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Reducing Risks Caused by False Alarms in McHenry Township Fire Protection District

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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 second year of the Executive Fire Officer Program encompasses the topic of reducing community risk. The class challenges the executive fire leaders to lead the charge for reducing risks in their communities.

Second only to emergency medical calls in McHenry Township Fire Protection District (MTFPD) are calls for false fire alarms. The problem is that every time MTFPD responds to these false alarms, it puts not only citizens, but fire personnel at risk. The purpose of this project was to identify strategies to reduce risk to the citizens and firefighters caused by false fire alarms received by MTFPD. The descriptive research approach was used to conduct a comprehensive review of all aspects of fire alarms. This review was completed through the use of two surveys. One was sent to all MTFPD end users to answer the question of what were the causes of false alarms. In addition, the end users were asked about their willingness to move to wireless transmission for their fire alarm signals to dispatch. The second survey was sent to area fire departments that already use wireless radios to transmit fire alarm signals.

The results illustrated that many of the false alarms could be eliminated by switching to the more reliable wireless radio vs. the current regular phone line. Education, as well as punishment, can be used as a means to have the end user keep their fire alarm system well maintained. Research also showed that there are alternative ways to respond to alarms.

MTFPD should consider altering its response to fire alarms. Research shows that less than 0.5% of all fire alarms at MTFPD are for true emergencies.

By reducing the number of fire alarms, as well as changing the way MTFPD responds to them, community risk can be reduced.

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INTRODUCTION

The McHenry Township Fire Protection District (MTFPD) is a fire protection district that serves an area of approximately 56 square miles and more than 65,000 people. The district encompasses seven municipalities and an unincorporated area. The district answers approximately 4,500 calls for service per year. Second only to EMS calls are false fire alarms. False fire alarms account for roughly 6% of total calls for service. The district operates four fire stations. Current response to all automatic fire alarms includes: two engines, an ambulance, and the shift commander. If the alarm is at a "target hazard," a ladder truck is also automatically dispatched.

The problem is every time MTFPD puts equipment on the road to respond to these automatic alarms, it puts citizens and fire personnel at risk. In addition to these risks, false fire alarms put equipment in service which takes resources out of service to handle other types of calls. The district needs to strive to reduce costs caused by false alarms as well as reduce the risk to the community, the department, and its members.

The purpose of this research is to identify strategies to reduce risk to citizens and firefighters caused by false alarms in the MTFPD. In addition, different means shall be explored to reduce costs and deliver a more efficient way to transmit automatic fire alarms to the dispatch center. Finally, the way MTFPD responds to fire alarms will be examined to find any additional strategies that can be implemented to make the apparatus response safer.

Using the descriptive research approach, the author will determine the answer to the following research questions:

1. What are the reasons for false fire alarms?
2. What equipment and what programs can aid MTFPD with developing strategies to reduce the risk caused by false alarms?
3. What have neighboring fire departments done to reduce false alarms?
4. What ideas do stakeholders in MTFPD have for false fire alarm reduction?

BACKGROUND AND SIGNIFICANCE

The MTFPD operates four jump companies; each operates out of a separate station. These three person jump companies either ride the ambulance to emergency medical service (EMS) calls or an engine to fire related calls. The 13th person on shift is the shift commander. These 13 people operate a 12-hour shift and are part-time. Anytime there is a request for the truck or squad, it is staffed with volunteers who come from home. Last year, MTFPD responded to just under 4,500 calls for service. Nearly 80% of these calls were for EMS. The second leading cause for calls were for false fire alarms. Over the last five years, MTPFD averaged 256 automatic fire alarms per year. Not addressed in this study are asymptomatic carbon monoxide alarms. These calls are typically handled as non-emergency, single-engine response.

Never has the cause for false alarms been explored at MTFPD. MTFPD uses a Firehouse brand software program to report to the National Fire Incident Report System (NFIRS). Unfortunately, the data added is not specific to the cause of the alarms. Going directly to the end user to determine the cause of false alarms will give a more accurate account of the cause of these alarms. For the purpose of this research, the end user will be the customer who has an alarm that is monitored and sent to our dispatch center. Defining the most common causes of false alarms will assist in developing the solutions to reduce them.

MTFPD currently works with seven different municipalities. These municipalities are the authority having jurisdiction (AHJ) over the ordinances that are enforced. MTFPD has not adopted any of its own ordinances. Therefore there are no ordinances that detail how fire alarms are transmitted to the dispatch center. Currently, businesses have the option of connecting directly to our dispatch center via a dedicated copper phone line, or by having it connected to an Underwriters Laboratory (UL) approved central station. The latest technology is to use wireless radios to transmit alarms. If transmitted directly to the dispatch center, time can be saved vs. using a central station. It needs to be determined if the new technology of wireless transmission can reduce false alarms. Other options will be explored to see if options exist in reducing false fire alarms caused by the actual transmission of the alarm from the end user to the dispatch center.

A comprehensive study of what other fire departments have done to reduce false alarms in their community will be reviewed. False alarms are not an uncommon problem at any fire department. It may be possible that several solutions have already been discovered by other departments.

The stakeholders at MTFPD have at least three reasons to reduce false alarms. The department could see a savings in costs as well as make the working environment safer for firefighters and citizens by reducing the risk of injury or death while responding to calls. Lastly, by reducing false alarms, it frees up units to be available to respond to other emergencies. Currently, all fire alarms are handled by four or five emergency vehicles responding on the still alarm with full lights and siren. It needs to be explored if there are better ways to respond. Determining the root cause of false alarms will be the key to discovering the best way to reduce them.

This research project is related to the Executive Analysis of Community Risk Reduction (EACRR) class because it directly deals with reducing risk to the community as well as the risk to the fire department that are encountered while responding to false alarms. It takes a whole dedicated culture to reduce risks. It includes looking at all aspects of the department. This project will look specifically at the causes of false fire alarms and how MTFPD responds to these alarms. Ultimately, the goal is to develop solutions to reduce the number of false alarms, and to change the way MTFPD responds to them. Hopefully this leads to a reduction in risk to the community and to the MTFPD.

This applied research project was completed as a requirement for the EACRR class in pursuit of completing the Executive Fire Officer Program. This program relates directly to the United States Fire Administration (USFA) four operational objectives. This project relates to the first operational objective to "reduce risk at the local level through prevention and mitigation" (Department of Homeland Security, US Fire Administration, National Fire Academy [USFA], 2009, p. II-2).

LITERATURE REVIEW

Responding to false alarms requires staff time and negatively influences the overall safety of the community by diverting fire department resources from actual emergencies. Additionally, responding to false alarms increases the risk to firefighters and civilians by exposing them to risks associated with responding to and from calls for service (Reese, 2009). By looking at other options for responses to fire alarms, responses can be made safer. This may include reducing responding equipment, which leads to less chance of injury to a civilian or firefighter while responding to or returning from an alarm (Reese, 2009). Glen Kitteringham(2007) M.S.C., CPP

wrote in his article, *Nuisance Alarms* "fire crews run the risk of injury or death as they respond to alarms." He also states that "nuisance alarms take firefighters away from legitimate alarms, create wear and tear on vehicles, and waste their valuable time." According to National Fire Protection Agency (NFPA), the second leading cause of firefighter fatalities is from incidents relating to the response or return from calls of service (NFPA, 2008). USFA (July, 2006) identified that responding to and returning from fire calls is the third leading cause for firefighter fatalities. The NFPA(2008) states that at least 20 firefighters are killed each year responding to or returning from alarms, many of them false. False alarms generated by alarm systems put the public at risk by increasing the likelihood of traffic injuries due to the number of fire apparatus that are needlessly responding to the alarm with lights and sirens. If these issues can be resolved, this will effectively lower the risk to the citizens (Hoover, 1997). Clearly, this portion of the literature review shows that it is dangerous responding to and from calls for service.

The next portion of the review included looking at the types of fire department responses to automatic fire alarms. The NFPA Fire Protection Handbook (2003) identified that resources dispatched to calls should have the capability of assuming an interior fire attack on structure fires. The handbook uses a guideline for establishing a minimum suggested response based on the hazard classification of the building. The handbook identifies three classes of hazards. The first is high-hazard. These hazards consist of schools, hospitals, nursing homes, high rise buildings, and other high life hazard occupancies. Medium-hazard occupancies consist of apartments, office buildings, and industrial occupancies not requiring extensive rescue or firefighting resources. Low-hazard occupancies are three-family residential properties, small business, and industrial occupancies. The handbook identifies the need for a minimum number of 16 firefighters for low-hazard occupancies and a minimum of 26 firefighters for high-hazards.

The handbook does not identify a response recommendation for activated fire alarms, nor does it classify what is needed for medium hazard response. NFPA 1710 (2001) identifies an initial fire alarm assignment be based on tasks being performed. It recommends a minimum of 14 firefighters.

The NFPA 1710 does not distinguish by occupancy type, nor does it suggest what should be used on for response to automatic fire alarms. Reese (2008) stated that in response to the millions of fire alarms across the country:

> The practice for a first alarm response includes a shift commander, two engines, and a ladder truck. This response is taught in every fire-based education program. It is a standard operating practice. It is hard to believe that this response has not been altered over the years. (p. 28)

Coleman (1997) stated the following:

> Reducing the number of apparatus responding to fire alarms will reduce the risk relating to the response to and from alarms. However, this is an additional risk to the firefighter when an automatic alarm is determined to be an actual fire situation. (p. 353-354)

Klaene & Sanders (2000) advise that, “even though a high percentage of automatic alarms are false, reducing the response can create an atmosphere of apathy and can lull firefighters into complacency causing a disastrous outcome”(p. 238-239). One method to effectively reduce the risk to the community caused by having emergency vehicles operating on the streets is to limit the number of responding units going to automatic alarms. Some options include having only a duty chief check the alarm or have the closest company respond lights and siren. Finally, Hickey (1993) further states: the *Fire Suppression Rating Schedule* [sic] specifies that “two engine

companies and one ladder company shall be dispatched on first alarms for all building fires" (p. 84) This is a minimum response to structure fires. It does not state what the response shall be for automatic fire alarms. Tualatin Valley Fire and Rescue have completely changed the way they respond to many calls. Certain low risk areas are often staffed with one firefighter in a 4-wheel drive vehicle. This type of response greatly reduces the number of apparatus that responds to automatic alarms (Clemo, 2010).

Punishment is often used as a means to deter multiple false alarms. Property owners who have troubled systems are more likely to address system problems than to continue to pay fees for false alarms (Reese, 2008). Dove (2008) recommends that fire departments be proactive in the management of false alarms by educating alarm owners. An ordinance that applies fees for false alarms caused by an alarm company set off a false alarm while working on a system will greatly help reduce the number of these nuisance alarms (False Alarm Reduction Association, 2001).

Next, a comprehensive review of the root cause of false alarms was done. (Moore, 2002) states that: "A fire alarm system design must address the nuisance alarm issue. Compliance with nationally recognized standards, with required maintenance, provides a critical first step in reducing the potential for nuisance alarm"(p. 46) Most false fire alarms are due to a lack of equipment maintenance or because of a process that set the alarms off such as cleaning or painting (Grandview Fire Department, 2007). Halas (1991) emphasized that false fire alarms are primarily caused by a malfunction with the smoke detector. Bertschinger (1988) points out that "false alarms are often the result of application of smoke detectors in areas where they are not suited" (p. 47). Kenneth W. Dugan, PE, FSFPE, writes his article *Reliability of Fire Alarm Systems* in Fire Protection Engineering (Winter 2007):

> Failure rates are highest in a system or with components when just manufactured, when deficits or damage manifest themselves. The failure rates become much lower and stable for the useful life of the system components. The failure rate will increase as the components reach the end of their useful life when wear out failures begin to occur. The above described failures can be reduced through proper maintenance, care, and inspection. A well-maintained system, reliability of an alarm system goes way up. (p. 34-48).

Moore (2007) in his article *Become Part of the Solution, Not Part of the Problem*, identified that as the quality of the alarm installation increases, false alarms will decrease. This saves fire departments and cities money. Moore (2008) continues by saying that lack of maintenance is a leading cause of false fire alarms. He also stresses that a properly trained technician greatly improves the overall performance of the system.

The Minneapolis Fire Department report (2008) *Result Minneapolis* identified that during 2007, their department responded to 4,822 false fire alarms, 14.2% of the total calls for service for the year. In their report, they listed the top ten causes for fire alarms in 2007. Their records identify alarm system activation being caused by maintenance personnel working on the system, construction work, and dust as the leading causes. Second, was smoke detector activation as a result of proper system response to environmental stimuli. Alarm malfunction is the third leading cause and was identified as improper performance. The fourth-leading cause was smoke detector activations due to malfunction where no reason was found causing the malfunction. Malicious false alarms were identified as the fifth-leading cause and these were identified as manual pull stations being activated. The sixth-leading cause was heat detector activation with no heat conditions. The seventh identified cause was malicious false telephone calls not tied to

an alarm system. Sprinkler system activation caused by testing or broken pipes was identified as the eighth-leading cause. Carbon monoxide alarms and central station malicious false alarms with no explanation were identified as the ninth and tenth respectfully.

Kitteringham (2007) stressed the importance of investigating the cause of every false alarm. Failure to do this does not allow the root cause to be addressed. Moore (2002) stated that the system's design was key to the overall reduction of false alarms.

One problem that occurs is that the NFIRS (FEMA, 2008) is used to categorize false fire alarms based on the situation found by the fire department upon arrival on the scene. This system categorizes false fire alarms and false calls as malicious, or mischievous, system or detector malfunction and unintentional activation of the system is used by fire departments throughout the country. The biggest problem with categorizing this way is consistency.

The next portion that was reviewed was the way automatic fire alarms are transferred to the dispatch center. Traditionally, automatic alarms are transmitted to the dispatch center via copper phone lines. For quite some time, wireless technology has been available for cell phones and other radio uses. It is now becoming the preferred way to transfer automatic fire alarms to the dispatch center. (Rodgers, 2000) states: "in the last 10 years there has been a dramatic increase in the use of wireless radio alarm systems" (p.-36-37). He attributes this to the huge advances in the mobile phone field. He summarizes by saying: "if signal strength is adequate the system is very reliable. According to John Smith (2010) states that: "Radio fire alarm system designers and engineers have embraced technology to create a new generation of radio fire alarm systems that are much more sophisticated in terms of performance, fault monitoring, and reliability" (p. 36).

The final part of the review dealt with looking at alternative responses to automatic alarms. The City of Las Vegas Fire Department created an ordinance that requires the fire department to not respond to false alarms if there is no substantiating information supporting the alarm (Szymanski, 2006). That is a drastic change from traditional responses to automatic alarms. Tualatin Valley Fire and Rescue deploys a one-person response vehicle to automatic alarms in certain areas of their countywide department. They strategically use this one-person response to verify and check what is wrong before additional resources are deployed (Clemo, 2010). John Gaughan from Algonquin-Lake in the Hills Fire Department deploys the closest still engine to respond with lights and siren. The second engine and truck respond without lights and siren until the first engine confirms what is found. The exceptions to this rule are high target hazards such as schools or hospitals (personal communication July, 2010).

Reducing the number of responses to false alarms will reduce the risk associated with responding to and returning from incidents, not only to firefighters, but also to citizens. When fire companies are committed on false alarms they are not available for other calls for service. This greatly compromises the fire department's ability to respond to valid emergencies. Certain guidelines need to be followed when responding to structure fires. These same guidelines do not necessarily apply to automatic alarms. Maintenance, installation, and design all play a major part in the reliability of systems. Using the NFIRS reporting system nationwide leads to a lot of variables to how people classify alarms and the reason for the alarms. Using NFIRS leads to a variety of results. Finally, the use and reliability of wireless radios as a means to transmit automatic alarms was explored.

PROCEDURES

The purpose of this research is to identify strategies to reduce risk to the citizens and firefighters caused by false fire alarms in MTFPD. In addition, different ways were explored to possibly reduce costs and deliver a better way to transmit fire alarms to the dispatch center.

This project was initiated in April 2010 with an initial literature review and online card catalog search at the Learning Resource Center at the National Emergency Training Center in Emmitsburg, Maryland. Additional literature review was performed at the author's local village library (through inter-library loan), this author's personal library, and Internet research using Google as the main search engine. The purpose of the literature review focused on several different areas of risk reduction involving false fire alarms. The first area reviewed looked at the dangers associated to not only the public, but also to the firefighters as they respond to and return from fires and fire alarms. The next portion reviewed looked at how other departments respond to alarms as well as why they chose the apparatus and manpower they do to respond to alarms. Next a review was done to see if financial punishment is a viable option to deter end users from having false fire alarms. A comprehensive review of the root causes of false fire alarms was done next. This included how fire departments classified false alarms. Additionally, information was reviewed related to how the actual fire alarm is transferred to the dispatch center. Finally, alternative ways that fire departments respond to fire alarms were researched.

Two separate surveys were sent out to obtain feedback. The first survey sent out was to the commercial occupancy end users that have fire alarms that report to the MTFPD dispatch center. The first question was to determine what is the actual cause of the false alarms? There were five categories to which people responded. They included the following: Storms or power

outages, phone line problems, construction work, battery problems, and detector issues. The average number of alarms per year was then considered. The cost to monitor the alarm was considered next. End users were then surveyed about how well they felt they were educated concerning their fire alarm systems. Finally, the survey questioned whether or not end users would be willing to go to a wireless radio system to have their alarm monitored. This included whether the user would object to MTFPD monitoring the alarm. Currently no fire alarms are monitored wirelessly in MTFPD nor is the end user required to have the alarm monitored directly by MTFPD. A copy of the survey can be found in Appendix A.

Secondly, a survey was sent to McHenry and Lake County area fire departments that currently use wireless radio to monitor fire alarms. A copy of the survey can be found in Appendix B. The author met personally with officers of the departments that agreed to answer the survey. The purpose of the personal interview was twofold. First, the author wanted to see if using wireless alarms truly did reduce the number of false fire alarms at their fire departments. Secondly, the author wanted to review how area departments respond to fire alarms in terms of equipment and manpower. Third, a review of MTFPD's NFIRS reporting system was done to determine the average number of false alarms per year in the district. In addition, the number of actual fires was analyzed vs. the number of fire alarms. Lastly, by using this NFIRS data, the reasons for the false fire alarms at MTFPD were explored.

Several limitations were encountered in this research. The first limitation was the number of responses from area departments that use wireless radio to report fire alarms. The author was fortunate enough to find several fire departments in the Chicago-metro area that use wireless radios to report alarms. Unfortunately, only 20% of the departments responded and allowed the author to interview their personnel. This limited the variety and depth the author hoped to obtain

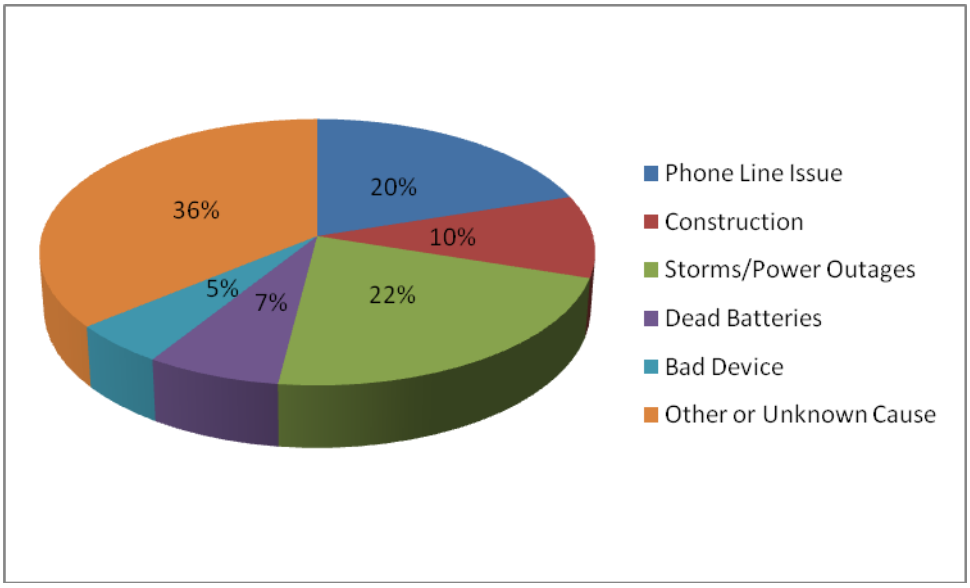
from those departments. Equally disappointing was the 31% that responded to the survey sent to the end users. Trying to determine the cause of false alarms by using MTFPD NFIRS reporting system was deemed to be an impossible task. It was quickly discovered that there was no consistency or accuracy to the way MTFPD codes automatic alarms. The inaccuracy in the way MTFPD codes the causes for false alarms has caused nearly all the figures concerning the types of alarms to come directly from the end users themselves.

RESULTS

The descriptive research method was used to answer the following questions. These questions attempt to identify the different strategies to reduce risk caused by false fire alarms. The first question was to determine the reasons for false fire alarms. Answering this question using the statistics MTFPD collects with its NFIRS compliant system was not possible. The two most common types of classifications used by fire personnel included: a system malfunction or an unknown or unintentional classification. Unfortunately, neither one of these is very specific as to what was the root cause of the alarm was. In a small percentage of the incidents it was possible to look at the narratives of the NFIRS report to better explain the actual cause of the alarm. Instead, the author used the results of the survey from the end users to determine the cause. It was found that there were five main causes for false alarms. The most common cause of false fire alarms was from storms/power outages. This accounted for 22% of all alarms. Second were phone line issues, meaning that the telephone line that links the fire alarm to the dispatch center had a problem that prevented the signal from being delivered properly. This occurred 20% of the time. Third, end users blame construction in the building accidently setting off the alarm 10% of the time. Fourth, a dead back-up battery in the alarm panel set the alarm off 7% of the

time. Lastly, 5% of the time it was because of the false fire alarm due to a detector problem or malfunction. Figure 1 illustrates the breakdown of call types.

Figure 1: Causes of False Fire Alarms

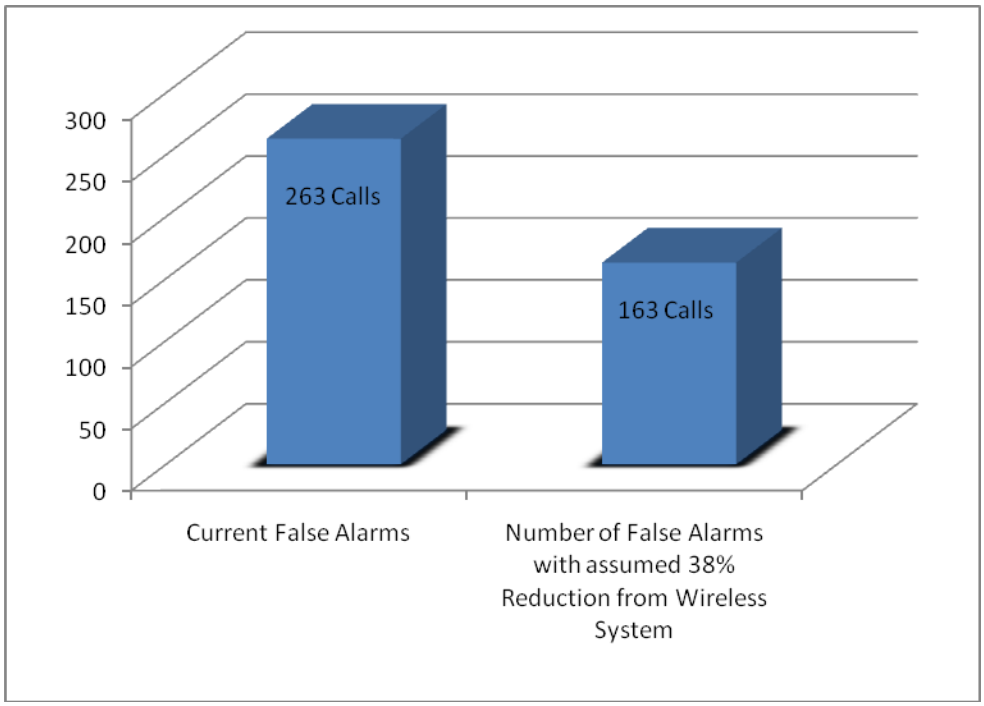


The top five reasons were evaluated on the surveys in determining the causes of false fire alarms. Further research confirms that education of the end user is a key reason for false fire alarms. There was a direct relationship to how well the end user knows their alarm system and the number of false alarms an end user will have. Maintenance, installation, and design also play a key role in the frequency of false fire alarms.

What equipment and programs could aid MTFPD with determining the proper strategy to reduce false fire alarms and risks associated with them? Survey research from area departments showed that just switching from using a copper telephone line to using a wireless radio alarm will drastically cut down on the number of false fire alarms. Based on the success other departments found by switching to the wireless system, and by using an average of their decrease

in alarms, MTFPD could expect to see a 38% drop in false fire alarms just by implementing these changes. Figure 2 shows the reduction in calls if wireless alarms were implemented.

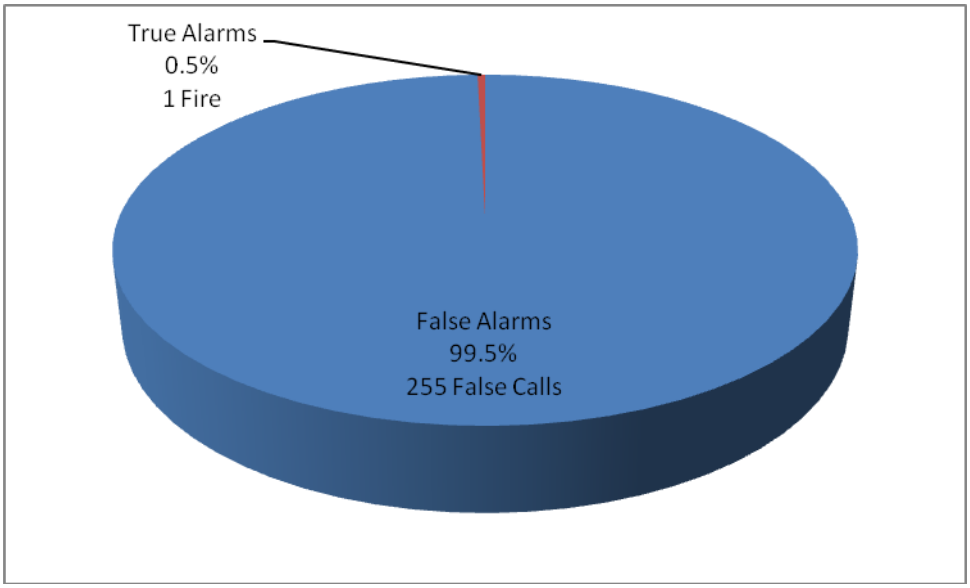
Figure 2: Reduction in False Fire Alarms due to Implementation of Wireless System



An ordinance that has a progressive fine scale may motivate end users to become better educated about their systems, as well as give them some incentive to keep their systems maintained.

Figure 3 shows the number of false fire alarms vs. true fires.

Figure 3: False Alarms to True Alarms



Less than .5% of fire alarms in MTFPD are true fires. A program using an altered response to automatic alarms could prove to be a program MTFPD may choose to implement.

Figures 4 & 5 illustrate the reductions seen at Woodstock and Algonquin Fire Departments after wireless alarms were implemented.

Figure 4: Reduction in False Alarms in Woodstock, IL

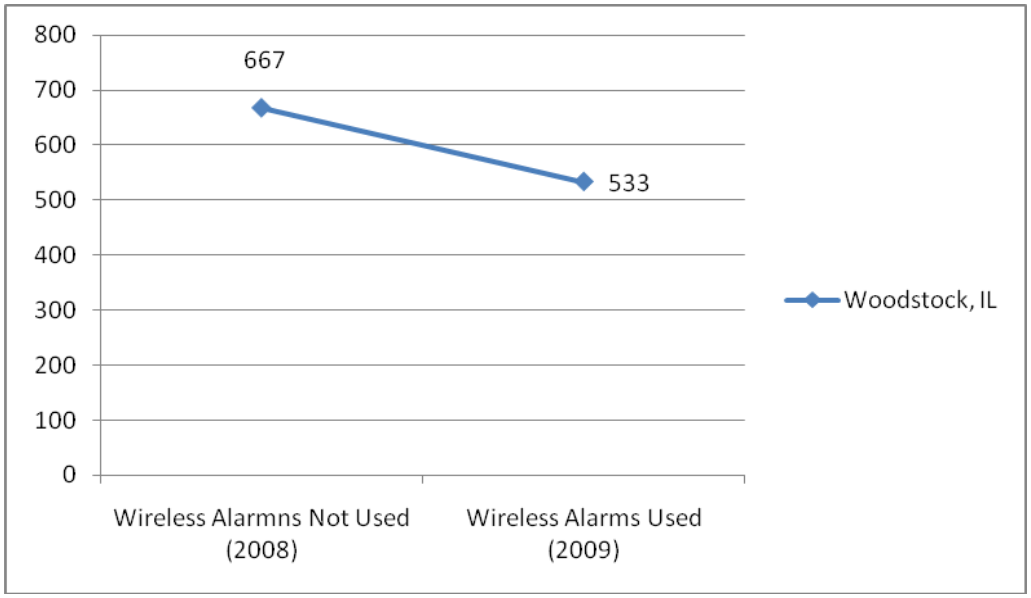
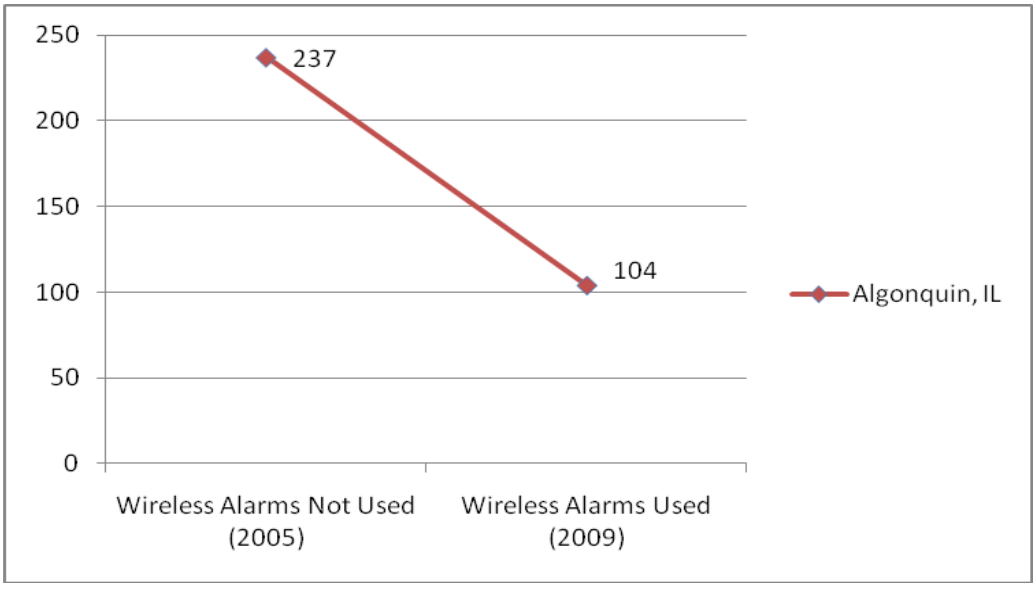


Figure 5: Reduction in False Alarms in Algonquin, IL

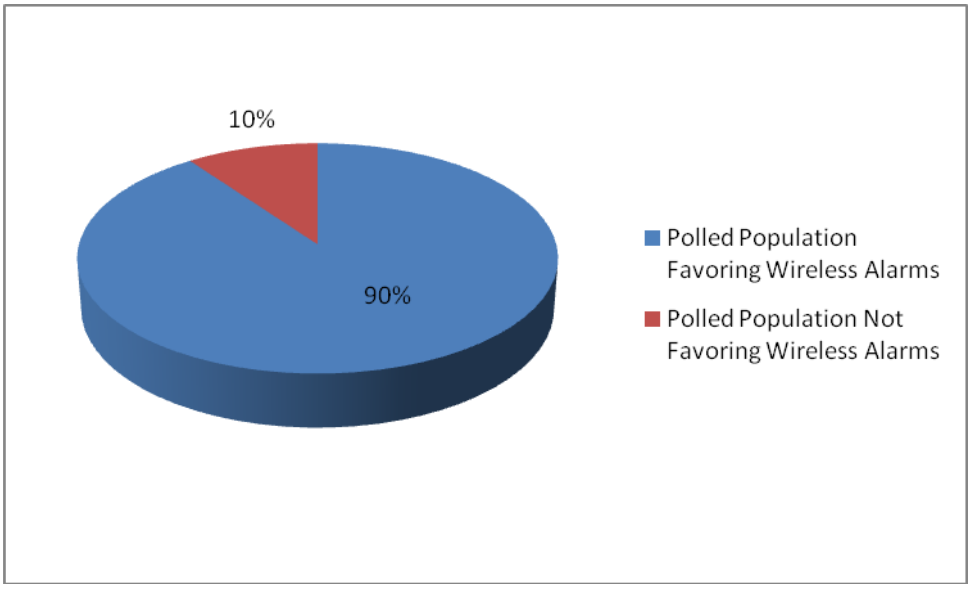


What have other fire departments done to reduce false fire alarms? Lake in the Hills, Assistant Chief, John Gaughan (personal communication, July 2010) advised in a personal interview that: "there is no question that wireless radio is not the way of the future, it is the only way to go. He further stated that, old copper phone lines are expensive and not nearly as reliable. The use of wireless transmission greatly reduces the everyday false alarm". Assistant Chief Pat Burke from Woodstock Fire Department (personal communication, July 2010) shared the same feelings. He advised that: "wireless radio is half the cost, easier to monitor, and more reliable".

Woodstock Fire Department saw a 20% reduction in false fire alarms once a wireless radio system was installed to transmit alarms to the dispatch center. This was compounded with the implementation of a progressive fine ordinance used for repeat offenders. Using the same parameters, Algonquin Fire Department saw a 56% reduction in false fire alarms. In addition, both departments conduct personal visits to repeat offenders to try and mutually fix the problem by educating and getting to the root cause of the repeat calls. Algonquin also has implemented a plan where they only respond lights and siren with closest responding vehicle. The other vehicles respond without lights and siren with normal traffic.

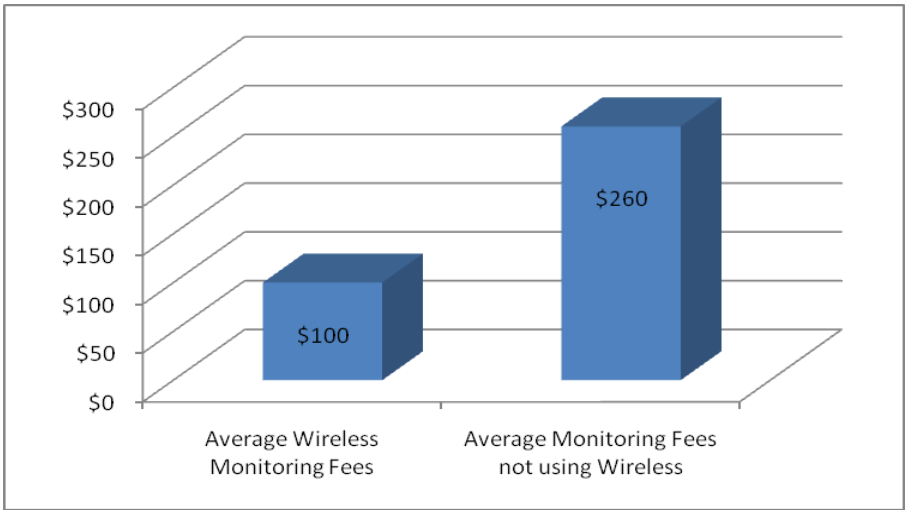
Figure 6 illustrates how many current end users are in favor of using wireless alarms.

Figure 6: Polled Population Favoring Wireless Alarms



What ideas do stakeholders in MTFPD have for false alarm reduction? More than 90% of the end users (stakeholders) advised that they were either willing to switch to wireless monitoring for their alarm system or would need to learn more about it before switching. Only 10% advised that they would object to having MTFPD monitor their alarm directly. The fact that the average cost to monitor an alarm on a regular phone is $260.00 also made the end user eager to go to wireless at roughly half of the cost. Figure 7 shows these figures.

Graph 7: Average Monitoring Costs



The Chief staff at MTFPD would be in favor of any and all programs that would reduce false fire alarms. They realize the correlation of having fewer false calls is safer and saves the district money.

DISCUSSION

False fire alarms account for the second largest number of calls at MTFPD second only to emergency medical calls. Every response to false fire alarms puts firefighters and the community at risk (Reese, 2009). By reducing these false calls it logically follows that MTFPD can reduce risk. NFPA (2008) states that responding to and returning from calls is the third leading cause of death to firefighters. The very way we respond to alarms needs to be reviewed. Many apparatus respond to false fire alarms needlessly with full lights and a siren (Hoover, 1997). MTFPD currently runs all equipment to all alarms with full lights and siren. In addition to responding to all alarms full lights and siren, MTFPD sends two engines, a shift commander, an ambulance, and a ladder truck to all fire alarms. This response is based on the department's interpretation of what the Insurance Service Organization (ISO) recommendation is. The NFPA Fire Protection

Handbook (2003) identified that resources dispatched to calls should have the capability of doing an interior fire attack. It says nothing about what the response needs to be to a fire alarm. Reese (2008) further states that sending a shift commander, two engines, and a ladder truck are taught from the first day of fire school. This is generally done under the premise of firefighter safety. Nowhere in the research did it ever address what the proper or appropriate response should be to a fire alarm. Many departments are altering their responses to fire alarms. Often, departments will send only one vehicle or alter the response to where only the closest vehicle will respond lights and siren. Tualatin Valley has completely changed the way they respond to fire alarms in low risk areas (Cleo, 2010). They often only send one fire/medic in a 4-wheel drive to confirm the cause of the alarm. Las Vegas Fire Department actually created an ordinance that has the fire department not respond to a fire alarm unless there is supporting information that the alarm is real (Szymanski, 2006). An area department near us just sends the closest company lights and its siren, the remaining two companies drive with normal traffic. According to the NFIRS data collected at MTFPD it was found that, with such a small number of fire alarms being true problems, it makes sense to look at alternate vehicle and manpower responses to fire alarms.

The first research question dealt with the root causes of fire alarms. 42% of all fire alarms at MTFPD are caused by phone line issues or power outages and interruptions. Most of these problems appear to have a direct correlation to the way the alarm is transmitted to the dispatch center. It was found that construction people and equipment problems were often the cause for false alarms at MTFPD. This really was no different than what the research showed. Moore (2007) tells us that a well maintained system causes the reliability to go up. Lack of maintenance also causes false fire alarms to go up. Brand new systems and very old systems also create more false alarms (Winter, 2007). Moore (2002) reminded us that the systems design is the key to

limiting false alarms. There are many reasons for false alarms, but it is clear that the better designed, maintained, and properly transmitted alarm will greatly reduce the number of false fire alarms.

Transmitting fire alarms has changed greatly over the years. Smith (2010) tells us that fire alarm engineers have embraced technology to create a whole new way to transmit fire alarm via a radio frequency. Officers at two neighboring departments who were interviewed could not say enough about how much wireless radio alarms have improved the reliability and reduction of false alarms. Assistant Chief John Gaughan (personal communication, July 2010) reminds us that old copper phone lines are not only more expensive, they are also much less reliable. Pat Burke (personal communication, July 2010) from Woodstock Fire Department, added that wireless radio is not only more reliable, it is half the cost of the old hard line. MTFPD has been contemplating passing an ordinance to require end users to transmit their fire alarms to our dispatch center via wireless transmission. There have been many reasons MTFPD has not made the switch but it would appear the time has come. Wireless transmission has very little down side. The survey seems to prove that MTFPD's end users are not averse to making the switch. It would require education to the end user.

Lastly, most of the nation uses the NFIRS reporting systems to report calls. Part of this reporting includes classifying false alarms. The issue comes where everybody classifies their alarms differently. Examining our own data proved to be a real challenge. The false fire alarms are classified as either unintentional or malicious. Unless the shift commander puts some comments in the narrative about the exact cause, one could not discover it. The only way to find out the source of the alarm was to go right to the end user. Although the scope of this research has not solved the above issue, it is worth noting that it is a problem with our reporting system.

RECOMMENDATIONS

As stated earlier, the objective of this research paper is to identify strategies to reduce risk to both the citizens and firefighters caused by false fire alarms in MTFPD. Additionally, different ways were explored to possibly reduce costs and deliver a better way to transmit fire alarms to the dispatch center.

There were found to be five main causes of fire alarms as nearly 25% of the alarms are caused by storms/power outages. Second only to these causes was a phone line problems. These are issues that can be overcome by switching the ways end users have their alarms transmitted to the McHenry dispatch center. Discussions with neighboring departments make it clear that wireless transmissions of fire alarms is the best answer to reducing the number of fire alarms. They advised that there is virtually no downside to have alarms monitored via wireless means. By having alarms monitored using wireless transmission eliminates all phone, storm, and power outage alarms. It is estimated that MTFPD could reduce its false fire alarms by 38% or by about 100 alarms per year. This is a very obtainable fix that will take some up front commitment by the department by passing ordinances, educating end users and requiring all alarms to be monitored by MTFPD and be transmitted via wireless transmission.

The next most common causes of the alarms were caused by construction workers, battery failure or faulty detectors. These issues can be corrected by educating the end user about calling the alarm out-of- service when work is being done to the system or the system is being tested. It would include advising end users the importance of having regular maintenance to the system that would include changing the batteries regularly. MTFPD needs to institute an education program geared towards its end users to educate them about the above issues. The fire

prevention bureau or shift crews could implement such a program during inspections. If the education doesn't work, the MTFPD could pass another ordinance directed at progressively fining end users who continue to have false fire alarms. Other communities have very successfully instituted fines that progressively fine end users that have multiple false alarms over a certain period of time. It gives some incentives to keep their systems properly maintained.

With 99.5 % of all fire alarms being false, one must question the reason for sending 4 to 5 apparatus to all fire alarms. It has been proven over and over again that the most dangerous part of every fire call is the ride to and returning from the call. Second only to heart attacks, are accidents in apparatus that kill firefighters. It makes no sense to send two engines, an ambulance, a truck, and shift commander lights and siren to all fire alarms when history shows that less than 0.5% or 1 in every 256 calls is actually a fire. It is very important that MTFPD respond to all alarms, and realize the importance of having the proper resources available to assist the public in their time of need. However, the response at MTFPD can be modified so it is safer for the firefighters and citizens. The MTFPD should consider sending only the closest unit and possibly the shift commander lights and siren. All other units should respond no lights and siren with normal traffic. Once the first unit arrives on the scene, it can be determined what else is needed. The exception to this rule would be target hazards. Target hazards include occupied schools, hospitals, nursing homes, etc... These responses would remain the same by sending all equipment lights and siren like is done now. MTFPD should eliminate the ambulance response. This would keep one less vehicle off the road, and available for other calls. Research showed that many other departments have made similar changes to response with great success.

There is no one single answer to reduce risk to citizens and firefighters caused by false fire alarms. The answer takes a comprehensive approach to all aspects of the alarm. The bottom

line is that the end user cooperation is the key to reducing the alarms. Going to wireless transmission of alarms, educating, and fining end users is an effective way to reduce the number alarms in MTFPD. By altering the response to automatic alarms it can be made safer to respond to and return from alarms. All of this would help make the citizens as well as firefighters safer by reducing the number of alarms responded to, as well as making it safer by the way MTFPD responds to the alarms.

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APPENDIX A

McHenry Township Fire Protection District
Attn: Asst. Chief Mike Majercik
3610 W. Elm Street
McHenry, IL 60050

Fire Alarm Response Risk Reduction Survey
Executive Fire Officer Program

Please take a moment to help me evaluate the risk associated with fire alarm response for my Executive Fire Officer Research Project. When you are finished, please return to the address listed above. If you have any questions please do not hesitate to contact me at (815)669-5384.

Name of Fire Department: _____

Population of Response District: _____

What is your fire departments response to a trouble alarm?

_____

_____

Approximately how many trouble alarms does your fire department respond to annually since going wireless?

_____

Approximately how many trouble alarms did your fire department respond to annually before going wireless?

_____

What is your fire departments response to an activated fire alarm?

_____

_____

Approximately how many fire alarms does your fire department respond to annually since going wireless?

_____

Approximately how many fire alarms did your fire department respond to annually before going wireless?

_____

Has your fire department seen a reduction in nuisance/false alarms since going wireless?

_____

_____

In your fire department's response district is their 100 percent compliance in all buildings with the wireless fire alarm systems?

_____

If so, how where you able to obtain 100 percent compliance in getting all building to go wireless with their fire alarm system?

_____

_____

Did your fire department encounter any problems/road blocks while having the existing buildings go wireless? If so, what were the issues?

_____
_____

Has your department experienced any negative customer feedback in regards to the wireless fire alarm systems?

_____
_____

What is the annual cost to the occupancy for monitoring fees on the wireless fire alarm system?

_____

What was the average cost to the occupancy for monitoring fees prior to going wireless?

_____

Does your fire department require that all alarms be monitored by the fire department's dispatch center (no central station alarms permitted)?

_____

Does your fire department fine building owners/businesses for false alarms? If so, at what rate?

_____
_____

Does your fire department educate businesses/occupancies on how to prevent false alarms? If so, how?

_____
_____

Does your fire department educate businesses/occupancies on how to respond to fire alarm activation? If so, how?

_____
_____

Does your fire department have any emergency response/driving procedures in place to help reduce the risk associated with responding to fire alarms?

_____
_____

Additional Comments:

_____
_____
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Thank you for your participation

APPENDIX B

McHenry Township Fire Protection District
Attn: Asst. Chief Mike Majercik
3610 W. Elm Street
McHenry, IL 60050

Fire Alarm Response Risk Reduction Survey
Executive Fire Officer Program

Please take a moment to help me evaluate the risk associated with fire alarm response for my Executive Fire Officer Research Project. When you are finished, please return to the address listed above. If you have any questions please do not hesitate to contact me at (815)669-5384.

Name of the business and/or occupancy: _____

Address of business and/or occupancy: _____

_____

How many fire alarm activations do you average per year in your building?

_____

If you have experienced fire alarm activations in your building, what has been the cause of the activation?

_____

_____

How many times a year does your fire alarm panel go into a trouble alarm and require maintenance?

_____

If you have experienced trouble alarms that have required maintenance, what has been the cause?

_____

_____

Do you feel that your business or occupancy is adequately educated on how to prevent false fire alarms?

( ) Yes ( ) No Explain: _____

Do you feel that your business or occupancy is adequately educated on how to deal with a fire alarm activations?

( ) Yes ( ) No Explain: _____

What fire alarm monitoring company do you use?

_____

What is the average total cost per year for monitoring the fire alarm system?

If the cost was the same or less, would your business or occupancy be willing to go to a wireless fire alarm system if made available?

( ) Yes ( ) No ( ) More information needed

If the cost was the same or less, would your business or occupancy have an issue with an ordinance that would require all fire alarms to be monitored by the fire department?

( ) Yes ( ) No ( ) More information needed

Thank you for your participation