarms. The survey found that 56% of fire departments send one unit to a residential fire alarm and 39% send two units. For a commercial fire alarm 29% send one unit, 41% send two units, and 29% send three or more units (Appendix A).

What dispatching alternatives are available to fire alarms?

The dispatching of apparatus to fire alarms can be broken down further depending on the type of occupancies: 1. A one unit response to a full structure fire response for residential and commercial occupancies. 2. No response until a confirmed call of actual fire or some exist. 3. The Fire Industry Association suggests one engine at a day and night time alarm and two engines for night time sleeping risk alarms. 4. All responding apparatus do not need to respond “Code 3”, there can be variances given to reduce the number of apparatus moving at emergency speed to reduce the chances of accidents while en route to fire alarms.

Should the LFD alter their current response to fire alarms?

NFPA 1710 does not have any recommendations in regards to fire alarm response. Their only recommendation is for structure fires which allow four minutes or less for the first arriving engine company and/or eight minutes or less for the deployment of a full first alarm assignment at the fire incident (NFPA, 2010). ISO states that one engine with three full-time personnel responding to a fire alarm would meet their requirements and would maximize the local jurisdiction points for fire alarm response. The only information regarding how to respond to fire

alarms came from (Peeples, 2000, p. 14) stating that, “Only a risk/benefit analysis may demonstrate that non-emergency response to automatic fire alarms is prudent.”

Discussion

False fire alarms statistics show that 17% of firefighter deaths were responding to or returning from alarms (Fahy, LeBlanc, & Molis, 2015). Any possible way to reduce the amount of fire alarms will increase the chances of firefighters and the community not being involved in an accident.

38% of those surveyed stated that their alarm response has stayed the same as long as they know, or they disagree with their current response to fire alarms (Appendix A). Some fire departments have adjusted their response to fire alarms, but are doing so based on what they think is good for their department and not by any standard set by any governing agency. NFPA has only recommendations for structure fires and ISO will give full credit for a response of one engine staffed with three full-time personnel. The LFD has had a response model that was typical of many departments and responded two or more units to fire alarms; it was established that way with no one knowing why, or how.

Fire alarms account for four to ten percent of all calls throughout the United States, which translates to 160,000 fire alarms per year (Karter, 2013). The other concern is that the costs of sending units to fire alarms can cost from $300 to $600 per fire alarm (Escobar, 2013). The costs to the LFD could be as much at $165,000. A prudent fire department must look at all aspects of their budget and find ways to utilize their budget efficiently by looking at every possible way to save money and utilize it in a way that promotes the organization in days where there is increased scrutiny within public service budgets.

The LFD has been fortunate and has no recorded accident, death, or injury due to responding to any incident in the last 8 years, but this does not mean that the LFD is immune. The LFD has been progressive in their ways and staying ahead of negative statistics. The LFD's recent change in their response to fire alarms has changed in hopes of being responsive to fire alarm statistics, but the only concern was that the LFD was making the correct decision based on current knowledge and regulations.

Looking at what other department respond to fire alarms and what dispatching alternatives were available ranged from no response until verification of fire or smoke existed, to a full structure fire response. Anaheim fire department responds only one engine to fire alarms, very similar to the LFD, whereas the Fresno Fire department responds a full structure fire response to fire alarms. The Henderson Fire department will only respond units if there is a visual verification of a fire. This is similar to the thought of Fire Chief Gonzales which stated, "every time they got alarms with no confirming calls, they were false alarms. Every time they got a confirming phone call, it was a real fire" (Hershfired 1995). Henderson Fire does continue to respond to alarms at schools, health care facilities, and government buildings (Trask, 2008). The LFD currently sends one unit (code 2) to false alarms with the exception of target hazards (high risk facilities) where they send one engine, truck, and battalion chief. The closest unit will respond "Code 3", while the others "Code 2". If smoke or fire is noticed "en route" or "on scene" to the fire alarm, the company officer will call for a full structure fire response. This upgraded response is very common with the surrounding districts and from the comments noted in the research paper survey (Appendix A).

The FIA recommended dispatching one unit to day time alarms regardless of occupancy, and any night time where people are, or could be sleeping, would be two engines (Graham,

2012). This theory would require a dispatching system that would allow for such programming and the time for inputting this type of information into the CAD, which is something the LFD lacks at this time.

Responses from the survey found that 50% of all units respond “Code 3” to all fire alarms, 6% respond “Code 2” to all fire alarms, and 44% send a mixture of “Code 2” and “Code 3” response (Appendix A). Apparatus are most likely to be involved in a collision when running “Code 3”, and with the statistics that such a high number of fire alarms are false, every response is not a true emergency. By reducing emergency rate responses, we reduce the risk of collision (IAFF, 2010). It is in the best interest of agencies to find ways to reduce the chances of collision, one needs to look at statistics for fire alarm response and combine that with the needs/wants of their local jurisdiction. Part of the decision for the LFD to include certain target hazards with an increased response is because of the occupancy. Hospitals, care facilities, and assisted living facilities were included in the increased response due to the chance of large loss of life, or that the buildings were non-sprinklered for occupants, and there was limited ability for self-rescue.

The implications of this research for the LFD are that even there are no set standards for what is a proper response to fire alarms; there are a lot of statistics and information on reasoning for difference response models. The LFD must take into consideration emergency response vehicles responding “Code 3”, statistics of apparatus responding to and from emergencies, risk vs. gain on property loss and life safety, and the recommendations by ISO.

Recommendations

Prior to the research the LFD had recently changed their response model to fire alarms from three or more units per fire alarm, down to one unit for most occupancies, and three for

target hazards. This decision was not based on anything but what one other surrounding agency currently responds to fire alarms.

The problems associated with fire alarm responses came down to life safety, fire loss, and how fire alarms affect the fire department budget. Since NFPA does not have a real stand on what should respond to fire alarms and ISO deals with insurance ratings, one needs to look how an overall dispatching change would affect their community. Several factors will depend on: Community and local government reaction to increased/decreased insurance rates, property loss due to delayed fire apparatus response vs. risks of “Code 2 or Code 3” driving, and costs associated with fire alarm response.

With a majority of all fire alarms being false, one must look at their current statistics to determine if they are putting their firefighters and citizens at risk by sending so many units to fire alarms. In addition, the statistics show that fire loss and the number of reported fires has continued to decrease, while the rate of firefighter deaths responding to fire alarms has remained unchanged. There definitely needs to be some movement by NFPA and the USFA to bring out some recommendations so fire departments have something to go on, rather than worrying about any legality of their decisions.

I feel that the current call stacking for fire alarms for the LFD has been a good decision. The current response of one unit “Code 2” to all fire alarms with exception of target hazards, which responds three units, closest “Code 3”, and the remaining “Code 2”, reduces the amount of exposure to “Code 3” driving to a minimum. This response model gets more units on the road when there is an extreme life hazard. In addition, there will be cost savings due to the reduced response model. The LFD will need to continue looking at nationwide and local statistics to ensure that they are always looking at ways to keep firefighters and their citizens safe.

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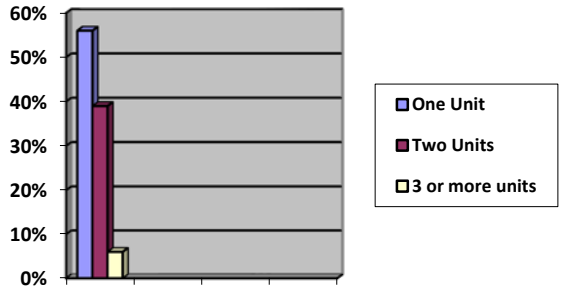
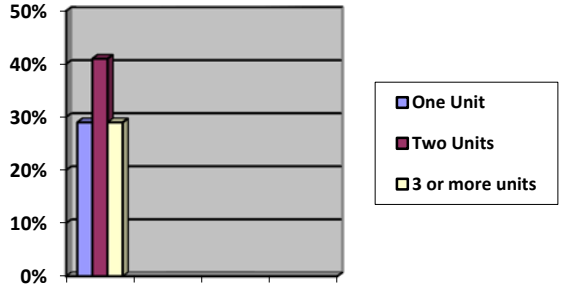
Appendix A
Fire alarm response survey

1. What does your department respond to a fire alarm for a residential occupancy?



2. What does your department respond to a fire alarm for a commercial occupancy?



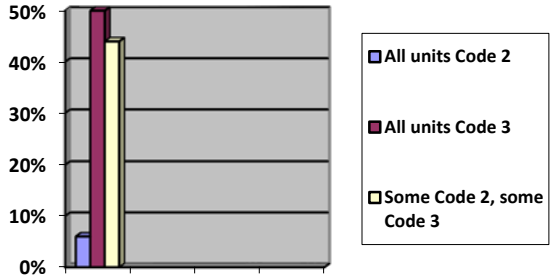
Comments:

A. Hospitals receive full structure fire assignment with 1st engine responding code 3 and all others code 2.

B. Depends on occupancy.

C. 2-3 units depending on hazard classification

3. Do all unit(s) respond “Code 2” or “Code 3”?



Comments:

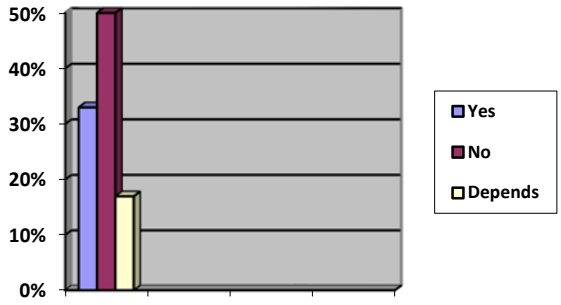
A. Truck responds code 2

B. Closest code 3, secondary code 2

C. Residential is Non-Emergent and Commercial is Emergent

D. All units are dispatched code 3, units may downgrade at the direction of the first due officer at their own discretion.

4. Does your department have a different response from the above questions where there is a target hazard involved?



5. Do you have any alternatives to fire alarm response that is unique?

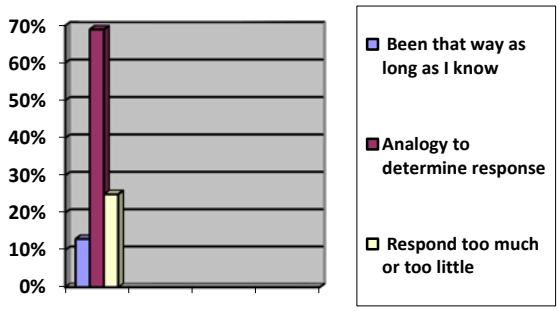
A. Will sometimes respond a safety officer in car for certain alarms, we have a coal mine.

B. Hospitals receive full structure fire assignment for fire alarm.

C. High-rise, large assembly, and large assisted living get a greater response.

D. 9 responses of “No”.

6. What is the basis for your department's response to fire alarms?



Comments

A. It's overkill. Should be a single engine Code 2 to investigate. If a caller reports smoke/fire upgrade to a structure fire response.

B. Life hazard, size and complexity of buildings determine response.

C. The county-wide dispatch through the interagency supervisory board that this level of response was acceptable for all jurisdictions.

D. Based on the critical task analysis and standards of response coverage review.