

**An Evaluation of Fire Apparatus Usage and Operating Cost for
Green Township Fire & EMS**

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CERTIFICATION STATEMENT

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ABSTRACT

Green Township Fire & EMS (GTFE) was one of the first communities in Greater Cincinnati to provide paramedic-level pre-hospital care to its citizens. In 2005, this service was expanded to include the response of a paramedic engine company to assist ambulance crews. The problem this research will address is that GTFE has vehicle operating expenses that are surpassing the allotted budget for fueling, maintenance, and repair. The purpose of this research is to determine a means of reducing GTFE's maintenance, fuel, and repair costs without a significant drop-off in service.

Four research questions were posed as a basis for this project:

1. Is a fire apparatus necessary on emergency calls that are medical in nature?
2. How much does it cost for fire apparatus to respond to emergency calls compared to other vehicles?
3. What disadvantages exist in abandoning or reducing the practice of sending fire apparatus in tandem with ambulances on EMS calls?
4. What do trends suggest regarding usage, fuel price, and maintenance costs for fire apparatus?

This research was evaluative and included a review of GTFE maintenance records, fuel logs, and emergency calls, as well as literature review to seek answers to the four research questions. The results indicate that realistic alternatives exist within GTFE without an increase in cost that would provide a similar service that currently exists.

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INTRODUCTION

Statement of the Problem

“As the stereotype goes, government bureaucracy is the antithesis of creativity. Yet, in times of austerity, creative thinking is badly needed. We need to do more with less” (Millar, 2012).

Fire departments across the nation have embraced the arrival of emergency medical services (EMS) as an appropriate way to enhance their services within their communities. Green Township is no different, even setting the bar in 1980 as being the first to provide paramedic-level service in Greater Cincinnati. As calls for EMS increased, more stations were built and more personnel were added to the stations, solely to provide staffing for ambulances. Suburban development soared in Green Township, with residential homes being built bigger and multi-family occupancies becoming commonplace, both with increasing amounts of steps and heavier people to carry. This combination was a sizeable challenge for the two-person ambulance crew. But sending more people on the ambulance crew seemed impractical, because rarely did the ultimate treatment and transport of the sick patient require more than that two-person team.

In 2005, GTFE began sending a fire apparatus with a three-person crew in tandem with their two-person ambulance crew to all EMS calls to assist with lifting, data entry, and treatment of the patient as needed. EMS calls outweighed fire calls by an 8:1 ratio, but the crew of the fire apparatus would arguably be better-utilized by assisting residents rather than staying back at the station. And because the three people on the fire apparatus were kept intact as they responded with their ambulance, (as opposed to a sole member or two of the fire apparatus responding in an alternate chase-type vehicle) they were able to break away as needed for additional fire or EMS calls.

In recent years, although GTFE had a standard four-month service plan in effect for all apparatus, the fleet was experiencing costly repairs beyond a routine nature. Brakes and tires were being replaced more frequently, and fuel costs were reaching record highs. Prior to 2012, the vehicle maintenance budget for GTFE absorbed most of these repairs, or money was borrowed by the general fund of the township. But as a result of recent state-reduced funding to townships and other municipalities, Green Township trustees ordered a 3% budget reduction for all departments (police, fire, and public works). Furthermore, the distinct possibility of the 3% materializing to 10% by 2013 also existed.

The problem this study addressed is that Green Township Fire & EMS' vehicle operating expenses surpassed the allotted budget for apparatus fueling, maintenance, and repair. The combination of the rising price of fuel coupled with the increased repair frequency of fire trucks due to their increased workload by responding to EMS calls has put a sizable strain on their ability to live within their budget for those items.

Purpose of the Study

The purpose of this study was to identify and describe factors affecting the increase in operating and maintenance cost of apparatus. Budget reductions with no guarantee of a return to the norm suggest that creative approaches to cost-cutting be examined without a noticeable interruption of emergency services. Ultimately, it will be examined as to whether or not Green Township can continue to use fire apparatus for non-fire-type activities, specifically EMS calls.

Research Questions

The following questions were answered by evaluative research:

1. Is a fire apparatus necessary on emergency calls that are medical in nature?
2. How much does it cost for a fire apparatus to respond to an emergency call compared to other vehicles?
3. What disadvantages exist in abandoning or reducing the practice of sending fire apparatus in tandem with ambulances on EMS calls?
4. What do trends suggest as far as usage, fuel price and maintenance costs for fire apparatus?

BACKGROUND AND SIGNIFICANCE

Green Township is the second-largest township in the state of Ohio, in terms of population density. Located in Hamilton County, its 27.8 square miles consist of 61,395 people. Since 2000, its population has grown 10% (Sperling, 2011). In 2011, Green Township Fire & EMS responded to 6,367 emergency runs, an average of 17.4 emergency runs per day. Fire runs accounted for 1,563 calls while emergency medical calls tallied 4,804 responses (Green Township News, Spring 2012).

Green Township Fire & EMS consists of four stations strategically placed throughout the community. A full staffing compliment is nineteen personnel on duty amongst the four stations. All personnel are cross-trained as firefighters and emergency medical technicians (EMT's) with most of the EMT's trained to the level of paramedic. In July, 2005, Fire Chief Doug Witsken realigned the township's staffing, and eventually added personnel. Up to that point, EMS calls were handled by a three-person ambulance crew, which also cross-staffed a fire apparatus at three of the township's four fire stations. Furthermore, it was estimated that 75% or more of the township's medical calls didn't require three personnel for transport, but the fire administration felt that sending only two responders to EMS calls was too few. Additionally, Chief Witsken felt very passionately about "crew integrity", or not breaking apart a crew assigned to a respective apparatus. With the realigned staffing, Station 54 and Station 55 (the township's two busiest stations) have five personnel on duty at all times. Staffing on the ambulance was dropped from three to two, and the fire truck was assigned three personnel. At least one paramedic would be on each apparatus, and together they would respond to medical calls in their district. Due to a lower call volume, three personnel staff Station 107, and they operate on a "first-

emergency-first” basis. When a fire call occurs, all three personnel respond on the fire apparatus, leaving the medic unit unstaffed. When a medical call occurs, two personnel respond in the medic unit and one person follows in a sport-utility vehicle (SUV); thus the fire apparatus sits unstaffed. When the township is at full staffing, Station 53 operates with five personnel, and in a similar fashion as Stations 54 and 55. When staffing is reduced below five personnel at Station 53, they operate like Station 107, on a first-emergency-first basis.

Three out of Green Township’s four stations send both a fire apparatus and an ambulance on all emergency medical calls. Up until recently, this was simply viewed as the cost of doing business. But now, this poses a problem as budgets are getting slashed and cuts are being made in several areas within the department of Fire & EMS.

Fire apparatus come with a variable price tag – \$400,000 to \$500,000 for a traditional pumper truck to upwards of \$750,000 to \$900,000 for a ladder truck. Since 1995, Green Township has purchased fire apparatus with Tax Increment Financing (TIF) funds. To put it simply, these are monies passed on to the township and local school districts by developers who are assessed a fee to build on township land that was earmarked as TIF property at the origins of the program in the early 1990’s, when several plots of vacant land existed. TIF funds may only be used for capital improvements, and may not be used for personnel, fuel or maintenance costs. These costs are to be absorbed by the budgets of the respective departments via the levies assessed to the residents. Essentially, although the residents aren’t paying for the purchase of a fire apparatus, they are paying for the people, fuel, and maintenance of the apparatus. But TIF funds will be eliminated in the year 2025, and the luxury of “free” apparatus replacement will be gone. A more reliable and disciplined apparatus usage program should be explored prior to the loss of TIF dollars, when GTFE’s budget will need to include apparatus replacement.

In 2004, GTFE implemented a four-month preventative maintenance schedule for fire apparatus. Despite this practice, maintenance and repair costs rose 120% from 2004 to 2012. However, emergency calls only increased by 14% in that same time frame (see Table 1). The variable that accounts for the rise in maintenance and repair costs is the addition of a fire apparatus responding to the township's vast majority of EMS calls in addition to the ambulance. Budget cuts have demanded that different approaches to all disciplines within GTFE be examined, and modifying apparatus usage may yield a lower apparatus operating cost.

Table 1

9 year Vehicle Maintenance Budget

Year	Budget ^a	% Increase since 2004 ^b	Run % Up over 2004
2004 ^b	\$30,000	-----	-----
2005	\$32,000	7%	8%
2006	\$36,500	22%	12%
2007	\$69,000	130%	14%
2008	\$85,000	183%	14%
2009	\$80,000	166%	16%
2010	\$81,000	170%	15%
2011	\$80,000	170%	15%
2012	\$65,000 ^c	116%	19%

^a Money spent on maintenance repairs

^b 2004 represents the last full year that fire apparatus did not respond to medical calls

^c Chief reduces maintenance budget hoping to avoid / postpone costly repairs

The potential impact this study could have on Green Township Fire & EMS is a reduction in how often a fire apparatus is utilized for non-fire-type emergencies. This could mean a reduced response of personnel on medical calls, which may yield more injuries due to fewer amounts of personnel available for lifting. This study may introduce the suggestion of a modified fire apparatus that would allow for more flexibility in handling both fire and medical calls while reducing operating and maintenance costs. Furthermore, if it is decided to drop personnel from the fire apparatus (either temporarily or permanently) to assist with medical calls, the fire apparatus will encounter challenges when faced with higher-impact fire calls such as building fires or entrapments due to a reduction in personnel. Lastly, this study may indicate more training for dispatchers via ride-alongs with local fire departments, in recognizing through their fielding of 911 calls, how many personnel will be required to remedy the emergency in question.

LITERATURE REVIEW

The literature review focused on evaluating why fire apparatus began responding to EMS calls. This was followed up with researching problems with America's growing obesity problem and the hardship it yields when only two care providers respond to an EMS call. Next, utilizing Firehouse Software, GTFE's available manpower for high impact fire calls was examined compared to simultaneous EMS calls. Lastly, research was conducted on trends for fire apparatus usage, fuel prices, fire apparatus maintenance forecasts, and projections of green technology available for fire apparatus.

Fire departments nationwide responded to 1.64 million fire calls in 2006, compared with 2.98 million in 1980, a 44 percent decline. But at the same time, they went on more medical

calls: from 5 million in 1980 to 15 million in 2006, a 200 percent increase (NFPA – 2007).

GTFE goes against the grain in that respect, experiencing a 74% increase in fire calls since 1990.

A fair analysis of GTFE fire apparatus responding to EMS calls compared to the national average cannot be completed due to GTFE only beginning to respond to EMS incidents with fire apparatus in 2005.

Rowe writes that firefighters didn't always respond to emergency medical calls. But as the incidence of structure fires began to fall sharply thanks to fire-resistant building materials and sprinkler systems, firefighters spent less time actually squirting water on fires and evolved to an all-emergency response squad. He goes on to report that the practice of sending a fire apparatus offers backup to the ambulance crew. Often, the personnel on the fire apparatus help by filling out forms, lifting heavy patients, or helping in some other way (Californian, 2009).

It has also been argued that fire departments' transitioning into larger roles in EMS is only natural. Due to fire stations being strategically located throughout cities and the fact that response time modeling is used for EMS just as it is used for fire suppression, having the two services housed under one department seems intuitive. Moreover, since firefighters are already trained to manage high stress and high risk situations, it seems the furthering of life-saving skills would be the logical next step (Roberts, 2010).

Assistant Chief Henry Hollander offers the following response when asked about the necessity of sending both a fire apparatus and an ambulance go to a medical call, stating "we hope for the best and prepare for the worst"(Hollander, 2012). This is consistent with the practices of the Grand Junction Fire Department in Colorado. A compliment of six responders is sent to most EMS calls. Although it may look like a lot of personnel at first, it quickly becomes clear that everyone has something to do on serious medical calls. One crew member gathers

patient information, another is obtaining a pulse rate, a blood pressure reading, and listening to lung sounds. Crew members are needed to set up intravenous fluids for medication administration and to also prepare the EKG cables for a heart rhythm interpretation. While all those things are occurring, another crew member is preparing a stretcher for transport and scouting out the safest way to remove the patient from their house. They offer that it is essentially like moving a temporary emergency room to the patient's location. When the patient is ready for transport to the hospital, three or four personnel work as a team to lift and safely place the patient onto the stretcher. This provides more stable and steady movement for the patient and provides a safer lift and transfer for the care providers, which reduces the risk of lifting injuries. There may be a lot to accomplish in an emergency situation, but when there are enough hands available, on-scene times can be minimal and the patient can get en route to a hospital quicker (Grandjunction.us, 2010).

In the Sedona, Arizona fire department when a 911 call occurs, dispatchers often do not get precise or complete information. As such, their dispatch is based on a worst-case scenario. To ensure the highest level of care, they send the closest fire apparatus (with three personnel) and ambulance (with two personnel), with each unit having at least one paramedic. They offer that no medical call is "routine." Most require assessing the patient, obtaining their vital signs, providing oxygen therapy, and moving them, at a minimum. The patient may also require intravenous drug administration, cardiac monitoring, spinal immobilization, or restraints. Their personnel say that they have no way of knowing what they will encounter on a call until they arrive, so they work in a "what if" and "all risk" business. In emergency services, they have learned that if they assume something is "simple" they can be horribly mistaken. The winner in those situations will always be the citizen who needs help (sidonafire.org, 2010).

GTFE Chief Douglas Witsken commented, “In 2005 we were fortunate enough to realign and add staffing to compensate for a 102% increase in EMS calls since 1990. With 75% of our EMS calls not requiring three personnel for transport, we took one person off of three of our three-person ambulance crews, redirected personnel from a slower station, and assembled a dedicated paramedic engine company at two of our busiest stations. This allows another emergency crew to respond to simultaneous emergency calls within their district, whether they are fire or EMS in nature” (personal communication, March 2013).

In their standard for the organization and deployment of emergency medical operations, the National Fire Protection Association, or NFPA, states in 1710-5.3.3.3.4 that personnel deployed to advanced life support, or ALS, medical responses shall include a minimum of two members trained at the paramedic level and two members trained at the emergency medical technician – basic level arriving on the scene within the established response time (NFPA – 2010).

The two paramedics need not arrive on the same unit. Some EMS systems utilize an approach of placing one paramedic on the ambulance and sending another one on a fire apparatus. This spreads out resources by placing paramedics on two separate vehicles, allowing for the delivery of advanced life support for simultaneous EMS calls. If the patient’s condition requires life-threatening intervention, the paramedic from the fire apparatus gets off and joins the paramedic and EMT from the ambulance crew (Ludwig, 2005).

Rowe adds that in flush financial times, the practice of sending a total of five responders in two vehicles drew little scrutiny. Now though, with the county, state and nation facing severe financial cutbacks, officials say they are examining every expense. Furthermore, he reports that

on most calls, paramedics on the ambulance say that neither the fire apparatus nor its crew are needed, and it's more of a luxury to have the fire apparatus on the scene (Californian, 2009).

Charles Grimes of Ferrara Fire Apparatus reports that per-mile costs for fire equipment depend on their use and the quality and regularity of maintenance, with the average routine and preventative maintenance costs for fire engines being \$4,500 (Californian, 2009). In comparison to Grimes' figure, Green Township's annual maintenance bill for Engine 54 and Engine 55 is more than double.

Mortenson cites that the old way of doing things – sometimes described as “sending everyone to everything” – is no longer economically or environmentally sustainable. The public increasingly asks why an expensive fire apparatus races across the city when there's clearly no fire. Fuel consumption and diesel emissions have become carbon footprint issues. Vehicle maintenance and replacement is costly (Oregonian, 2010).

In an effort to extend the life of their department's larger, more expensive fire apparatus, the Springfield Fire Department in Illinois is adding smaller rescue-type vehicles to replace fire trucks in responding to medical calls. Fire Chief Ken Fustin expects that fire apparatus will respond to as many as 5000 fewer medical calls with the addition of the newer rescue vehicles. Mayor Mike Houston supported the fire chief's plan and added that the vast majority of the fire department's calls were for medical emergencies. “Typically the fire department has responded to these calls using vehicles costing \$600,000 to over \$1,000,000”, Houston said. “The miles that result from these medical calls shorten the life of these very expensive vehicles. By using rescue-type vehicles that cost approximately \$125,000, we will be extending the life of our more expensive vehicles and be able to respond quicker and safer” (Stroisch, 2013).

The Vancouver Fire Department in Washington may soon be testing how well it works to send a SUV instead of a fire apparatus to lower level medical calls. Lower level medical calls include occurrences of back pain, minor assaults, and headaches. An eleven-member community resource team recommended the change in an effort to stabilize the department's budget without gutting services. Like other local public service departments, the Vancouver Fire Department has seen their costs outpace revenues. If the department continues with business as usual, the projected deficit of \$1.65 million in 2013 will grow to \$4.69 million by 2018 (Rice, 2012).

Idling vehicles are common in the public sector. Firefighters and EMT's allow their vehicles to idle to perform their duties, which include operating portable radios, emergency lights, laptops, power tools, and hydraulic equipment. The emissions generated from these tasks by cities all over the United States contribute to the fact that each year vehicles in this country consume more than six billion gallons of diesel fuel and gasoline – without moving. With fuel costs rising, a major fleet management challenge will be keeping emergency vehicles on the road to serve the public while staying within the budget (Wikipedia, 2012).

Most engines, ladder trucks, and other large vehicles such as heavy rescues, get anywhere from three to five miles per gallon of fuel. And an idling fire engine uses two gallons of diesel fuel every thirty minutes. These figures alone make it essential for fire departments to evaluate the manner in which they operate their fleet on emergency and non-emergent basis (Crawford, 2008).

James Dufford, a firefighter / paramedic assigned to GTFE Station 55, is hesitant in reducing the compliment of five personnel that are currently sent to most EMS calls in Green Township. "We are sent to a wide variety of EMS calls, and the person sending us, the dispatcher, cannot see the person in distress...they can only talk to them. They cannot see the

house, they cannot see they steps, and they cannot always get an accurate location of the patient within the house. While it is not every call that we need all five personnel to help care for the patient, it is certainly better to have them there or at least on the way, rather than have to wait for additional resources to be dispatched. Having the patient wait for procedures or care until more resources arrive isn't in our best interest, especially if an additional crew is just sitting around the firehouse" (personal communication, May, 2013).

Nearly every EMS system sends a unit to assist the ambulance for a number of reasons. Many times there is not always enough reliable information on the patient's condition to determine if additional help is needed. Valuable time may be lost if additional personnel are not dispatched until an ambulance arrives at the scene and makes an assessment. Also, even so-called "routine" medical calls require the patient to be removed from their home and lifted into the back of an ambulance. Even if the patient is not obese, it is safer for the patient and for the backs of the ambulance crew to have additional help to assist with moving and lifting (Henrikson and McGillivray, 7/2012).

The possibility of reducing the amount of GTFE responders to EMS calls comes at a time when the weight of an average American continues to climb. Both men and women have gained approximately twenty-four pounds between 1960 and 2002. In American men older than twenty, the average weight is 191 pounds, and for women the average is 163 pounds. Americans are also a bit taller than in the past, with both sexes averaging a one inch increase compared to 1960. The combination of the increased weight and height adds up to an overall increase in body mass index, which increased from twenty-five in 1960 to twenty-eight in 2002 (Hitti, 2004).

The task of transporting patients who weigh at least 100 pounds more than they should is now a daily reality throughout the nation. The job strains ambulance crews, causing widespread back injuries. Although advancements have been made to stretchers and ambulances to safely move and transport heavier, obese patients, the reality is that the patient still needs to be safely moved from their injured or sick position to get to the stretcher and ultimately the ambulance. Most of these jobs require extra muscle power and hands, often times resulting in firefighters helping the ambulance crew with lifting (Leavenworth, 2012).

Lifting patients, and particularly patients who may be in distress, is a very difficult task due to uncontrolled factors such as slippery, uneven ground surfaces and patient combativeness. Ambulance crews are routinely asked to lift and carry several times the NIOSH (National Institute for Safety and Health) recommended load limit of thirty-five pounds for most patient lifting tasks in healthcare. Although NIOSH criteria are not mandatory, ambulance crew members should be proactive and ask for assistance to lighten the load (Safe Lifting Portal, 2000).

Joseph Spears is a firefighter / paramedic with GTFE. Up until last year, Spears was assigned to Station 53, where EMS calls resulted in the response of five personnel. Recently, Spears was transferred to Station 107, where EMS calls are handled by three personnel. He had the following comments to share regarding his experiences on EMS calls. "In my opinion, I have not experienced a drop in our delivery of service on EMS calls when three of us respond versus five. Now, there are certainly times when five people are necessary, and we do a good job of getting more guys on the way in quick fashion in those circumstances. But, to drop below three personnel on an EMS call would certainly be a disservice to our customers. Three

personnel is a safe, effective number for an initial EMS response (personal communication, July 2013).

Patrick Gunn, President of Green Township Professional Firefighters IAFF (International Association of Fire Fighters) Local 2927 commented “The three firefighters that staff GTFE fire trucks is already below NFPA requirements and it is unrealistic due to the poor financial climate to think that the staffing of GTFE fire trucks will be increased anytime soon. Dropping a firefighter from a three-man engine company to respond in an SUV with the corresponding medic unit leaves that engine company unprepared to handle labor-intensive calls such as structure fires and some auto accidents. Responding to such emergencies with two firefighters is unsafe, and falls even further below NFPA staffing recommendations for engine companies. It is safer to keep the crews together, allowing a complete engine company of three personnel to break away as needed to simultaneous calls for service, whether they are fire or EMS-related” (personal communication, July 2012).

Michael Cramerding, a medical professional and a resident of Green Township, follows GTFE’s emergency response practices diligently, and weighed in on the possibility of its amending. “When people call 911, they are generally having their worst day...they have a problem with their body that renders them short of breath, in pain, or unable to move. If I have to call 911 for me, my wife, or my two kids, they better be sending more than just two people to help, especially if they have the ability to send more. My taxes pay for five firefighters in the firehouse that protects my home. If I need their help, I expect them to send enough people to help me and my family” (personal communication, May 2013).

Joe Abel is a firefighter and paramedic for GTFE, as well as for the Delhi Township Fire Department, the community immediately south of Green Township. While not as busy as Green

Township, Delhi Township shares similar demographics with Green Township. Joe offered his insight in comparing the EMS services provided by each community. “Delhi Fire Department sends a compliment of three responders utilizing a SUV responding with an ambulance to most medical calls. Serious calls such as cardiac arrests and traumas get an additional engine company for support. I can recall very few circumstances when we have had trouble handling an EMS call with three people on the scene” (personal communication, May 2013).

In this country, where in 2007 consumers used 142 billion gallons of gasoline, future expectations for gasoline prices are varied. But most economists predict that prices will stay between \$4 and \$5 a gallon for the next several years with a possible pull back to the mid to high \$3 mark at best. The bottom line is: chiefs who are waiting for fuel prices to return to 2006’s \$2.75 average and are not taking steps to improve their department’s fuel efficiency are being naïve, and, to a great degree, negligent (Crawford, 2008).

Fifteen or twenty years ago, it would not be uncommon for a fire pumper to be in service for twenty to twenty-five years. This same piece of equipment would accumulate about 50,000 miles in a twenty-year span. Trucks did not leave the stations except to respond to fire calls, to fuel, or to train. Today, with the introduction of fire-based EMS, trucks are on the road more and can easily accumulate 10,000 – 15,000 miles a year (Drake, 2005).

Some departments are preserving their fire apparatus and reserving them (and their crews) for serious EMS calls, in addition to fire-type calls. Jeff Heintz, a firefighter / paramedic with the Liberty Township Fire Department in Butler County Ohio commented on his department’s amended policy regarding fire apparatus response to EMS calls. “Liberty Township sends a two-person ambulance crew and a two-person SUV to all EMS calls. A three-person engine company responds to assist the ambulance and SUV only on serious EMS calls

such as cardiac arrests, traumas, or unconscious patients. The rationale behind this is to reduce the wear and tear on the fire trucks. SUV's have four tires to replace; fire trucks have six and sometimes ten tires to replace. SUV's are more maneuverable, they have an easier time stopping compared to a fire truck, and they arrive to scenes quicker than a fire truck. There is also a significant savings in fueling a SUV compared to a fire truck, and a substantial difference in the miles-per-gallon" (personal communication, July 2013).

According to Chris Ferrara of Ferrara Fire Apparatus, introducing a hybrid-style fire engine remains a low possibility in the future. With the recent decisions of Caterpillar and Detroit Diesel to discontinue their production of fire apparatus engines, only Cummins remains, leaving little option except to use what's available. Additionally, more stringent Environmental Protection Agency (EPA) emission standards that went into effect in 2010 could cause engines to use more fuel because they cause engines to run hotter. More fuel will be needed to generate higher revolutions that create the heat needed to burn off the byproducts of soot and other exhaust contaminants (Ferrara, 2008).

Fire trucks bear a traditional red color, but look for them to become more "green" in the future. Lawrence-Douglas County Fire Medical in Lawrence, Kansas is experimenting with solar panels on their fire trucks and ambulances to reduce idling time and related fuel costs. Ambulance panels are easy to locate, but fire trucks with light towers and air conditioning units present more of a challenge; but as solar panel technology continues to improve, this will be an easier task to accomplish (McLoone, 2011).

In a 2005 article in Fire Chief Magazine, Chief Alan Saulsbury (ret) offers his insight as it relates to fire department inventory for apparatus, not including EMS transport vehicles.

Today the average fleet looks something like this, regardless of department size:

- 50 % pumpers
- 15% tankers
- 15% aerial devices
- 20% rescue and support vehicles

If 95% of today's responses are for non-fire incidents, why is 80% of our fleet designed for only 5% of our calls? As fire apparatus fleets grow to accommodate specialized vehicles, the percentage of fire vehicles will decline. The remaining pumpers and aerials will be modified and updated to supply a wider scope of support services.

Compare this to the projected fleets of the year 2020:

- 40% pumpers
- 15% tankers
- 10% aerial devices
- 35% rescue and support vehicles (Saulsbury, 2005).

Utilizing the U.S. Energy Information Associations (EIA) data for gasoline and diesel prices, both fuel options hit record highs for 2012, with gasoline averaging \$3.62 per gallon and diesel averaging \$3.97. The average cost of gasoline from 2008-2012 was \$3.20 per gallon and diesel fuel averaged \$3.41 per gallon (EIA, 2012).

HME is the world's first manufacturer of fire apparatus to introduce a 100% natural gas-powered fire truck to the firefighting industry. The apparatus engine meets all present EPA emission standards without additional filters or exhaust treatment devices. Additionally, it uses domestically-produced fuel, lessening the dependence on foreign oil. HME's product of a 8.9 liter, 320 horsepower engine is specifically tailored for high-frequency EMS, fire and rescue runs

that occur in today's fire service, and it exists in an environmentally-friendly manner (Fire Engineering, 2010).

PROCEDURES

The initial research for this paper submitted via the Ohio Fire Executive (OFE) program began with a thorough review of several Green Township Fire and EMS' maintenance records and fuel usage spanning the years 2009-2011. Line item budgets for Green Township Fire and EMS were reviewed to compare adjustments made to allow for increases in fuel purchases and maintenance expenses. Emergency calls for the years 2009-2011 were reviewed for "high impact fire calls" such as building fires and motor vehicle crashes with entrapment. This was done to see if these types of calls occurred frequently enough to have an impact on the possibility of a short-staffed fire truck if it was decided to temporarily shift personnel to respond in a smaller vehicle with the ambulance to EMS calls.

Next, the EMS response of similarly-sized departments was examined for similarities and differences. Also, other communities who send a fire truck in addition to an ambulance to medical calls were reviewed to identify their logic in sending such a compliment of responders. Additionally, it was examined what other departments with similar budget woes are doing to reduce apparatus costs. NFPA 1710 was used to cite national standards for EMS response. Miles per gallon and fuel consumptions were compared between Green Township Fire & EMS engine companies that respond to medical calls versus a Green Township Fire & EMS station that utilizes a SUV in lieu of an engine company in support of the ambulance crew.

Research was expanded to include articles relevant to fire truck usage beyond fire-type calls, and the costs associated with the operation of fire trucks and SUV's. Historical data and future projections of fuel prices as well as trends in apparatus maintenance were also reviewed. Guidance was sought via archived applied research papers within the OFE program, as well as the Executive Fire Officer program through the National Fire Academy. Interviews were conducted with the chief of Green Township Fire & EMS, paramedics within GTFE and neighboring fire departments, and a citizen that resides in Green Township. The data collected pertaining to the procedures was analyzed and when applicable, it was transformed into tables which can be found in the appendix of this research.

Definition of terms

EMS. The integrated system of medical response established and designed to respond, assess, treat, and disposition victims of acute injury or illness and those in need of medically safe transportation (National EMS Management Association, 2012).

Ambulance. A vehicle for transportation of sick or injured people to, from, or between places of treatment for an injury or illness (Wikipedia, 2012).

Fire truck. Any of various large trucks that carry firemen and equipment to the site of a fire (Wikipedia, 2012).

Sport Utility Vehicle. A rugged automobile similar to a station wagon, but built on a light truck chassis (Wikipedia, 2012).

Fire-resistant. So resistant to fire that for a specific time and under conditions of standard heat intensity it will not fail structurally or allow transit of heat (Merriam-Webster, 2012).

ALS. Advanced Life Support. A higher level of emergency medical care for sustaining life, including defibrillation, airway management, and drugs and medications (Mosby's Medical Dictionary, 2009).

EMT. A person trained and certified to appraise and initiate the administration of emergency care for victims of trauma or acute illness before or during transportation of the victims to a health care facility via ambulance or aircraft (Mosby, 2012).

Paramedic. A member of an ambulance crew trained in a number of ALS support skills, including infusion and cardiac care (Mosby, 2012).

Engine Company. Basic unit of fire attack consisting of apparatus and personnel trained and equipped to provide water supply, hose lines, location, and removal of endangered occupants, and the treatment of the injured when necessary (Brunacini, 1985).

Rescue / Specialty Vehicle. Special fire or rescue vehicle containing rescue tools, EMS supplies, and in some departments, forcible entry, lighting, air supply, ventilation equipment, or other special services (Brunacini, 1985).

Tanker. A specialist fire apparatus with the primary purpose of transporting large amounts of water to the fireground to make it available for extinguishing operations (Wikipedia, 2012).

Aerial Devices. Apparatus equipped with ladders that allow access or egress of firefighters and casualties at height, provide a high level of water point (elevated master stream) for firefighters, or provide a working platform from which tasks such as ventilation or overhaul can be executed (Wikipedia, 2012).

NFPA. National Fire Protection Association. A United States trade association that creates and maintains private, copyrighted standards and codes for usage and adoption by local governments (Wikipedia, 2012).

Entrapment. Refers to persons being partially or completely in the vehicle and mechanically restrained by a damaged vehicle component (Transportation-Dictionary, 2011).

Tax Increment Financing (TIF). A public financing method that is used as a subsidy for redevelopment, infrastructure, and other community-improvement projects (Wikipedia, 2013).

NIOSH. National Institute for Safety and Health. Part of the Center for Disease Control that is responsible for conducting research and making recommendations for the prevention of work-related illnesses and injuries (www.cdc.gov, 2013).

SAFER. Staffing for Adequate Fire and EMS Response. A federal grant program created to provide funding directly to fire departments to help them increase or maintain the number of trained, front-line firefighters available in their communities (www.fema.gov, 2013).

IAFF. International Association of Fire Fighters. A labor union representing firefighters in the United States and Canada (Wikipedia, 2013).

Limitations of the Study

This study was designed primarily for a medium-sized suburban fire and EMS department in southwest Ohio. Due to manpower distribution, call volume, and apparatus, it may not be applicable to all fire and EMS departments. Private-based EMS was not examined because it is not utilized in the region, nor has any interest been generated in pursuing such services. NFPA was the only known organization that could be referenced for standards regarding EMS responses. Fuel records for Green Township Fire and EMS are incomplete; only

certain stations track fuel usage. Thus, when comparing fuel usage, only apparatus housed where fuel records were recorded could be included in the research.

RESULTS

Fire trucks began responding to EMS calls essentially as a means of job security. With fire calls decreasing due to amped up fire prevention measures, firefighters added EMS to their portfolio. Communities that send a fire apparatus to EMS calls in addition to their ambulance crew feel that too many responders are better than too few, often finding some sort of job for everyone on the scene. NFPA recommends that a minimum of four responders be sent to ALS emergency calls. While some departments have the money and manpower to assign personnel solely to a SUV / chase vehicle to assist the ambulance crew, many do not, and thus they elect to use the crew from the fire apparatus to supplement the ambulance crew.

The maintenance records of two of GTFE's busiest fire apparatus were reviewed and compared with a fire apparatus that only responds to fire-type calls, as well as a SUV that responds to EMS calls in lieu of a fire apparatus. The comparison showed that a GTFE fire apparatus that is primarily used solely for fire-type calls has a cost-per-mile that is over fifty percent lower than two of GTFE's fire apparatus that routinely respond to both fire and EMS calls within their district. Furthermore, the SUV assigned to Station 107 and responds in lieu of a fire truck to EMS calls incurs only a three cent cost-per-mile (Firehouse Software, 2012). See these comparables on Table 2 in Appendix 1.

With reports of fuel costs not decreasing in the near future, it was pertinent to review the possible savings of substituting a SUV for a fire apparatus in the supplemental response of EMS calls for GTFE. In 2011, Engine 55 consumed 3058.88 gallons of fuel and averaged 2.47 miles

per gallon fuel efficiency. Conversely, Car 5377, a SUV assigned to Station 107 and responds in tandem with a two-person medic unit in lieu of a fire truck (due to fewer personnel assigned to the station) averaged 11.05 miles per gallon. Table 3 in Appendix 2 identifies this statistic (Firehouse Software, 2012).

Furthermore, if Engine 55's role were to be reduced to responding on only half on their station's EMS calls, their preventive maintenance costs would be reduced by thirty-seven percent over a three year period. Additionally, Engine 55's adjusted cost per mile would drop almost thirty-four percent (Firehouse Software, 2012). Table 4 in Appendix 3 explains these savings.

The weight of the average American has an impact on EMS responses. GTFE routinely sends up to five personnel to EMS calls. Reducing that number to two in some cases may place responders in awkward lifting positions, which may yield more lifting-related injuries. NIOSH's recommendations suggest that one responder should be present for every thirty-five pounds of patient weight. If the average adult weight is 177 pounds, five emergency personnel should be available on the scene to move or lift that patient.

In the years 2009-2011, Green Township responded to 69 building fires and 21 motor vehicle accidents with entrapment (Firehouse Software, 2012). These two dispatch events represent the two most demanding types of incidents requiring the most personnel available on the initial arriving apparatus. In the event it is decided department-wide that GTFE will utilize chase cars in-place-of fire apparatus to respond in tandem with a medic unit to EMS calls, the respective fire apparatus will be temporarily short-staffed. Table 5 in Appendix 4 examines the occurrence of building fires and entrapments between 2009-2011, and whether or not an EMS call was occurring simultaneously within the same district, resulting in a reduced personnel compliment for the first-due fire apparatus. The results show that GTFE has a three-person fire

apparatus crew intact over ninety-two percent of the time when a building fire or entrapment occurs.

With private EMS non-existent in southwest Ohio, area fire departments are tasked with providing all of the manpower for all EMS patient assessments and transports. It is commonplace for surrounding communities to send some sort of supplemental response in the aiding of the responding ambulance, with both vehicles coming from the same department, but not necessarily the same station. Table 6 in Appendix 5 compares the vehicles used for EMS calls in the aiding of the responding ambulance.

While six-figure savings may not be possible in the short-term, if GTFE were to look at the results of this research, they would realize that significant dollars could be saved immediately without a significant drop in service. Simply by shutting off fire apparatus on half of their EMS responses, over \$6000 could be saved annually on fuel. Furthermore, if fire apparatus shut down their engines on low-level fire responses, over \$3000 more could be saved annually. A reduction in fire apparatus usage for non-fire-type calls will result in less wear and tear on fire apparatus. This will result in greater life spans for tires, brakes, belts, and shocks. Collectively, these measures will allow money to be saved out of the general operating budget of GTFE, and perhaps redirected towards personnel or training programs. Additionally, the elimination of TIF funds in 2025 will require apparatus purchases from the operating budget. By adopting these measures now, better apparatus operating discipline will be in full swing when greater financial struggles appear in the future.

DISCUSSION

From 1980-2006 the United States saw fire apparatus experience a 44% decline in fire-type responses, while it saw them respond 200% more often to EMS calls. GTFE went against the

norm when it came to fire calls, experiencing a 74% spike from 1990-2006. Furthermore, with GTFE just beginning to send fire trucks on EMS calls in 2005, they would obviously see a substantial increase above the national trend.

While GTFE's fire calls have increased, Chief Douglas Witsken's motivation for adding additional personnel and subsequently more staffed apparatus in 2005 was a 102% increase in EMS calls from 1990-2004. Rather than purchasing more ambulances and assigning more personnel to that capacity, cross-trained firefighter-paramedics assigned to fire apparatus would first-respond to simultaneous EMS calls and render aid until a next-due transport unit arrives, as well as being available for fire-type calls.

Examining Assistant Chief Henry Hollander's statement regarding why fire trucks respond to medical calls in addition to the ambulance, "we hope for the best and prepare for the worst", GTFE follows a similar style. The salaries of the personnel in each firehouse are already paid for at the beginning of each shift. If five people are available to help a person in distress who dials 911, it is debatable to say as to whether or not some should stay behind and either continue their training, exercise, finish their dinner, watch TV, or sleep. GTFE prefers to send five responders all at once instead of sending too few initially and have the customer wait for additional resources. Essentially, it is the crew on the fire apparatus, rather than the actual fire apparatus / vehicle that is needed on EMS calls.

Established in 1896, NFPA's mission is to reduce the worldwide burden of fire and other hazards on the quality of life by providing and advocating consensus codes and standards, research, training, and education. They are the world's leading advocate of fire prevention and an authoritative source on public safety, and therefore their standards are relevant to this research (NFPA, 2010).

While compliance with NFPA is unrealistic for some fire departments due to reduced funding, personnel shortages, or a low call volume, those that have the staffing to comply with NFPA's standard for EMS response – four responders for ALS calls – should strive for compliance. Green Township has five personnel assigned to three of four fire stations. Sending four to an EMS call while having the fifth alone at a station seems impractical. However, with some calls for BLS emergencies requiring a limited EMS response, Rowe's offering of the fire truck crews' presence being a luxury holds merit.

Recent calls for budget cuts by Green Township trustees have put less-than-desirable items on the chopping block, such as staffing and training. This research suggests that there are more indirect ways to save money and perhaps avoid undesirable cuts. Wear and tear on fire trucks has increased substantially for GTFE, and it is more than double in some cases in comparison to Ferrara Fire Apparatus' recommended average of \$4500 annually for routine and preventative maintenance costs. Reducing fire truck usage would save some money in not only fuel costs, but the prolonging of inevitable wear and tear.

Several fire departments across the nation are purchasing alternative SUV-type vehicles in lieu of fire trucks for supplemental EMS response. GTFE currently has an SUV-type vehicle in all fire stations, so the expense of purchasing new vehicles is irrelevant. Furthermore, the availability of TIF funds allows GTFE to explore future vehicle purchases without worrying about that expense cutting into the operating budget. Two neighboring departments employ an SUV and a crew member to supplement their ambulance's response to EMS calls. Abel reports that there is rarely a noticeable drop-off in service when he compares the three-person response of Delhi Township Fire Department compared to the five-person response of GTFE. Spears concurs, comparing his current position in a three-person station at GTFE with his previous

assignment at a five person station, offering that a similar service can be delivered with three personnel.

With over 300,000 members, the IAFF is one of the driving forces behind several advances in fire and EMS services. One of their most profound achievements is assisting in the enactment of the SAFER (Staffing for Adequate Fire and Emergency Response) grant program. The IAFF is the primary advocate for providing firefighters and EMS workers with the tools they need to perform their jobs. Because the IAFF has an active presence in the political and legislative arenas, and with recognized experts in the fields of occupational health and safety, the voice of their leadership is relevant in this research (www.iaff.org, 2013).

Because of GTFE's staffing alignment amongst their four fire stations, any modification of the personnel distribution will result in the reduced staffing of fire trucks. Although it falls below NFPA recommendations, Green Township Professional Firefighter's President Patrick Gunn has accepted a fire truck staffed with three firefighters as the norm for GTFE. However, moving one or two off of the fire truck to make an EMS call worsens an already less-than-desirable situation, and could render the fire truck out of service. But a review of high-impact fire calls (building fires and entrapments) from 2009-2011 showed that first-due fire trucks were in-service with a crew of three more than ninety-two percent of the time. EMS calls occurring in the same first-due district at the same time as a high-impact fire call required ALS beyond the two people assigned to the ambulance only eight percent of the time in that three year period. Mortenson's citation of "sending everyone to everything no longer being economically sustainable" holds merit, especially if GTFE can provide ALS services with simultaneous fire protection over ninety-two percent of the time.

For GTFE to completely abandon the practice of sending fire apparatus on EMS calls would be irresponsible. Having the additional personnel available for lifting not only the patient, but also the stretcher, is certainly beneficial. Leavenworth states that transporting patients that weigh 100 or more pounds than they should is a daily reality in America. It is unrealistic to think that a two-person team can safely lift a patient weighing 200 pounds. As opposed to private ambulance services who generally transport patients from one bed to another either from a hospital bed to a nursing home bed, or vice versa, EMS ambulance crews often find patients in precarious positions; the bottom of a flight of steps, maybe wedged between a toilet and a bathtub, or on the third floor of a multi-family dwelling with no elevator. Furthermore, private ambulance crews often have the convenience of the crew of the first-responding fire apparatus to assist with lifting.

As reported by Saulsbury, apparatus trends are showing a shift away from a fire-truck dominated force. Rather, more specialty-type vehicles are being specified and used to assist with EMS responses. GTFE's access to TIF funds certainly makes the purchase of apparatus much easier than most fire departments who struggle to fit new apparatus purchases into their budgets. While the purchase of a vehicle to assist an ambulance in EMS response is more convenient for GTFE compared to other jurisdictions, assembling a separate crew for the vehicle would be a challenge. NFPA recommends four responders for ALS emergencies. If two personnel are temporarily detailed off of a fire apparatus to respond in a SUV to assist an ambulance crew, only one crew member will remain back at the station to staff the fire apparatus. A fair compromise would be for one crew member to separate from the fire apparatus to respond in a SUV for most EMS calls, but for the three crew members of the fire apparatus to respond together in the fire apparatus to assist the ambulance with life-threatening EMS calls.

HME touts a compressed natural gas engine as an attractive environmentally-friendly alternative to diesel engines. However, their current model engine has only 320 horsepower. Fire apparatus generally have a higher horsepower, closer to 400 or 500, which allows them to pull hills while carrying extra weight in the form of tools, water, hose, and ladders.

Low miles-per-gallon coupled with unnecessary engine idling are yielding high fuel usage for GTFE. The US Energy Information Association reported that fuel costs reached record highs in 2012, with no expectation of a recession in fuel costs in the foreseeable future. Avoiding fire trucks when they're not necessarily needed and shutting off their engines on low-magnitude emergency scenes, as well as investing in solar panel technology would be a prudent set of steps for GTFE. This would show both the elected officials and the citizens of Green Township that there is a plan in place to save money. Furthermore, green improvements such as solar panels can be paid for with TIF funds, thus preserving GTFE's budget for more pressing items.

RECOMMENDATIONS

Based on the findings of this research, Green Township Fire & EMS should consider implementing the following practices to establish better discipline in preserving fire apparatus and reducing preventative maintenance, fuel, and repair costs. The following recommendations appear in no particular order of importance.

1. Use information gathered from dispatches to send a more appropriate compliment of personnel and apparatus. EMS dispatches would be categorized into 3 groups: (a) basic emergencies requiring a two-person ambulance crew, (b) advanced emergencies requiring a two-person ambulance crew followed by one person in an SUV, and (c)

- serious emergencies requiring the response of a two-person ambulance crew as well as a three-person fire crew. See Table 7 in Appendix 6.
2. Designate one member of the fire apparatus crew as the “medic chaser” who will assist the two-person ambulance crew on certain EMS responses utilizing a SUV.
 3. Maintain fuel records at all four fire stations. Presently this occurs via a “Gasboy” code system at two of GTFE’s four fire stations. The other two stations have inconsistent practices of recording fuel refills using pen and paper. This data is inaccurate and not tracked regularly. Electronic “Gasboy” systems should be purchased for all fire stations.
 4. Fire apparatus should begin shutting off their engines at most EMS scenes and some low impact fire call scenes. This will yield moderate savings in fuel consumption.
 5. Pursue the purchase of solar panels for fire apparatus and ambulances. Solar panels can be purchased with TIF money and will aid in energy conservation and reductions in fuel usage.
 6. Consider trading in Engine 54 and Engine 55. Both of these apparatus have had an extensive repair history. New fire apparatus can be purchased with TIF money.

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APPENDIX 1 – APPARATUS USAGE VS MAINTENANCE COSTS

Table 2

Comparison of Apparatus Usage and Maintenance Costs from 2009-2011

Apparatus	EMS calls	Fire calls	mileage	repairs	cost/mile
Engine 54 ^a	3887	1511	32,407	\$29,756	\$1.08
Engine 55 ^a	3979	1367	22,264	\$27,285	\$1.23
Engine 107 ^b	n/a	728	8474	\$16,226	\$0.52
Car 5377 ^c	2032	n/a	10,560	\$416.35	\$0.03

^a*Engine Companies that are staffed with 3 FF's and respond in tandem with their respective medic unit*

^b*Due to shared staffing, this apparatus does not respond to medical calls*

^c*This vehicle is used by 1 FF in a 3-person station to respond with the other 2 FF's on Medic 107 for EMS calls*

APPENDIX 2 – FUEL USAGE COMPARISON**Table 3***2011 Fuel Usage Comparison*

Apparatus / Vehicle	Gallons of Fuel	2011 mileage	Miles Per Gallon
Engine 55	3058.88	7584.5	2.47
Car 5377	328	3628	11.05

APPENDIX 3 – ENGINE 55 REDUCTION RESULTS

Table 4

Engine 55 Maintenance Bill

Apparatus	3 year mileage	3 year repairs	Cost per mile
Engine 55	22,264	\$27,285	\$1.23

Engine 55 EMS Response Reduction

50% reduction ^a	Adjusted mileage ^b	Adjusted repairs ^c	New cost per mile ^d
8237	14,027	\$17,190	\$0.82

^a Represents the total miles saved over 3 years if Engine 55's EMS responses were reduced by 50%

^b Represents the 3-year approximate mileage if Engine 55 had a 50% reduction in EMS responses from 2009-2011

^c Represents the adjusted cost of maintenance and repairs over a 3-year period if Engine 55 had a 50% reduction in EMS responses

^d Represents the updated cost per mile if Engine 55 had a 50% reduction in EMS responses

APPENDIX 4 – HIGH IMPACT FIRE CALLS

Table 5

Occurrence of EMS Calls Within the Same District as a Building Fire or Entrapment 2009-2011

Fire Company	Building Fires	Entrapments	EMS Run ^a	Crew Intact ^b
Engine 54	20	8	2	93%
Engine 55	21	2	1	96%
Quint 53	15	11	3	89%
Total	56	21	6	92.2%

Note. Engine 107's numbers were not included because they cross-staff a medic unit, making simultaneous EMS calls irrelevant for them in this study.

^a*Times when an EMS call is occurring during a high magnitude fire-type response resulting in the first-due fire company being short staffed if their 3rd crew member is in a chase car at the EMS call*

^b*Percentage of high magnitude fire-type calls when an EMS call is not occurring in the first-due district, resulting in the response of an intact 3-man fire company*

APPENDIX 5 – EMS RESPONSE COMPARISON

Table 7

Comparison of EMS Response for Hamilton County Departments

Department	Responders ^a	Chase Vehicle ^b	Daily call volume	Population
Green Twp	3	Engine Company	18.2	61,395
Delhi Twp	1	SUV ^c	8.6	30,104
Harrison	2	SUV ^C	5.5	14,853
Anderson Twp	2	Engine Company	14.9	43,446
West Chester Twp	3	Engine Company	19.7	60,958
Liberty Twp	1	SUV ^c	10.5	37,259

^a *How many personnel respond in addition to the dispatched ambulance – consisting of 2 personnel*

^b *Type of vehicle used to supplement the response of the ambulance, with all vehicles coming from the same station*

^c *This is either replaced or supplemented by an engine company on calls for cardiac arrest*

APPENDIX 6 – PROPOSED RUN CARD

Table 8A

Proposed EMS Run Card

Dispatch Event ^a	Level	Medic Only ^b	SUV ^c	Engine Company ^d
Auto Accident with Injuries	ALS 2			x
Auto Accident – per struck	ALS 2			x
Medical Alarm	ALS 1		x	
Person Assaulted	BLS	x		
Abdominal Pain	ALS 1		x	
Animal Bite	ALS 1		x	
Allergic Reaction	ALS 1		x	
Person Burned	ALS 2			x
Back Pain	ALS 1		x	
Person Choking	ALS 2			x
Chest Pain / Heart Attack	ALS 2			x
Hypothermic Emergency	ALS 1		x	
Drowning	ALS 2			x
Diabetic Emergency	ALS 2			x
Electrocution	ALS 2			x
Eye Injury	BLS	x		
Fall Injury	ALS 1		x	
High Fever	BLS	x		
Headache	BLS	x		

APPENDIX 7 – PROPOSED RUN CARD (CONTINUED)

Table 8B

Dispatch Event ^a	Level	Medic Only ^b	SUV ^c	Engine Company ^d
Hyperthermic Emergency	ALS 1	x		
Industrial Accident	ALS 2			x
Laceration	BLS	x		
Lift Assist	ALS 1		x	
Psychiatric Emergency	ALS 1	x		
OB / Miscarriage	ALS 2			x
Non-Breather / Arrest	ALS 2			x
Overdose	ALS 2			x
Poisoning	ALS	x		
Seizure	ALS 2			x
Suicide threat / attempt	ALS 1		x	
Stroke	ALS 1		x	
Sick Person	ALS 1		x	
Person Shot / Stabbed	ALS 2			x
Trouble Breathing	ALS 2			x
Unconscious	ALS 2			x

^a Represents the Hamilton County dispatcher's options when categorizing an EMS request

^b Requires the response of only a two-person ambulance crew initially

^c A chase car / SUV will respond to assist the two-person ambulance crew.

^d A fire apparatus / engine company will respond to assist the two-person ambulance crew.