

**A Proposed Plan of Action to Develop and Implement a Technical Rescue Program
for the Kettering Fire Department**

By: Mitch Robbins
Shift Commander
Kettering Fire Department
2329 Wilmington Pike
Kettering, OH 45429

A proposed research project submitted to the Ohio Fire Executive Program

30 July 2010

CERTIFICATION STATEMENT

I hereby certify that the following statements are true:

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

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

Signed: _____

Printed Name: _____

ABSTRACT

In the past, the Kettering Fire Department has responded to numerous technical rescue incidents in which the department was unable to participate at the expected level of performance due to training and equipment deficiencies. Inadequate training has caused members to operate equipment and to perform in situations exceeding their competency levels. The problem the study will address is if the existing technical rescue training and equipment at the Kettering Fire Department adequately ensure an appropriate response to a technical rescue incident.

The purpose of the study was to identify the technical rescue needs of the Kettering Fire Department and the city it serves and to utilize those results to create and to implement an appropriate response capability for technical rescue incidents.

The following questions were answered by evaluative research:

1. What are the technical rescue needs of the Kettering Fire Department and the community it serves?
2. What are the training and equipment requirements necessary to insure an effective technical rescue program which complies with applicable national standards?
3. Are regional resources available to assist the Kettering Fire Department in a technical rescue incident?

The procedures utilized for the research project were researching via a literature review, creation of a mission/vision statement, completion of a SWOC analysis, exploring a local training and research facility, completion of an internal survey, performing a risk assessment, benchmarking local departments, and researching existing city resources.

The results of the survey indicated a lack of members' confidence in personal, peer, and leadership's level of technical rescue knowledge, skills, and abilities. The SWOC detailed an organization with fewer strengths than weaknesses in regard to technical rescue. Researching the

local training facility concluded it was not presently an option. The risk assessment confirmed the presence of hazards within the city. Benchmarking local departments confirmed aid from regional resources is a possible option for the Kettering Fire Department. And, examining other city departments verified existing city resources.

The potential impact of the study on the Kettering Fire Department is a recommendation of the creation and implementation of a detailed and documented technical rescue program which is actively supported and practiced by the department. A program would enable the members of the department to operate appropriately at a technical rescue incident with the proper equipment and training which will allow for the prevention of injury or death to victims and/or rescue responders.

TABLE OF CONTENTS

CERTIFICATION STATEMENT	2
ABSTRACT	2
TABLE OF CONTENTS	4
INTRODUCTION.....	5
Statement of the Problem	5
Purpose of the Study	6
Research Questions	6
BACKGROUND AND SIGNIFICANCE	7
LITERATURE REVIEW	11
PROCEDURES	16
Definition of Terms	19
Limitations of the Study	24
RESULTS.....	25
DISCUSSION	42
APPENDIX A – Survey	48
APPENDIX B – SWOC Analysis.....	51
APPENDIX C – Benchmarking Questionnaire	54
APPENDIX D – Benchmarking Reponses Graph	57
APPENDIX E – KFD Technical Rescue Equipment Inventory	58
APPENDIX F – Street Department Equipment for Technical Rescue	63

INTRODUCTION

Statement of the Problem

Technical rescue refers to those aspects of rescuing life or property which employ the use of apparatus and abilities exceeding those normally reserved for firefighting, medical emergency, and rescue. Technical rescue examples include: vehicle and machinery search and rescue, wilderness search and rescue, rope rescue, water search and rescue, confined space search and rescue, trench/excavation search and rescue, and structural collapse search and rescue, etc. These types of rescue are often extremely dangerous, physically demanding, require the correct equipment, and entail extensive practical training.

According to the Technical Rescue Program Development Manual published by the United States Fire Administration and the Federal Emergency Management Agency (1995), “Many fire departments and rescue agencies across the country have recognized that their baseline skills and their existing equipment are insufficient for rescue incidents that have occurred or may occur in their response areas.”

Unfortunately, in the past several years the Kettering Fire Department (KFD) has responded to numerous Technical Rescue incidents in which the department was unable to participate at the expected level of performance due to training and equipment deficiencies. Inadequate training has caused members to operate equipment or perform in situations exceeding their competency levels. *The problem the study will address is if the existing technical rescue training and equipment at the Kettering Fire Department adequately ensure an appropriate response to a technical rescue incident.*

Purpose of the Study

The purpose of the study was to identify the technical rescue needs of the Kettering Fire Department and the city it serves and to utilize those results to create and to implement an appropriate response capability for technical rescue incidents.

Research Questions

The following questions will be answered by evaluative research:

- 1. What are the technical rescue needs of the Kettering Fire Department and the City of Kettering?*
- 2. What are the training and equipment requirements necessary to insure an effective technical rescue program which complies with applicable national standards?*
- 3. Are regional resources available to assist the Kettering Fire Department in a technical rescue incident?*

BACKGROUND AND SIGNIFICANCE

The City of Kettering Fire Department provides initial fire and emergency medical services to approximately 58,000 residents and roughly 17,000 businesses. Also, the Kettering Fire Department provides contracted assistance to the city of Dayton and, if requested, assistance to the cities of Oakwood, Moraine, Riverside, Washington Township, and Beavercreek. The Kettering Fire Department is accountable for the 18.5 square miles within the city and, as such, provides a variety of emergency services to the community including: fire suppression, fire prevention, fire inspection, fire investigation, emergency medical services with advanced life support, public education, hazardous materials incident response, and technical rescue. (City of Kettering Census, 2000)

The Kettering Fire Department utilizes a combination fire department and, as such, has five fire stations staffed with both career and volunteer members and two stations staffed with volunteer members only. The career portion of the department consists of 57 members including: one Chief, two Assistant Chiefs, four Shift Commanders, 7 Captains, and 41 career members. The volunteer portion of the department consists of approximately 80 members. The department also employs 1 civilian Fire Marshall and three clerical positions.

As stated, the department is comprised of a combination configuration of both career firefighter/paramedics and volunteer firefighters (with several also being emergency medical technicians). Monday through Friday 7 a.m. to 5 p.m. the department operates five career Advanced Life Support (ALS) stations consisting of one career ladder and four career engines. An ALS station is able to perform advanced life-saving procedures, such as cardiac monitoring, administration of IV fluids, and medications, and the use of advanced airway adjuncts.

After 5 p.m. and on weekends the department controls fire suppression with seven Basic Life Support (BLS) volunteer stations consisting of seven volunteer engines and two volunteer

ladders. A BLS station is able to perform non-invasive emergency life-saving care that is used to treat airway obstruction, respiratory arrest, or cardiac arrest.

The city's EMS alarms are responded to by two 24-hour career staffed ALS medic transport units and one non-transport ALS squad. After 5 p.m. and on weekends these career crews are supplemented with four volunteer staffed BLS ambulances.

In addition to the necessity of a technical rescue program for safety and protection reasons, the department has several objectives relating to technical rescue needs and abilities incorporated in the yearly plan. The objectives include: increasing the fire department's rescue capabilities through implementation of the rescue strike team program, increasing the number of qualified rescue technicians in the department, and purchasing and deploying tools and equipment on the strike rig to effectively provide safe operation at trench and building collapse emergencies (City of Kettering Budget Report, 2007). The concept of the strike rig program is/was to develop and implement a technical rescue program using an adequately equipped strike rig and to sufficiently respond to technical rescue incidents. The department has indeed trained personnel, purchased several components of rescue equipment, and placed the equipment on the strike rig. The strike rig is a specialty firefighting or emergency medical services apparatus primarily designed for technical rescue situations such as car accidents, rope rescues, water rescues, or building collapses (essentially a massive mobile toolbox). Unfortunately, the number of qualified rescue technicians has not proportionally increased with the addition of the equipment. As a result, members are compelled to operate equipment or perform in situations exceeding their proficiency levels. So, although the department has committed to aspects of technical rescue via the yearly plan, the organization has yet to communicate and execute a recognized and documented technical rescue program.

Also, the City of Kettering's charter designates the Kettering Fire Department as the

confined space rescue team for the city. (City of Kettering Charter, 2009) The Fire Department performed a risk assessment survey identifying potential confined space hazards within the city. The department has purchased numerous costly components of confined space rescue equipment and in 1999 the department began training members via the BERT program (36 of 57 career members and 2 volunteer members completed the program). The objective of the BERT or Basic Emergency Rescue Technician program is to reduce the risk to rescuer and to victim by equipping emergency personnel with the knowledge and skills necessary to perform technical rescues such as confined space safely, efficiently, and confidently. Regardless of the equipment purchased and the training received, the question still exists as to whether the members of the Kettering Fire Department are completely competent or equipped to adequately perform in a confined space rescue emergency situation.

Additionally, the Kettering Fire Departments firefighter/paramedic position description includes technical rescue both in the general statement of duties and in the distinguishing features of the position. (City of Kettering Fire Department Paramedic/Firefighter Job Description, 2008). Although the statements appear in portions of the position description the question exists as to whether the members of the Kettering Fire Department are completely competent or equipped to successfully perform in a technical rescue situation.

In conclusion, to date both the City of Kettering and the Kettering Fire Department have only moderately committed to the creation and implementation of a technical rescue program. Although the ideal has been partially recognized via the City's yearly plan and charter, via the purchasing of apparatus/equipment and minimal training, and via the firefighter/paramedic position description the organization has yet to communicate and execute a recognized and documented technical rescue program. The Kettering Fire Department has engaged in past technical rescue situations and future instances are certain to occur. *The potential impact the study may have on the*

Kettering Fire Department is the creation and implementation of a detailed and documented technical rescue program which is actively supported and practiced by the department. The study will enable the members of the department to operate at a technical rescue incident with the proper equipment and/or adequate training which will allow for the prevention of injury or death to victims and/or rescue responders.

LITERATURE REVIEW

As stated in National Fire Protection Association 1670 Standard on Operations and Training for Technical Search and Rescue Incidents, “The standard shall identify and establish levels of functional capability for conducting operations at technical search and rescue incidents while minimizing threats to rescuers.” Additionally, NFPA 1670 states, “The requirements of this standard shall apply to organizations that provide response to technical search and rescue incidents including those not regulated by governmental mandates.” NFPA 1670 also declares, “The authority having jurisdiction (AHJ) shall establish levels of operational capability needed to conduct operations at technical search and rescue incidents safely and effectively based on hazard identification, risk assessment, training level of personnel, and availability of internal and external resources.” NFPA 1670 defines AHJ as, “An organization, office or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, material, an installation or a procedure”. (National Fire Protection Association [NFPA], 2004)

As acknowledged in NFPA 1006 Standard for Rescue Technician Professional Qualifications, “The standard establishes the minimum job performance requirements necessary for fire service and other emergency response personnel who perform technical rescue operations.” (National Fire Protection Association [NFPA], 2000). Both NFPA standards identify specific expected levels of abilities and knowledge to effectively perform at technical rescue incidents. Proper scene management and competent, efficient utilization of rescue tools and techniques are crucial to the success of any rescue effort. One’s confidence to perform well in technical rescue situations is in direct relation to one’s training, practice, and experience.

Currently, the Kettering Fire Department has not incorporated these standards into the written departmental policies and procedures. In regard to these statements, KFD needed to perform a complete hazard identification and risk assessment of the response area and an

assessment of the abilities and knowledge of members in order to determine the feasibility of conducting technical rescue operations on a AHJ level.

As previously mentioned, the City of Kettering and the Kettering Fire Department have partially completed a confined space rescue program. The program considers the Kettering Fire Department to be the primary responder for confined space rescue for the employees and subcontractors for the City of Kettering. In 2003, the city and the department indeed confirmed 115 potential confined space rescue hazards. (Kettering Fire Department Confined Space Rescue Program, 2003). The four phases of program development have been detailed in the recommendations section. The city and the department may have partially completed the first phase of risk assessment for the confined space aspect of technical rescue; however, the remaining phases of planning, team development, and standard operating procedures development need to be completed.

The Ohio Administrative Code promotes the development and adoption of a comprehensive written risk management plan by employers. The plan should consider all department policies and procedures and it should include goals and objective to guarantee that the threats related with emergency and non-emergency procedures are identified and successfully managed. The code also has a section detailing the area of technical rescue. The code states,

The employer shall provide or make available and approve personal protective equipment and associated technical equipment that is appropriate for technical rescue operations that provides for the safety of each member operating at the scene

(1) Technical rescue operations are defined by the employers according to their risk management plan.

(2) Employers shall develop and require use of a written plan covering the safe use, limitation, care, inspection, maintenance, and replacement of the equipment utilized in

technical rescue operations, and all affected employees shall be trained in accordance of such plan.

While the Ohio Administrative Code provides minimum requirements of employers via specific guidelines it also allows for exemptions from said requirements. It is simply a codification of the rules. (Ohio Administrative Code, 2003). In contrast, the Ohio Revised Code includes all statutes or laws of the state. If it is believed that almost every rescue organization will, at one time or another, be tasked with a complicated rescue scenario requiring special knowledge, abilities, and equipment then preparedness is imperative to the members and the community regardless of it being considered a rule vs. a law.

According to the Technical Rescue Program Development Manual published by the United States Fire Administration and the Federal Emergency Management Agency, (1995) “Fire departments across the United States have assumed a major role as primary responders to rescue incidents that involve, among other things, structural collapse, trench cave-in, confined spaces, industrial and agricultural machinery, water emergencies, and people trapped above or below grade level. These emergencies are grouped into a category of rescue called technical rescue. Technical rescue incidents are often complex, requiring specially trained personnel and special equipment to complete the mission.” The manual further states, “Experience has shown that hasty rescue operations can endanger the lives of both rescuers and victims. At the same time, rescuers know that a victim’s survival chances are dependent on quick extrication and transportation to a hospital.” (United States Fire Administration [USFA], 1995)

A trend and hazard identified by the United States Fire Administration report is in respect to a new member’s existing knowledge, skills, and abilities. The fire service has grown to accommodate personnel from more varied backgrounds; therefore, the knowledge base among new recruits now also differs. In the past, many firefighters possessed trade skills related to equipment

and construction so mechanical aptitude and ability to use basic hand tools was assumed. Today, however, new members may not understand how to operate basic tools and machinery, or have any familiarity with driving a large truck. Today's students may require fundamental training in the simple mechanical skills necessary for both basic and technical firefighting operations. (USFA, 1995). The statement is true for the KFD.

In the book Trench Rescue, Martinette (2002) aptly stated "...the term technical rescue...is a generic term for special rescue operations requiring the Big Three. The Big Three includes special people, special equipment, and special training. Failure to integrate these elements into an active program...will result in a weak and potentially flawed system."

The Frequency/Severity Matrix included in the Incident Safety Officer Student Guide published by the Federal Emergency Management Agency (FEMA, 2004) provides an ideal illustration of why fire departments often determine their current skills and equipment to be inadequate in a technical rescue situation and why additional training and equipment are often necessary. For instance, technical rescue occurrences would be considered low frequency-high risk. An increased number of issues and dangers are present during a technical rescue event because responders have less experience base to reference due to a lower frequency of such events as detailed in Figure 1. Gordon Graham, a risk consultant, added a new factor to the matrix. He discusses a concept called Naturalistic Decision-making (NDM). Graham claims that NDM may be utilized to train members for low frequency-high risk situations by frequently introducing these situations during training exercises. As these circumstances are practiced throughout training opportunities, the knowledge becomes a reference point for the individuals. If the event reoccurs, the individual remembers the training and is able to act effectively and efficiently. (FEMA, 2004)

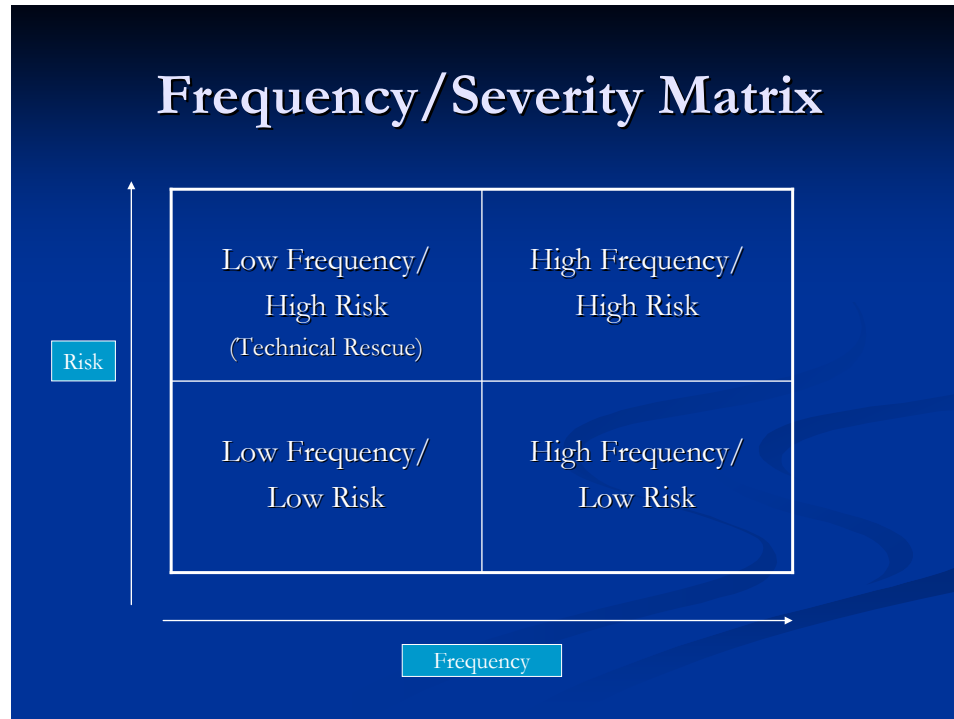


Figure 1

It is evident based on the literature review that creating and implementing a successful technical rescue program is necessary in order to adhere to the nationally documented standards, to adhere to the state documented code, to increase the levels of confidence and experience amongst members, and to insure the prevention of injury or death to victims and/or rescue responders.

PROCEDURES

The method selected to research the technical rescue project was evaluative research. The first research question was intended to identify the technical rescue needs of the Kettering Fire Department and the community it serves. Data was collected via current risk assessment and hazard identification documentation. In addition, the Computer Aided Dispatch (CAD) system, a web based statistics for the City of Kettering, and identified city target hazards were reviewed. Surveys were also used to determine the types of past technical rescue situations. The information was used to create future predictions and possible trends for technical rescue situations.

The second research question was intended to address the training and equipment requirements necessary to insure an effective technical rescue program which complies with applicable national standards. A survey was used to determine the current abilities, skills, and knowledge in regard to technical rescue. An equipment inventory was conducted to establish the technical rescue equipment currently owned by the KFD or the city. After verifying current training confidences, equipment confidences, and equipment inventories an analysis was completed to determine the difference between current and required training and equipment. The United States Fire Administration Technical Rescue Program Development Manual was referred to for a complete Technical Rescue Equipment List. NFPA 1670 and 1006 were also reviewed.

The third research question was intended to determine if regional resources were available to assist the Kettering Fire Department in a technical rescue incident. A survey was used to determine the opinion of the KFD members regarding a regional or department specific approach to technical rescue. Additionally, the benchmarking included questions regarding each department's ability to engage in mutual aid agreements to provide technical rescue services to other local jurisdictions such as Kettering.

To begin, a proposed mission/vision statement was created for the technical rescue program. The task of creating a mission/vision statement allowed for a constant referral to the statement when determining the answers to the many necessary questions. The proposed mission statement read: To ensure the safety of the Kettering Fire Department members and the community it serves by providing an efficient and effective technical rescue program.

A SWOC (strengths, weaknesses, opportunities, challenges) analysis was completed. It was important to determine the current strengths, weaknesses, opportunities, and challenges of the Kettering Fire Department in respect to technical rescue. For example, in which areas (if any) of technical rescue does KFD excel? In which is KFD lacking? Do certain members have particular strengths and weaknesses in regard to technical rescue? Are there opportunities for additional training and equipment purchases? Is there an opportunity for a single-discipline team or a multi-discipline team? Is there an opportunity for a regional approach? Is there an opportunity for a tiered approach? Is the support of city management a challenge? Are budget restrictions a challenge, etc?

Recently, it was announced that a complex known as Calamityville will be located within 20 miles of the city of Kettering. Calamityville is a national emergency preparedness project. It is a state-of-the-art, innovative, integrated, shared training and research facility which will provide training opportunities for medical, public health, public safety, and civilian and military disaster response decision makers. The goal is to have attendees occupy the facility and conduct work under a common exercise scenario. (Gebhart, 2010). It was important to thoroughly research Calamityville as an option for technical rescue training for the members of the Kettering Fire Department. All three research questions were addressed in regard to Calamityville. Does the training offered at Calamityville match the technical rescue training needs of the city and the fire department? What are the expenditures involved with attending training at Calamityville? Will

other departments in the area attend Calamityville and would it be beneficial to partner with said departments for a regional approach to technical rescue?

As previously noted, an internal survey was necessary. The purpose of the survey was to determine the opinions of all members in regard to technical rescue at the KFD. The survey was provided to 57 career members (including one Chief, two Assistant Chiefs, four Shift Commanders, 7 Captains, and 41 career members) and approximately 80 volunteer members. The survey focused on experience, confidence levels in regard to training, equipment awareness and knowledge, risk recognition, responsibility, and type of approach.

In addition, it was important to benchmark other local fire departments with technical rescue programs. Those neighboring departments included: Beaver creek, Dayton, Miami Township, Washington Township and Moraine. The task of conversing with these other departments with regard to the three research questions allowed for a comparing and contrasting of the strategies and tactics of area technical rescue programs. It was essential to survey each department to determine the different technical needs for different cities, the training and equipment each has determined to be required for a successful program, and each department's opinion of a regional approach to technical rescue.

Furthermore, it was necessary to determine if there are available resources within the city of Kettering. Resources that would be able to supplement the fire department in complex rescue situations. For instance, would it be possible for the fire department to utilize equipment already owned by the Kettering public works and/or street departments such as trench shoring and/or large transport equipment. Conferring with other departments within the city of Kettering allowed for an increased understanding of existing resources. Once the resources were identified, agreements with said departments needed to be reached and documented.

Definition of Terms

Authority having jurisdiction (AHJ). An organization, office or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, material, an installation or a procedure”.

Advanced Life Support (ALS). Implies that an emergency medical technician (EMT) is capable of performing advanced life support skills as either an EMT-A (Advanced), EMT-I (Intermediate) or an EMT-P (Paramedic). ALS (in most cases) refers to the skills and knowledge that a practitioner possesses. The ALS provider may perform advanced procedures and skills on a patient involving invasive and non-invasive procedures. Advanced life-saving procedures, such as cardiac monitoring, administration of IV fluids, and medications, and the use of advanced airway adjuncts.

Basic Emergency Rescue Technician (BERT). A program which trains firefighters in rescue disciplines including collapse, trench, and confined space rescue, vehicle and machinery extraction, rope and swift water rescue techniques, and search operations.

Basic Life Support (BLS). A level of medical care which is used for patients with life-threatening illness or injury until the patient can be given full medical care. It can be provided by trained medical personnel, including emergency medical technicians, and by laypersons who have received BLS training. BLS is generally used in the pre-hospital setting, and can be provided without medical equipment. Noninvasive emergency life-saving care that is used to treat airway obstruction, respiratory arrest, or cardiac arrest.

Benchmarking. The process of comparing one's business processes and performance metrics to industry bests and/or best practices from other industries.

Calamityville. A state-of-the-art, innovative, integrated, collaborative training and research facility.

Computer Aided Dispatch (CAD). A method of dispatching emergency services assisted by computer. It can either be used to send messages to the dispatchee and/or used to store and retrieve data.

Confined space search and rescue. Involves the rescue and recovery of victims trapped in a confined space or in a place only accessible through confined spaces. Confined space rescues can be technically challenging due to the environment in which they occur. Confined spaces are often narrow and constricting preventing easy access by rescuers. A confined space is a space which is large enough and so configured that a person can enter and perform assigned work, that has limited or restricted means for entry or exit and that is not designed for continuous human occupancy.

Dive Rescue International. An organization teaching aquatic preparedness to ensure public safety officials respond effectively to water-incident scenes.

Federal Emergency Management Agency (FEMA). An agency of the United States Department of Homeland Security whose primary purpose is to coordinate the response to a disaster that has occurred in the United States and that overwhelms the resources of local and state authorities.

Hazard identification. The determination of a situation that poses a level of threat to life, health, property, or environment.

National Fire Protection Association (NFPA). An organization charged with creating and maintaining minimum standards and requirements for fire prevention and suppression activities, training, and equipment, as well as other life-safety codes and standards.

Naturalistic decision making (NDM). A framework which emerged as a means of studying how people actually make decisions and perform cognitively complex functions in demanding situations. These include situations marked by time pressure, uncertainty, vague goals, high stakes, team and organizational constraints, changing conditions, and varying amounts of experience.

Ohio Administrative Code. Provides minimum requirements of employers via specific guidelines it also allows for exemptions from said requirements. It is a codification of the rules.

Ohio Fire Academy. Provides a variety of training programs from initial state certification, certificate based training and programs from the National Fire Academy.

Ohio Revised Code. Contains all acts passed by the Ohio General Assembly and signed by the governor. The Ohio Revised Code laws are state laws.

Ohio Task Force 1. An Urban Search and Rescue team located in southwest Ohio.

Record Management System (RMS). A computer system (or set of computer programs) used to track and store electronic documents and/or images of paper documents.

Region 3 Strike Team. A team which provides regional mutual aid on an immediate need or a planned need basis.

Risk assessment. The determination of quantitative or qualitative value of risk related to a concrete situation and a recognized threat.

Rope rescue. Involves the use of static, anchoring and belaying devices, friction rappel devices, various devices to utilize mechanical advantage for hauling systems, and other specialized equipment to reach victims and safely recover them.

Shoring. Tools and equipment used to support damaged buildings and damaged structural members, so as to stabilize the area involved and to avoid further (secondary) collapse.

Standard Operating Procedure. A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely for the performance of designated operations or actions. A set of instructions covering those features of operations which lend themselves to a definite or standardized procedure without loss of effectiveness.

Strike rig. A specialty firefighting or emergency medical services apparatus primarily designed for technical rescue situations such as car accidents, rope rescues, water rescues, or building collapses.

Structural collapse search and rescue. The act of accessing and removing a person who is endangered in structure with a loss of the load-carrying capacity of a component or member within a structure or of the structure itself. Structural failure is initiated when the material is stressed to its strength limit, thus causing fracture or excessive deformations.

SWOC. A strategic planning method used to evaluate strengths, weaknesses, opportunities, and challenges for a program venture.

Technical rescue. Refers to those aspects of rescuing life or property which employ the use of apparatus and abilities exceeding those normally reserved for firefighting, medical emergency,

and rescue. The application of special knowledge, skills, and equipment to safely resolve unique and/or complex rescue situations.

Trench/excavation search and rescue. Trench rescue involves shoring up the sides of a trench, and digging a trapped worker out of a collapsed ditch. A trench is an excavation that is relatively narrow in comparison to its width. The depth of a trench is greater than its width, but the width of the trench is not greater than 15 feet.

U.S. Fire Administration (USFA). A federal agency organized in 1974 to help combat the growing problem of fatal fires happening throughout the country. The USFA manages many of the federal programs related to fire fighting including systematic collection of statistics relating to fire incidents.

Vehicle and machinery search and rescue. The process of removing the vehicle/machinery from around a person that has been involved in a motor vehicle accident, when conventional means of exit are impossible or inadvisable. A delicate approach is needed to minimize injury to the victim during the extrication. This operation is typically accomplished by utilizing chocks and bracing for stabilization and hydraulic tools.

Water search and rescue. The act of accessing and removing a person who is endangered in a water environment, with due regard for any injuries and/or contamination that may be present.

Wilderness search and rescue. The act of accessing and removing a person who is endangered in an uncultivated, uninhabited, and natural area that tends to be far from human civilization.

Limitations of the Study

The survey response percentage was 40% and, thus, the results are less definitive than desired. Additionally, both survey and benchmarking responses may often be based on an individual's subjective opinion rather than a concrete objective fact.

Also, the practice of different dispatch personnel manually entering response type information may adversely affect the data obtained in regard to the number of technical rescue responses per year. If an error exists while entering the information into the Computer Aided Dispatch (CAD) system the system is not able to accurately record the incident. Or for example, if a response is initially recorded as a motor vehicle accident, but is determined to be a technical rescue incident upon arrival the change is only intermittently recorded.

In addition, the Kettering Fire Department does not utilize a Record Management System (RMS) so extensive documentation review of incidents is not available to determine if a response was or was not related to technical rescue.

RESULTS

The results of the evaluative research completed for the project identified the technical rescue needs of the KFD and the City of Kettering. In addition, the research indicated insufficient training, equipment deficiencies, and noncompliance to national standards in regard to technical rescue at the Kettering Fire Department. It also confirmed the opportunity to collaborate with other local jurisdictions for a regional approach to technical rescue. It was necessary to recognize those results and to develop a comprehensive program which provides effective and efficient responses to technical rescue events. The results addressed each of the research questions independently.

According to a dispatch summary completed by the Montgomery County Sheriff's office, the KFD responded to 126 technical rescue incidents from January 2005 through December 2009. The 126 technical rescue incidents were situations in which the rescuing of life or of property employed the use of apparatus and abilities exceeding those normally reserved for firefighting, medical emergency, and rescue. The types of situations included a total of: 23 vehicle accidents involving a structure, 63 vehicle accidents with a trap, 38 persons trapped (no vehicle), and 2 traps with a vehicle on fire as indicated in Tables 1 and 2. (Montgomery County Sheriff's Office, 2005-2010)

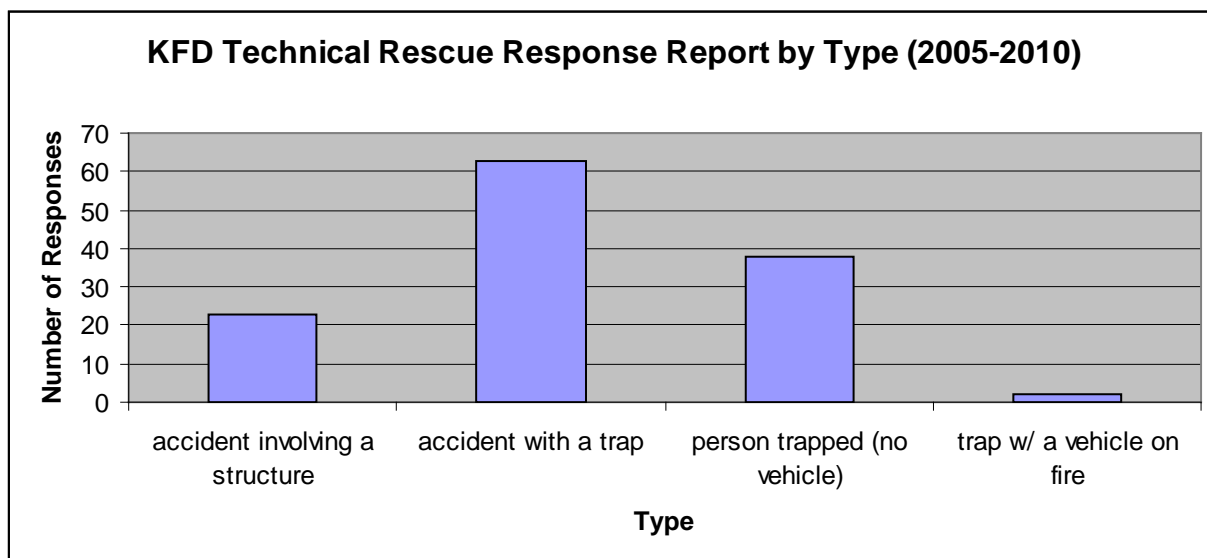


Table 1

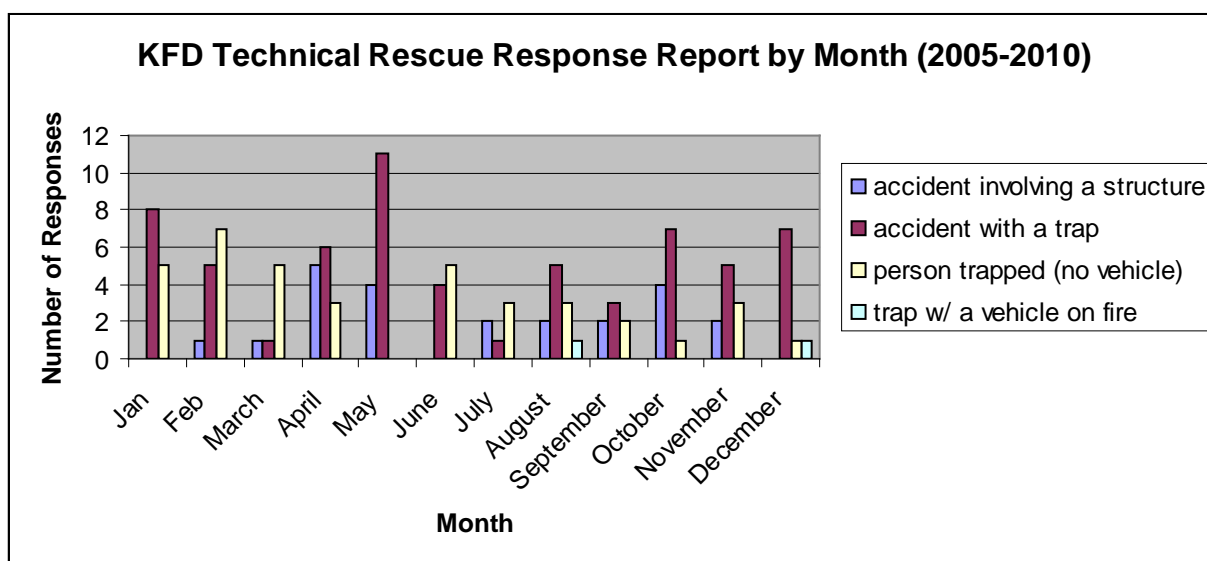


Table 2

Vehicle accidents involving a structure may include a vehicle striking a commercial or residential building. Vehicle accidents with a trap entail using technical rescue equipment/training to remove a person or persons from a vehicle involved in an accident. Examples of persons trapped

(no vehicle) may include elevator traps, machinery traps, etc. Traps with a vehicle on fire involve a person trapped in an automobile with an active fire.

The internal surveys also detailed additional historical technical rescue situations experienced by members while serving on the KFD. The examples include: a wilderness search and rescue incident for a lost 8 year old female, a confined space rescue incident in which a victim was trapped in a manhole, a confined space rescue situation in which an injured man was trapped in 800 foot tunnel, a structural collapse rescue circumstance with a victim trapped under a tumbled wall during construction of a new building, a calm water rescue in which an occupied vehicle was in a pond, an industrial machine incident in which the victim's hand was caught in the machinery at a local manufacturing facility, and a high angle rope rescue from a water tower.

It was important to reference historical information for the types of technical rescue which are more variable in nature such as vehicle and machinery search and rescue, rope rescue trench/excavation search and rescue, and structural collapse search and rescue. However, the more invariable types of technical rescue such as wilderness search and rescue, water search and rescue, and confined space search and rescue may be considered target hazards and documented as such. For instance, in regard to wilderness search and rescue one area (a park) is considered a target hazard in the City of Kettering. Also, seven lakes, ponds, and/or creeks have been identified as potential water risks/hazards in the City of Kettering (Reference Table 3).

Water Risk Assessment/Hazard ID

<u>Location</u>	<u>Depth</u>
Delco Lake	4'-10'
Pondview Park	6'-10'
Marilake	6'-15'
Chimneys of Oak Creek	15'-20' (2 ponds)
Lincoln Park Pond	6'-10' (2 ponds)
Kettering Rec Center Pond	5'-8'
Research Park Ponds	5'-8' (2 ponds)

Table 3

Additionally, as previously mentioned the fire department has performed a risk assessment survey identifying potential confined space hazards within the city as detailed in Table 4.

(Kettering Fire Department Confined Space Program, 2003)

Type of Space	Associated Hazard(s)
elevator	crush injuries
bleacher space	crush injuries, limited accessibility
vaults	oxygen deficient, carbon monoxide contaminated
electric vault	oxygen deficient, electrocution
entrapment by configuration	oxygen deficient, suffocation by strangulation
engulfment vaults	oxygen deficient, suffocation by drowning, crush injuries
sanitary and storm sewer system (incl manholes)	oxygen deficient, contaminated, lost, fall, explosive
cylindrical liquid tanks	oxygen deficient, chemical contamination
large metal box (leaf box)	oxygen deficient, organic contamination, organic toxins, crush injuries
machinery	oxygen deficient, organic contamination, crush injuries, thermal hazards
entry, exit, through ways from waterway overflows	oxygen deficient, contaminated, engulfment, hypothermia

Table 4

The responses to the internal survey provided insight into the thoughts and opinions of the members of the KFD (Reference Appendix A). Many department members have spent a significant portion of their career serving the KFD and the City of Kettering. The survey revealed 74% of the responders had been involved in a technical rescue incident while serving on the KFD (Figure 1). In contrast, only 28% have been involved in a technical rescue incident while serving on another fire department or on an auxiliary organization as indicated in Figure 2. To conclude, most members' only technical rescue experience was while serving with the KFD.

Have you been involved in a technical rescue incident while serving on the Kettering Fire Department (KFD)? If yes, please describe briefly.

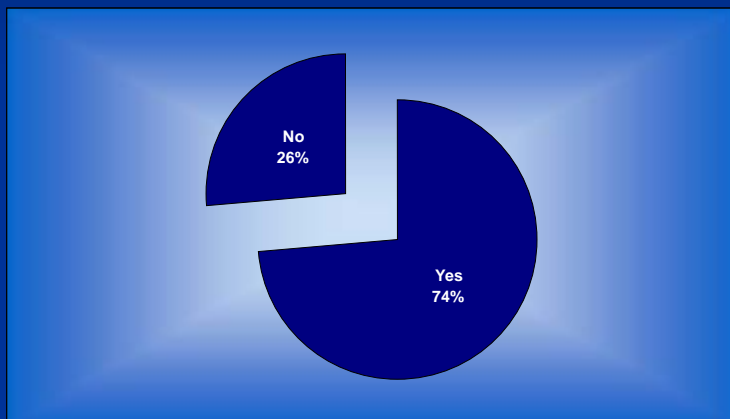


Figure 1

Have you been involved in a technical rescue incident while serving on another fire department or on an auxiliary organization (ex. FEMA, Region 3 Team)? If yes, please describe briefly.

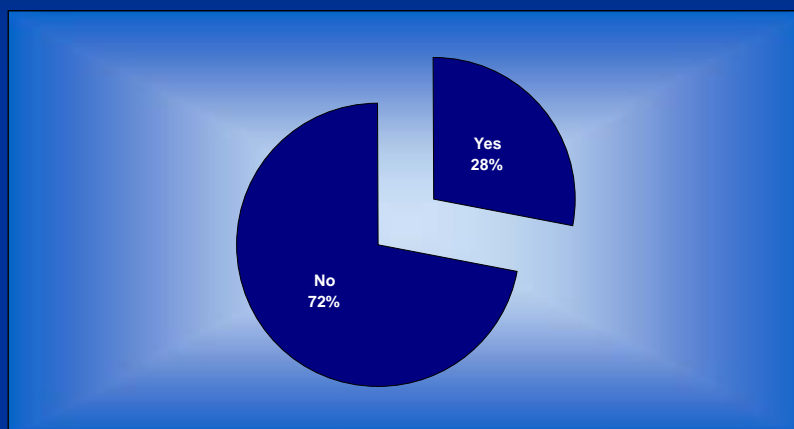


Figure 2

The results of the survey presented to both career and volunteer members referenced the question of the training and equipment requirements. To understand the necessary future technical rescue training requirements it was imperative to assess the current knowledge, skills, and abilities of members. The survey revealed a lack of confidence in personal, peer, and leadership's technical rescue knowledge, skills, and abilities. Also, 84% felt not confident or somewhat confident in their personal level of technical rescue knowledge, skills, and abilities while a minority of 16% actually felt confident as specified in Figure 3. Additionally, the survey replies depicted a majority of individuals not confident or only somewhat confident in the technical rescue knowledge, skills, and abilities of their peers and leaders (Reference Figures 4 and 5). As previously noted, one's confidence to perform well in technical rescue situations is in direct relation to one's training, practice, and experience.



Figure 3

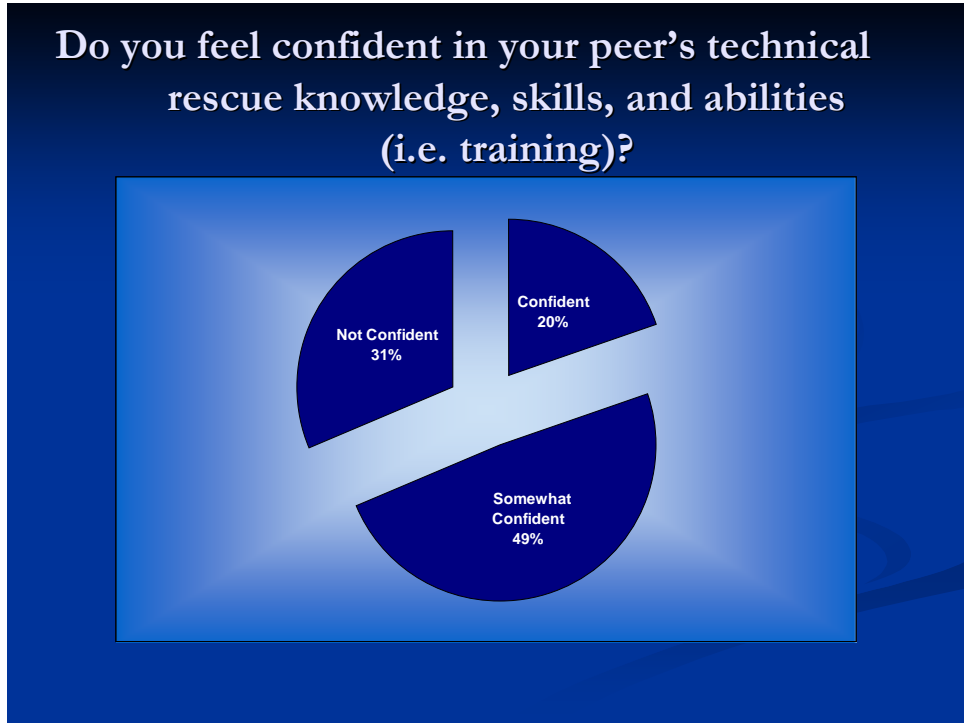


Figure 4

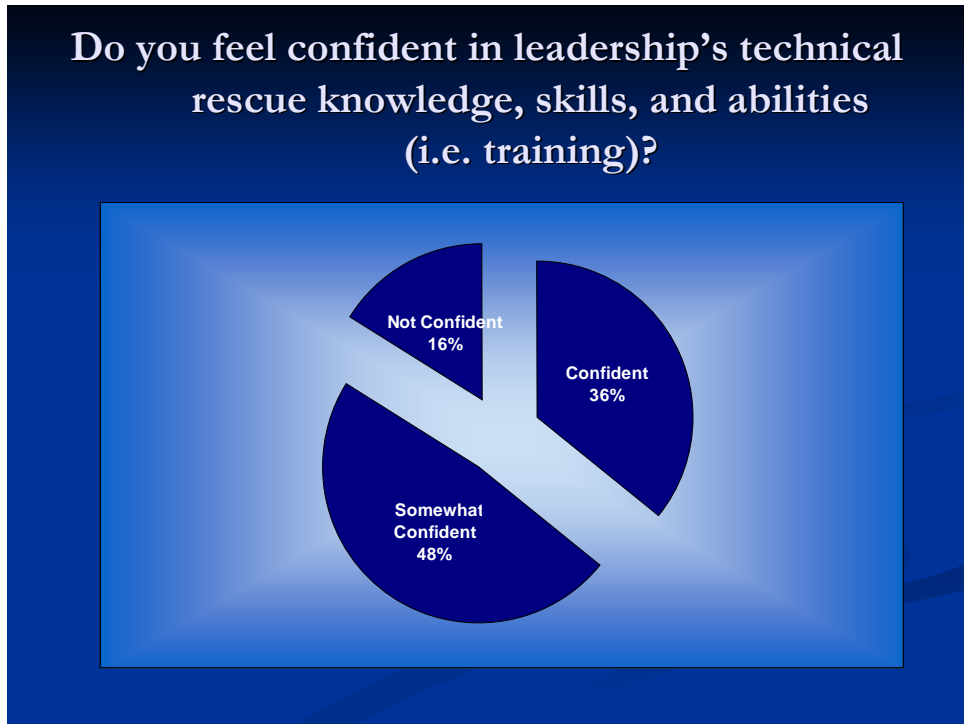


Figure 5

The survey also assessed opinions in regard to technical rescue equipment possession and operation. The KFD possesses most of the equipment necessary in technical rescue situations, however, only 34% of the responders were aware of the equipment. It is also a bit concerning and a definite indication of a lack of knowledge, skills, abilities (training) to observe 5% believing the KFD owns *all* necessary technical rescue equipment and the other extreme of 4% assuming the KFD owns *no* technical rescue equipment as designated in Figure 6. A minority of 20% felt adequately trained to operate the equipment currently owned by the department (Reference Figure 7).

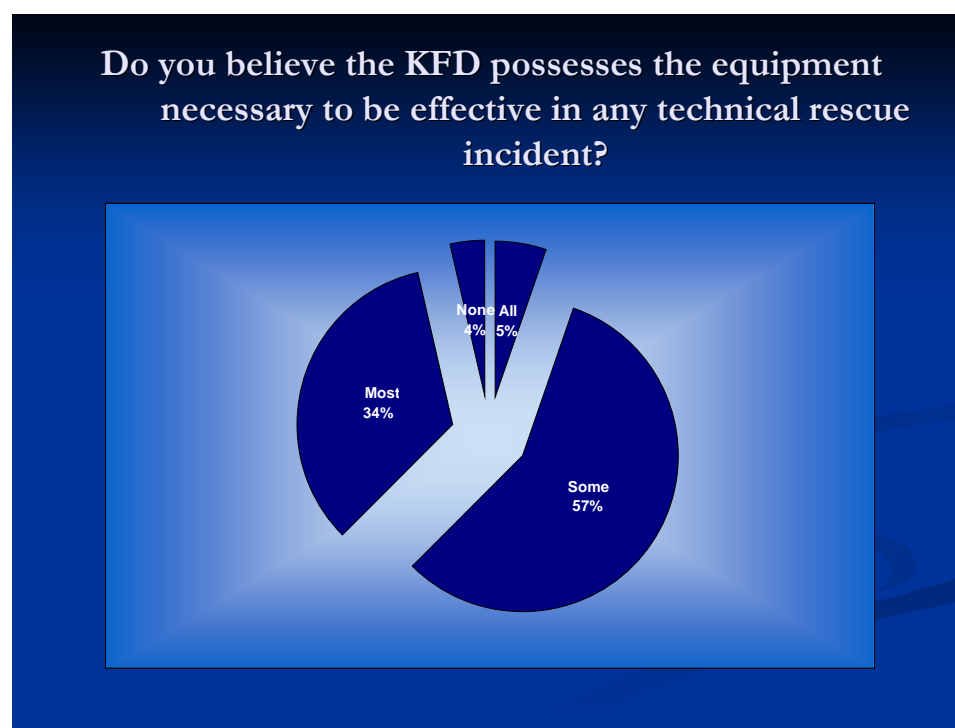


Figure 6

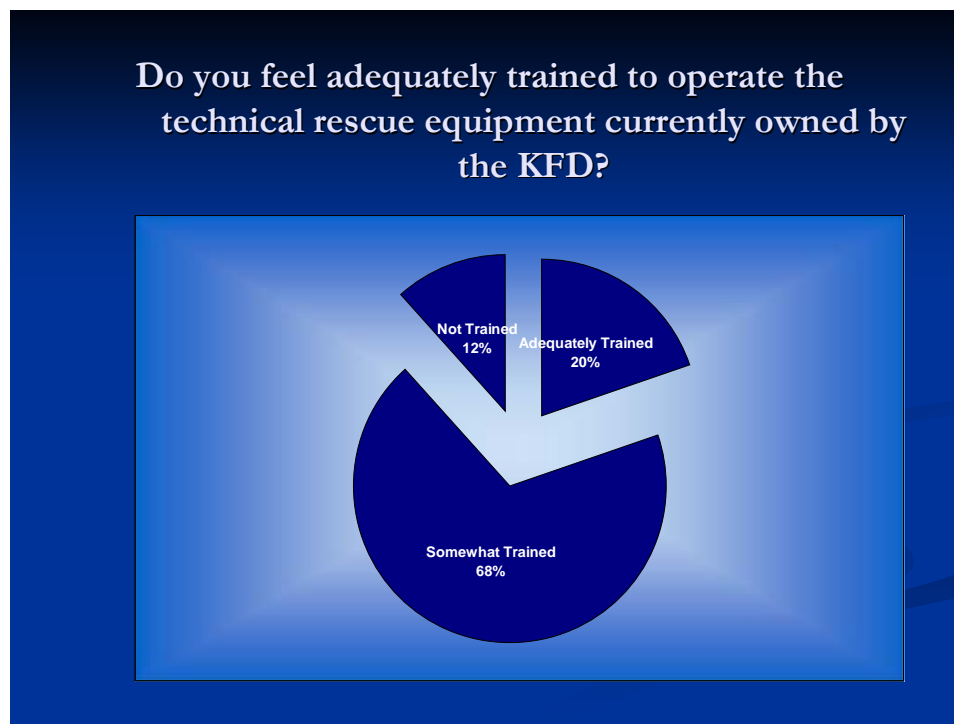


Figure 7

A portion of the survey addresses the subject of identifying the specific the technical rescue needs of the Kettering Fire Department and the community it serves. A majority of 67% of the responders are somewhat aware or not aware of the unusual rescue challenges within the City of Kettering as detailed in Figure 8. If members are not aware of the community's rescue challenges then it is necessary to identify those risks and to create a technical rescue program accordingly. The majority of members or 73% understand the need for a formal technical rescue plan and are personally interested in becoming an expert in the area of technical rescue (Reference Figures 9 and 10).

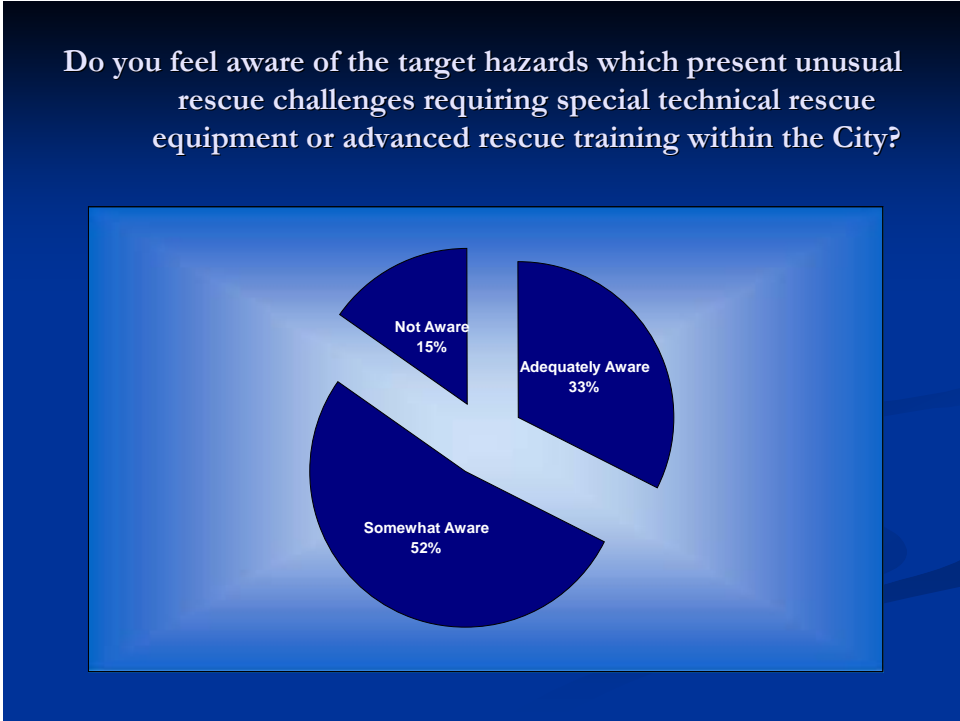


Figure 8

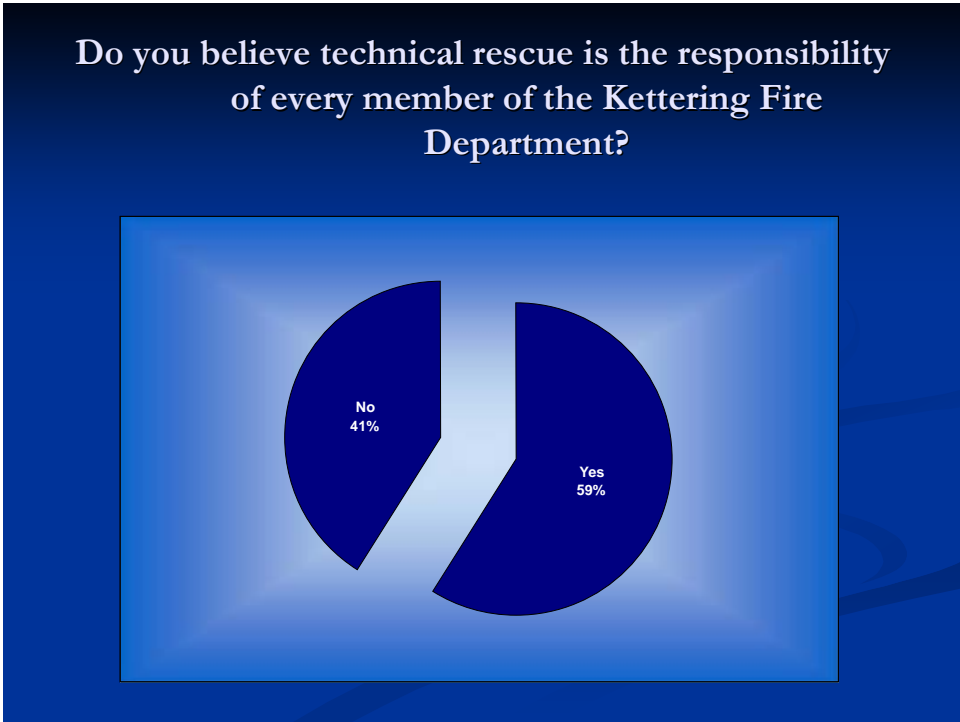


Figure 9

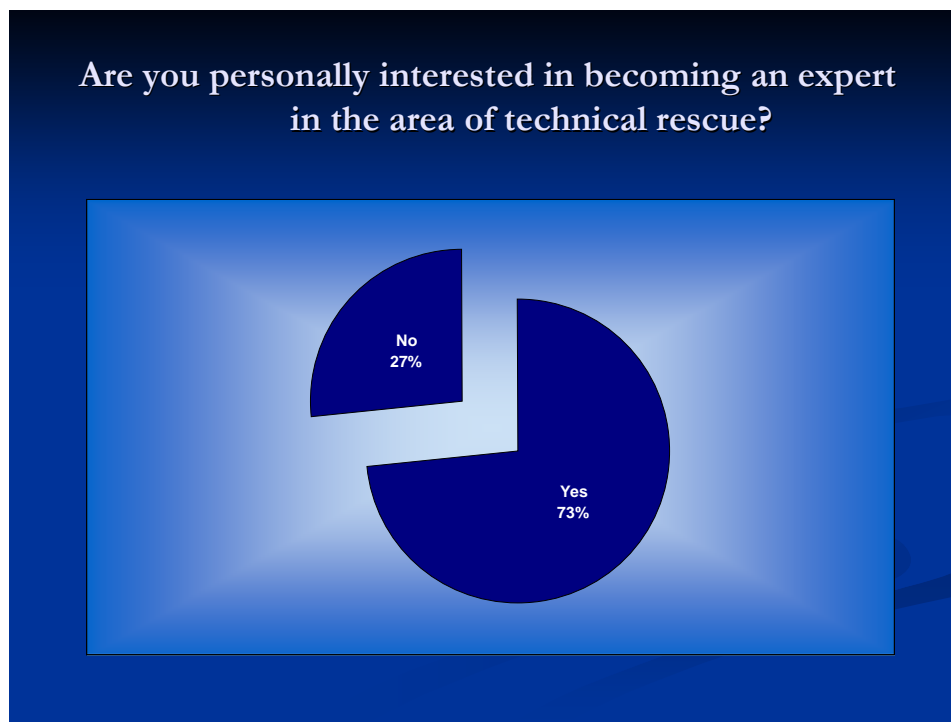


Figure 10

A question in the survey is related to the use of a departmental or a regional approach to technical rescue. The majority of members or 62% believe a regional approach to technical rescue is superior to a department specific approach as indicated in Figure 11. The benchmarking portion of the results will determine if regional resources are available to assist the Kettering Fire Department in a technical rescue incident.

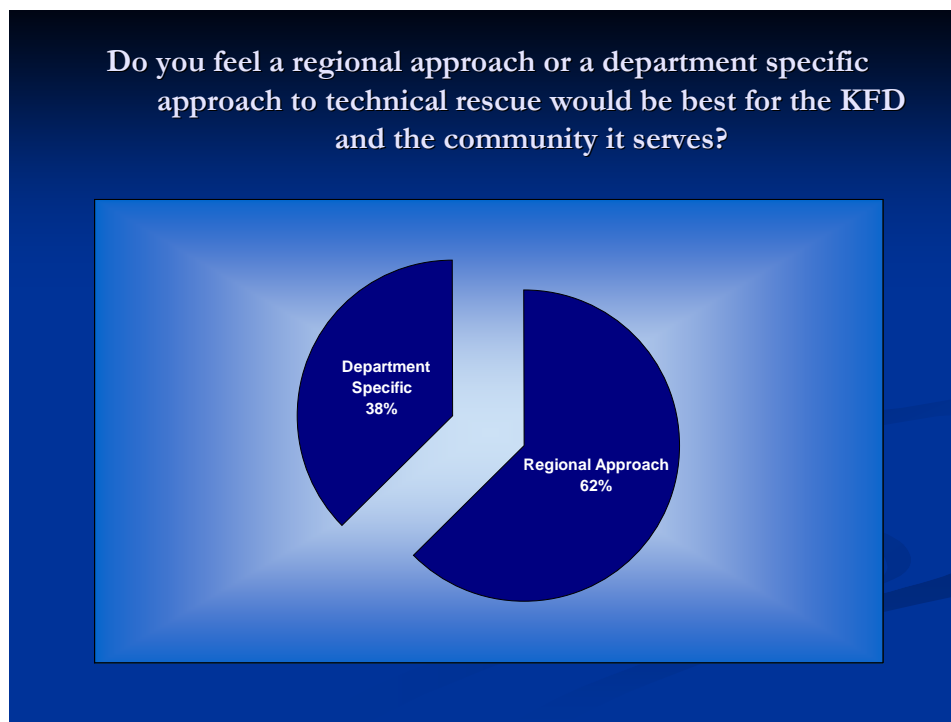


Figure 11

A majority of members have spent their entire career serving the KFD and the City of Kettering (Reference Figures 12 and 13). Therefore, if technical rescue training is not occurring at Kettering it is not probable the members have been trained elsewhere.

Please provide the number of years you have been in the fire service?

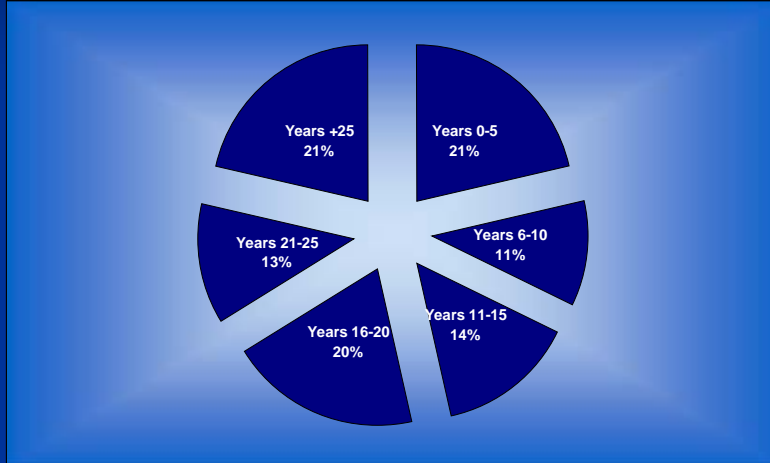


Figure 12

Please provide the number of years you have been with the Kettering Fire Department?

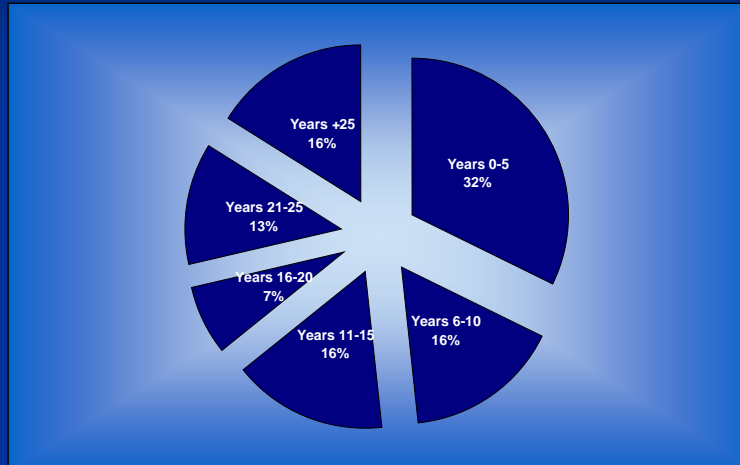


Figure 13

Utilizing the national emergency preparedness project Calamityville is presently not an option as the project is currently in the development phase. Perhaps Calamityville will be used for future supplemental technical rescue training.

A SWOC analysis was a strategic planning method used to evaluate the strengths, weaknesses, opportunities, and challenges in regard to the Kettering Fire Department and technical rescue (Reference Appendix B). It was evident from the analysis the KFD displays numerous weaknesses, opportunities, and challenges while presenting fewer strengths. Major weaknesses include but are not limited to: inability to provide complete technical rescue service to the City of Kettering, inadequate training (may cause injury/death to rescuer/citizen), equipment deficiencies (may cause injury/death to rescuer/citizen), current documented policies and procedures do not apply NFPA standards 1670 and 1006, all risks/hazards not identified and documented, and no agreement for technical rescue aid between cities. The SWOC also detailed important opportunities which a successful technical rescue plan would provide to the KFD. The opportunities include but are not limited to: increased service to citizens, cohesive relationships with other local departments, promoting the KFD organization, developing members, and increasing the sense of team throughout the organization. Of course, there will be challenges to surmount while implementing a technical rescue plan at the KFD. The challenges include but are not limited to: funding challenges, deaths/injuries, resistance to change, increased time demands, and willingness of members, etc.

Benchmarking other local fire departments with technical rescue programs was another method of evaluation. (Reference Appendices C and D). The departments referenced included: Beavercreek, Dayton, Miami Township, Washington Township, and Moraine. The task of conversing with these departments allowed for a comparing and contrasting of the strategies and

tactics of area technical rescue programs. It also assisted in answering the question of whether or not a regional approach to technical rescue is an option for the KFD. It is important for the leaders of the KFD to understand the services the other departments provide, the credentialing being used by each department, the budget requirements, and the mutual aid capacity of each department. According to the results, all of the departments provide various technical rescue services to the applicable city or township. All of the departments, with the exception of Dayton, provide technical rescue services based on the department's abilities vs. the community's needs. All of the departments with the exception of Moraine believe their organizations meet NFPA standards 1670 and 1006 at either the operation or technician levels. According to the responders, the majority of the departments train within their own departments (i.e. not utilizing external resources). The benchmarking also detailed the equipment owned by each department. Specifying the equipment owned by each of the departments confirms the KFD is not the only department which possesses only a partial inventory of the equipment needed for all types of technical rescue situations. It also validates the need for a regional approach to technical rescue. A regional approach would allow local departments to share costly technical rescue equipment. The sharing of equipment would be a benefit to the departmental budgets as several of the organizations acknowledged finances being a deterrent to continually improving technical rescue programs. It was interesting to discover Moraine actually sites the KFD as a mutual aid responder for structural collapse, confined space, and trench rescue in the department's policies and procedures. Although several departments offer assistance for different types of technical rescue, it would be necessary to research the training and credentialing of said departments in order to determine if each would truly be a potential resource for the KFD.

An equipment inventory was conducted to establish the technical rescue equipment currently owned by the KFD (Reference Appendix E). After verifying current equipment inventories an analysis should be completed to determine the difference between current and required equipment. The analysis may be completed in the planning phase detailed in the recommendations portion of the research paper. The United States Fire Administration Technical Rescue Program Development Manual may be referred to for a complete Technical Rescue Equipment List.

Conferring with several of the other City of Kettering Departments confirmed the availability of existing city resources that could be able to supplement the fire department in complex rescue situations. For example, the Kettering Street Department possesses trench shoring and confined space equipment (Reference Appendix F). Once the resources were identified, agreements with said department need to be reached and documented.

DISCUSSION

A recent fatal confined space incident in Middletown, Ohio is unfortunate evidence of the importance of a technical rescue program/plan for all departments. The Middletown Division of Fire released a report detailing the erroneous actions which caused two department members to nearly perish while attempting to rescue a city employee who lost his life during the incident. The city employee died due to lack of oxygen in a manhole storm sewer system. The two firefighters who tried to save the individual suffered from respiratory distress. The report specified several causes which led to the death and the injuries. For instance, the firefighters did not properly monitor the manhole space prior to entry and failed to lower a gas monitor into the space to determine the levels of oxygen prior to entry. The report also stated the firefighters should have realized the victim was in a confined space and subsequently followed the confined space rescue procedures. (Heffner, 2010). The Middletown occurrence is just one example of inadequate technical rescue training causing major issues. The Middletown Fire Department is now in a reactive training state vs. a preferred proactive training state. Could the Kettering Fire Department one day be in a similar situation? The example is evidence of inadequate training, insufficient equipment, noncompliance to national standards, an unsatisfactory use of resources, and a deficient risk/hazard analysis in relation to a technical rescue incident.

The first and third research questions are simple to answer. A risk assessment was necessary to determine the needs of the City and the department. And regional resources are a potential option. However, the second question regarding the training and equipment requirements necessary to insure an effective Technical Rescue Program which complies with applicable national standards was more complicated to answer. Both NFPA standards 1670 and 1006 identify specific expected levels of abilities and knowledge to effectively perform at technical rescue incidents.

Currently, the Kettering Fire Department has not incorporated these standards into the written departmental policies and procedures.

Based on the survey results it was apparent the majority of members of the KFD lack confidence in personal, peer, and leadership's technical rescue knowledge, skills, and abilities. The Frequency/Severity Matrix should also be referenced in regard to confidence. Since a technical rescue occurrence is considered low frequency-high risk it is imperative for members to have additional training for such instances as one's confidence to perform well in technical rescue situations is in direct relation to one's training, practice, and experience.

It is evident based on the background and significance, the literature review, and the results that the Kettering Fire Department must create and implement a successful technical rescue program. A program must be instituted in order to adhere to the nationally documented standards, to increase the levels of confidence and experience amongst members, and ultimately to insure the prevention of injury or death to victims and/or rescue responders.

RECOMMENDATIONS

The recommendations of the study are for the Kettering Fire Department: to create and implement a detailed and documented technical rescue program, to actively support and practice the program, to adhere to national standards via the program, to enable the members of the department to operate at a technical rescue incident with the proper equipment and adequate training, and to allow for the prevention of injury or death to victims and/or rescue responders as a result of the program.

Once the considerations of developing a technical rescue program and/or coordinating with other local jurisdictions had been contemplated and answers and an agreement have been reached,

the phases of organizing a team should begin. The four phases of team development are: risk assessment, planning, team development, standard operating procedures development.

First, all existing technical rescue potentials within the city needed to be identified and documented via a risk assessment. The first phase of team development was completed in the procedures portion of the project. A risk assessment allowed the KFD to assess the risks in the area. Assessing and presenting all potential risks within the response area will help to market the necessity of a team to city leaders. The risk assessment considered both the historical rescue data included on incident reports and any recently identified risks. Target hazards were also acknowledged. Target hazards are specific risk areas for the KFD. Examples include: sewers, industrial facilities, new construction, old buildings, etc.

Second, planning should occur. A planning committee consisting of capable planners and potential members of the team should be formed. The committee should address questions including: personnel requirements, equipment requirements, training needs, necessary administrative support, and political support. Present training and equipment resources should be identified. As previously mentioned, the KFD has previously purchased several components of rescue equipment; however, it is known that the number of qualified rescue technicians has not proportionally increased with the addition of the equipment. It is necessary to decide if a departmental or regional approach or a combination of both will be used. It is also essential to decide at which level(s) members will be trained: awareness level, operations level, technician level, or instructor level. The awareness level allows the responders to identify the hazard and its associated dangers. The operations level represents the level at which members learn the required techniques to render an incident safe for subsequent rescue operations. The technician level involves advanced training beyond the operations level. The personnel at the instructor level are certified instructors who are able to provide the requisite training to all levels of the organization.

The second phase should also incorporate a budget which considers the cost of personnel, training, education, instruction materials, equipment, and protective gear.

Third, the actual team should be developed. Team members should be selected and subsequently trained. Any initially necessary equipment and vehicles should be purchased. Fortunately, the Kettering Fire Department possesses the aforementioned strike rig with several components of rescue equipment. Administrative support needs should also be considered. The responsibilities may include: maintaining a team roster, sustaining equipment inventories and equipment repair/maintenance records, retaining training records and schedules, tracking expenses, etc.

Fourth, administrative and operational standard operating procedures (SOPs) establishing team organization, processes, and techniques should be documented. The administrative SOP should identify the personnel organization of the team, and the operational SOP should address the practical responsibilities of the team during a technical rescue incident. These SOPs should be reviewed on an annual basis. Also, the SOPs should be reviewed and possibly revised if any inadequacies are noted during an actual technical rescue incident. Via the proposed changes and recommended actions, the KFD will have the ability to successfully respond to technical rescue incidents.

REFERENCES

- City of Kettering. (2008). *Firefighter/Paramedic Job Description*. Kettering, Ohio: City of Kettering Human Resources Department.
- City of Kettering. (2009). *Charter*. Kettering, Ohio: City of Kettering Human Resources Department.
- City of Kettering. (2000). *Census Report*. Kettering, Ohio: City of Kettering Finance Department.
- City of Kettering. (2010). *Equipment for Technical Rescue*. Kettering, Ohio: City of Kettering Streets Department.
- City of Kettering. (2007). *Budget Report*. Kettering, Ohio: City of Kettering Finance Department.
- Dirr, J. (2008, April 11). Fairborn Lands Calamityville Training Site. *Dayton Business Journal*. Retrieved May 17, 2010, from <http://www.bizjournals.com/Dayton/stories/2008/04/14/story5.html>
- Federal Emergency Management Agency [FEMA]. (2004). Incident Safety Officer. Washington, D.C.: FEMA.
- Gebhart, M.E. (2010). *Calamityville: Bringing Medical Readiness...to the Edge*. Retrieved February 9, 2010 from Wright State University, National Center for Medical Readiness website: <http://www.medicalreadiness.org/calamityville/>
- Heffner, J. (2010). Errors Made During Manhole Rescue. *Dayton Daily News*.
- Kettering Fire Department. (2003). *Confined Space Rescue Program*. Kettering, Ohio: City of Kettering Fire Department.
- Kettering Fire Department. (1991). *Water Rescue Procedure*. Kettering, Ohio: City of Kettering Fire Department.
- Montgomery County Sheriff's Office. (2005-2010). *Kettering Fire Department Response Type Report*. Montgomery County, Ohio: Montgomery County Sheriff's Office.

Martinette, C.V., Jr. (2002). *Trench Rescue*. Lynchburg, Virginia: Jones and Bartlett Publishers.

Ohio Administrative Code. (2003). *Specific Safety Requirements of the Bureau of Workers'*

Compensation, Division of Safety and Hygiene, Chapter 4121:1-21 Fire Fighting.

Columbus, Ohio: Bureau of Workers' Compensation.

National Fire Protection Association. (2010). *Fundamentals of Technical Rescue*. Quincy,

Massachusetts: NFPA.

National Fire Protection Association. (2000). *Standard for Rescue Technician Professional*

Qualifications (NFPA 1006). Quincy, Massachusetts: NFPA.

National Fire Protection Association. (2004). *Standard on Operations and Training for Technical*

Search and Rescue Incidents (NFPA 1670). Quincy, Massachusetts: NFPA.

United States Fire Administration [USFA]. (1995). *Technical Rescue Program Development*

Manual. Emmitsburg, Maryland: USFA.

Wikipedia (2010). *Definitions of Terms*. Retrieved July 12, 2010 from <http://www.wikipedia.com>

APPENDIX A – SURVEY

Survey for Ohio Fire Executive Program

Technical Rescue

January 2010

I appreciate your time and effort in completing the survey. Please return your completed survey to me via inter-office mail by January 5, 2010. The anonymity of all responses is assured.

Said survey is regarding technical rescue. Technical rescue refers to those aspects of rescuing life or property which employ the use of apparatus and abilities exceeding those normally reserved for firefighting, medical emergency, and rescue. Technical rescue examples include: vehicle and machinery search and rescue, wilderness search and rescue, rope rescue, water search and rescue, confined space search and rescue, trench/excavation search and rescue, and structural collapse search and rescue, etc.

Please circle responses. Thank you.

1. Have you been involved in a technical rescue incident while serving on the Kettering Fire Department (KFD)? If yes, please describe briefly.

Yes _____

No

2. Have you been involved in a technical rescue incident while serving on another fire department or on an auxiliary organization (ex. FEMA, Region 3 Team)? If yes, please describe briefly.

Yes _____

No

APPENDIX A – SURVEY (CONTINUED)

3. Do you feel confident in your personal level of technical rescue knowledge, skills, and abilities (i.e. training)?

Confident Somewhat Confident Not Confident

4. Do you feel confident in your peer's technical rescue knowledge, skills, and abilities (i.e. training)?

Confident Somewhat Confident Not Confident

5. Do you feel confident in leadership's technical rescue knowledge, skills, and abilities (i.e. training)?

Confident Somewhat Confident Not Confident

6. Do you believe the KFD possesses the equipment necessary to be effective in any technical rescue incident?

All of the Equipment Most of the Equipment

Some of the Equipment None of the Equipment

7. Do you feel adequately trained to operate the technical rescue equipment currently owned by the KFD?

Adequately Trained Somewhat Trained Not Trained

8. Do you feel aware of the target hazards which present unusual rescue challenges requiring special technical rescue equipment or advanced rescue training within the City?

Adequately Aware Somewhat Aware Not Aware

9. Do you believe technical rescue is the responsibility of every member of the Kettering Fire Department?

Yes No

APPENDIX A – SURVEY (CONTINUED)

10. Are you personally interested in becoming an expert in the area of technical rescue?

Yes No

11. Do you feel a regional approach or a department specific approach to technical rescue would be best for the KFD and the community it serves?

Regional Approach Department Specific

12. Please provide the number of years you have been in the fire service?_____

13. Please provide the number of years you have been with the Kettering Fire Department?_____

APPENDIX B – SWOC ANALYSIS

Strengths

- Currently providing degree of service
- Few of these types of incidents
- Currently possess partial necessary equipment
- Experienced career and volunteer members at varying levels
- Member interest in becoming a technical rescue expert
- Departmental willingness to provide service
- Ability to reference past program at the KFD
- Several (4) members on Ohio Task Force 1

Weaknesses

- Inability to provide complete technical rescue service to the City of Kettering
- Inadequate training (may cause injury/death to rescuer/citizen)
- Equipment deficiencies (may cause injury/death to rescuer/citizen)
- Current documented policies and procedures do not apply NFPA standards 1670 and 1006
- All risks/hazards not identified and documented
- Career vs. volunteer standards of performance
- Lack of opportunity to perform the rescues
- No agreement for technical rescue aid between cities
- Consistency of training between career and volunteer members
- Lack of accountability for volunteer members

APPENDIX B – SWOC ANALYSIS (CONTINUED)

Opportunities

- Increase service to citizens
- Develop technical rescue SOPs
- Equate and regulate standards of performance for career and volunteer members
- Strategic placement of trained rescue technicians
- Build relationships/partner with local departments
- Utilize existing organization
- Promote the organization (hope to have Kettering seen as a leader)
- Highlight the funding differences between City of Kettering departments (police, parks and rec, streets)
- Increase experience via training
- Increased opportunities for all members/develop members
- Develop organization
- Develop members (increase knowledge, skills, and abilities)
- Purchase additional equipment
- Ability to further team concept
- Increase confidence of members
- Political and public support
- Conduct risk/hazard analysis
- Include technical rescue in job description

APPENDIX B – SWOC ANALYSIS (CONTINUED)

Challenges

- Death/injury of a rescuer
- Death/injury of a citizen
- Equipment funding
- Training funding/budget decreases
- A major city disaster
- City management/political support and approval
- Negativity, resistance to change
- Increased member time demands
- Lack of RMS to capture data
- Necessity of transferring members to ensure adequate technical rescue staffing
- Due to schedules training of career and volunteer members must be duplicated (day = career, evening = volunteer)
- Willingness/ability of members to attend additional training while performing current duties
- Need to re-organize strike rig/storage of technical rescue apparatus and equipment
- High turnover rate of volunteer members
- Public support (vs. all hazards approach)
- Possible legal liability due to not recognizing NFPA standard

APPENDIX C – BENCHMARKING QUESTIONNAIRE

Benchmarking of Neighboring Fire Departments

Technical Rescue

May 2010

A benchmarking assessment was developed to compare and contrast the strategies and tactics of area technical rescue programs. The analysis of area programs is essential to determine the different technical needs for different cities, the training and equipment each has determined to be required for a successful program, the expenses incurred for an effective program, and each department's opinion of a regional approach to technical rescue.

The local fire departments selected to participate in the evaluation are: Beaver Creek Fire Department, Moraine Fire Department, Miami Township Fire Department, Washington Township Fire Department, and Dayton Fire Department.

The areas of technical rescue surveyed included: auto extrication, industrial/commercial entrapment extrications, wilderness search and rescue, rope rescue, water search and rescue, confined space search and rescue, trench/excavation search and rescue, and structural collapse search and rescue.

1. Department Name: _____

2. Contact name: _____

3. Contact phone number: _____

APPENDIX C – BENCHMARKING QUESTIONNAIRE (CONTINUED)

4. Does the _____ fire department provide technical rescue to the citizens of said city/township?

No

Yes

5. If no, why is technical rescue not provided?

6. If yes, which areas of technical rescue does the department provide?

Auto extrication

Industrial/commercial entrapment

Wilderness search and Rescue

Water search and rescue

Confined space search and rescue

Trench/excavation search and rescue

Rope rescue

Structural collapse search and rescue

7. Are the areas of technical rescue provided/not provided based on the community's requirements or the department's abilities?

8. Does the department recognize NFPA 1670 as the standard identifying and establishing the levels of functional capability for conducting operations at technical rescue incidents?

Yes

No

9. Does the department recognize NFPA 1006 as the standard for the minimum performance requirements necessary for response personnel who perform technical rescue operations?

Yes

No

10. Please describe the types of training the department has completed to insure an effective and efficient technical rescue program.

11. Please detail the equipment the department has acquired to insure an effective and efficient technical rescue program.

12. Please provide an estimated cost of the technical rescue program (personnel, training, education, instruction, equipment, gear).

13. Does the department participate in a mutual aid agreement to provide technical rescue services to other local jurisdictions?

Yes

No

14. If requested as a mutual aid provider which technical rescue services does the department provide?

Auto extrication

Industrial/commercial entrapment

Wilderness search and Rescue

Water search and rescue

Confined space search and rescue

Trench/excavation search and rescue

Rope rescue

Structural collapse search and rescue

15. Does the department participate in a mutual aid agreement to receive technical rescue services from regional resources?

Yes

No

16. If it is necessary to receive mutual aid from a regional resource which technical rescue services does the department require?

Auto extrication

Industrial/commercial entrapment

Wilderness search and Rescue

Water search and rescue

Confined space search and rescue

Trench/excavation search and rescue

Rope rescue

Structural collapse search and rescue

Provide to City/Township

Department and Contact Info	Provide to City/Township									Community or Dept?	1670	1006	Training	Equipment	Cost	Provide	Receive	Notes
	Auto	Wilderness	Confined Space	Rope	Industrial/Commercial	Water	Trench	Structural										
Beavercreek Scott Dorsten 426-1213										Dept			water (Dive Rescue Intl), rope (in-house), auto (in-house, wilderness (region 3), industrial (in-house)	boat, rope/hardware, dry suits, auto, lock out, air monitoring, software	\$26,000 equipment, personnel TBD			provide auto; receive region 3
Washington Twp Michael Guadagno 433-3083										Dept			auto and rope every other year (in-house), ice every year	200-300' rope, auto (2 sets), 2 boats	\$5,000 2 years for rope, \$5000 ice suits, \$12,000 pump spreader			provide auto, rope, industrial, water; receive region 3
Dayton Bob Cocaine 333-3204										City			Howell crash course, train the trainer	confined space, tripod w/ wench, airshores on trailer, auto, rope bags, z-rig hardware	\$0 last 3 years, use own training center			provide auto, confined space, rope, industrial, water, trench, structural; receive region 3
Miami Twp Steve Shupert 684-3897										Dept			OH TF-1, DRI, Region 3 Intl (water, rope), AHJ (internal), spec rescue trench, OFA	rope, confined space	budget cuts, trying to maintain			provide trench (operations), structural (operations), wilderness (technician level), auto (tech level), industrial (tech), water (tech), rope (tech); receive region 3
Moraine Rettig 535-1142				low angle only						Dept			in-house w/ region 3 direction, DRI	confined space, 2 boats, auto, limited rope, 2 panels trench	0 cost for last 3 years due to budget cuts			provide auto, conf space, industrial, water (not dive), limited trench; receive auto for heavy auto, rope, dive, trench, structural

DRI (Dive Rescue International)
OH TF-1 (Ohio Task Force One)

APPENDIX E – KFD Technical rescue equipment inventory

STRIKE RIG 33 INVENTORYEXTRICATION

(6) 6' 4X4

(4) 6' 2X4

VERTICLE CHOKER BASKET (SLING LINK)

HYDRAULIC GENERATOR (WEBBER MACH SERIES)

HYDRAULIC GENERATOR (AMERICAN RESCUE GENESIS)

GENESIS SPREADER

3 GENESIS CUTTERS

CRASH BAG (includes 3 combi crash axe/cutter, 3 seatbelt cutters, 1 pair gloves, 1 hacksaw, 1 pair snips, 1 pair pliers, 1 large flathead screwdriver)

6 PORTABLE HYDRAULIC LINES

2 ATTACHED HYDRAULIC LINES

5 GAL FUEL CAN

4 FUNNELS

1 GAL HYDRAULIC FLUID

2 EXTRICATION BLANKETS

3 GENESIS RAMS

4 AMKUS RAMS (2 MID SIZE, 2 SMALL)

KODIAK SYSTEM

SAWZALL

7 PLASTIC STEPCHALKS

APPENDIX E – KFD TECHNICAL RESCUE EQUIPMENT INVENTORY (CONTINUED)

2 QUICK KIT HD RESCUE CHAIN KITS

AIRBAG CONTROL KIT

2 RAM ACCESSORY KITS (AMERICAN SYSTEMS)

TOOL BOX W/LARGE TOOLS/WRENCH

WINCH

AIR CHISEL W/MANIFOLD AND AIR LINE

LEVERAGE BAR

SMALL SPUD BAR

(23) 18” 4X4 CRIBBING

4 PLASTIC SOLID BASE FOR AIRBAGS

AIRBAGS:

(2) 13 135 TONS 120 PSI BAGS

(2) 22 216 TONS 120 PSI BAGS

(2) 32 315 TONS 120 PSI BAGS

WATER RESCUE

4 ICE RESCUE SUITS

15 LIFE VESTS

15 HELMETS

3 THROW BAGS 50’

4 WATER ROPE BAGS 200’

CHINCH RESCUE COLLAR

LIFE RING BUOY

INFLATABLE RAMP

APPENDIX E – KFD TECHNICAL RESCUE EQUIPMENT INVENTORY (CONTINUED)

AIR MANIFOLD WATER RESCUE

ICE RESCUE BAG (includes: 2 crash axe, hose inflation device, pair extra ice awls)

CONFINED SPACE

4 HELMETS

8 SAFETY HARNESS

SURESTRONG TRIPOD (LOAD 1100 LBS)

SMITH SAFETY TRIPOD

SAR AIR MANIFOLD BY AIRSYSTEMS MACK III

COMMUNICATION BOX (includes 4 communication ropes, 6 junction boxes, 2 headsets)

SADDLE VENT SYSTEM BY AIRSYSTEMS

AIRBOTTLE STAGING SYSTEM BY PAK MAT

SKA PACK W/ 8 MASKS

5 SKA CONFINED SPACE RESCUE BOTTLES W/HARNESS

FILL HOSE

4 SAR BREATHING/COMMUNICATION COMBO LINES 60' EA APPROX

14 SCOTT AIR LINES 60' EA APPROX

4 SAR COM LINES 200' EA APPROX

SPILL

6 SPILLFIX CONTIANMENT SYSTEMS

LEAK LOCK KIT

HAZMAT RESPONSE A REPAIR KIT FOR LARGE VEHICLES

PATCH SEALING KIT SMALL REPAIR

MERCURY SPILL KIT

APPENDIX E – KFD TECHNICAL RESCUE EQUIPMENT INVENTORY (CONTINUED)**TRENCH RESCUE****AIRSHORE STABILIZATION SYSTEM:**

(6 45”-67”), (6 21”-28”), (1 63”-97”), (5 18” EXTENSIONS AND 5 12”

EXTENSIONS)

(10) 8’ 2X12 STRONGBACKS

OTHER

2 GAS/CHEMICAL RELEASE KITS

PRAZI BEAM CUTTER

2 INCIDENT MARKING KITS

4 TOOL BELTS WITH TOOLS

REHAB KIT

HAZMAT IDENTIFYING KIT (includes pcb soil test kit, wastewater classifier, ph paper,
magnifying glasses)

6 FOLDING CHAIRS

SAW HORSE

2 RAPPEL KITS

HAZMAT AIR BLOWER BY AIRSYSTEMS

SKED STRETCHER

HALFBACK STRETCHER

2 COMBUSTIBLE GAS MONITORS

2 CO SCOTT MONITORS

14 TYVEK SUITS

4 JUMP SUITS

APPENDIX E – KFD TECHNICAL RESCUE EQUIPMENT INVENTORY (CONTINUED)

4 COOL VESTS

INFRARED THERMOMETER

4 GAS PHD LITE MONITOR

VERSA MIST VENTILATOR

WMD KIT

DISASTER KIT

OAKTON CHEMICAL TEST KIT

9 ELLIS CLAMPS W/RACHET

APPENDIX F – STREET DEPARTMENT - EQUIPMENT FOR TECHNICAL RESCUE

- (1) 24 inch pipe ball plug, pneumatic
- (2) 12-inch pipe ball plug, pneumatic
- (2) 6-inch pipe ball plug, pneumatic
- (4) 4-inch pipe ball plug, pneumatic
- (1) 20-foot utility rope, poly
- (6) 5-foot hose extensions
- (1) manhole cage
- (2) 3-ton chain hoist
- (9) 6 inch x 10 foot vent tubing, canvas / plastic
- (6) 12 inch x 10 foot vent tubing, canvas / plastic
- (4) equipment cable winches
- (1) Unihoist with Reese hitch and base plate
- (2) tripod personnel winches
- (5) 3/8th. 100 foot tag line
- (1) bag assorted utility rope
- (2) rescue t lifts
- (1) 175-foot tagline
- (1) 50 foot tagline
- (2) tie off adapters
- (1) equipment bucket with rescue wristlets
- (2) CMC / Roco professional rescue harness with chest harness
- (2) large Rose work harness
- (4) large DBI work harness

APPENDIX F – STREET DEPARTMENT - EQUIPMENT FOR TECHNICAL RESCUE**(CONTINUED)**

- (1) 8-foot tripod
- (1) 12-foot tripod
- (2) 6-inch manhole vent tubes
- (1) 6-inch electric blower
- (2) 3 section sewer ladders
- (2) single pulleys
- (3) harness bags
- (4) zippered rope bags
- (2) zip string rope bags
- (9) equipment bags
- (2) 4-gas TMX412 monitors
- (1) dual battery charger
- (4) leather carrying cases
- (1) sampling pump
- (1) 10-foot sampling tubing
- (2) spare ni – cad batteries
- (3) 9-volt battery conversion packs
- (6) 10 minute self-contained escape air apparatus
- (1) calibration kit
- (2) Ear Mark wireless com kit
- (2) spare Ear Mark headsets