Areas of Technical Rescue Competency:
A Study of the Englewood, Ohio Fire Department

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ABSTRACT

Emergency responders across Ohio respond to hundreds of rescue-related incidents each day. Unlike firefighter or emergency medical technician certification, which each requires very specific training requirements in Ohio, at the present no specific training for response to technical rescue incidents is required. With the adoption of a specific National Fire Code addressing Technical Rescue, the Englewood, Ohio Fire Department must question how it will prepare for and train for technical rescue.

The purpose of this research was to determine the status of one fire department was in relation to what is expected. This research project used an evaluative research methodology to answer the following questions: (a) what technical rescue potential exists within the City of Englewood, Ohio?, (b) how can the Englewood Fire Department properly train for the rescue potential?, (c) will the training needs assessment provide the necessary information to allow development of an operational and training program for technical rescue?

The principal procedure applied was review of information gathered from NFPA guidelines, publications, case studies, and interview of affected personnel. Data collected was formatted into a comparative table to evaluate the current areas of technical rescue competency.

The major findings of this research included a) equipment specific to the rescue potential is necessary, b) training of personnel in the use and maintenance of rescue equipment is necessary, c) guidelines and procedures specific to rescue incidents are necessary.

The recommendations to the Englewood Fire Department: 1) Train personnel to the NFPA 1006 standard in all of the rescue potentials. 2) Utilize NFPA 1670 compliant training for all levels of each rescue discipline. 3) Develop and implement operating guidelines, policies, and procedures as they relate to technical rescue. 4) Develop and implement a special operations plan for the department. 5) Develop a list of internal / external resources.

TABLE OF CONTENTS

INTRODUCTION

With the adoption of a specific National Fire Code addressing Technical Rescue, the Englewood, Ohio Fire Department must question how it will prepare for and train for technical rescue. Emergency responders across Ohio respond to hundreds of rescue-related incidents each day. These incidents include excavation collapse, structural collapse, water emergencies, entrapment in confined spaces and machines, and the most common, transportation emergencies. Unlike firefighter or emergency medical technician certification which each require very specific training requirements in Ohio, at the present, no specific training for response to technical rescue incidents is required. With the adoption of a specific National Fire Code addressing Technical Rescue, the Englewood, Ohio Fire Department must question how it will prepare for and train for technical rescue. Not only as a result of providing these services on a day-to-day basis for its given jurisdiction, the City of Englewood Fire Department chooses to be involved and regional and national rescue response plans with greatly increase the potential for its members to be involved in such incidents. The purpose of this research project was to evaluate the current staff of the fire department and compare them to the expectations set forth in the standards. An evaluative research method was used to answer the following questions:

1. What technical rescue potential exists within the City of Englewood, Ohio?
2. How can to the Englewood Fire Department properly train for the rescue potential?
3. Will the training needs assessment provide the necessary information to allow development of an operational and training program for technical rescue?

BACKGROUND AND SIGNIFICANCE

The City of Englewood Fire Department provides primary Fire and Emergency Medical Services to 12,235 residents. Also, by contract, the Englewood Fire Department administers and assists with the staffing of the City of Union Fire Department. The City of Union has 5,574 residents. Both departments are under the direction of Chief Elmer D. Bergman, Jr. Each city is primarily suburban in nature with a mix of commercial and manufacturing properties along the Interstate 70 corridor. Fire and Emergency Medical Services are provided from three fire stations with one-three person crew assigned to two of the stations 24 hours per day / seven days per week. These crews cross-staff Fire and Emergency Medical apparatus simultaneously and are backed-up by paid-on-call personnel. Each crew is led by a career firefighter/paramedic and the remaining two crewmembers are part-time personnel.

The City of Englewood Fire Department's fleet includes three Advanced Life Support Medic units, three Class A pumpers, and one 75' aerial device. One of the pumpers and the aerial device is equipped with hydraulic, pneumatic, and manual rescue tools. Additionally, the department has a heavy rescue unit equipped for response to excavation and building collapse incidents. This particular unit is part of regional rescue response plans with the Miami Valley Urban Search and Rescue Task Force and state/national response plans for Ohio Task Force One, a FEMA Urban Search and Rescue Task Force. Englewood Fire Department has a greater-than-average potential for the response to excavation and building collapse incidents as the department will provide this service to multiple jurisdictions throughout Ohio.

LITERATURE REVIEW

Rescue Program Development (FEMA 1995) stated, “Fire departments and rescue squads throughout the country perform technical rescues on a daily basis. Some complex technical rescue incidents last many hours or even days as rescue personnel carefully assess the situation, obtain and set up the appropriate rescue equipment, monitor scene safety, and remove hazards before they can finally reach, stabilize, and extricate victims.” According to Downey (1992), “Rescue encompasses all the basic training of a firefighter and a specialization that is the result of additional distinct training that includes using and operating the equipment and tools required for heavy lifting, cutting, below-grade and trench rescue, confined-space operations, vehicle extrication, search-and-rescue operations, and scuba operations”. Ohio abandoned a specific rescuer-training curriculum program in the mid 1990’s. Although many would agree it is necessary to establish a consistent training course, until now few have agreed upon how this would be accomplished. As stated in NFPA 1670 (2000), Standard on Operations and Training for Technical Rescue: “The authority having jurisdiction shall establish levels of operational capability needed to conduct operations at technical rescue incidents safely and effectively based on hazard analysis, risk assessment, training level of personnel, and availability of internal and external resources.” Additionally, NFPA 1670 (2000) states “The authority having jurisdiction shall establish written standard operating procedures consistent with one of the following operational levels: Awareness, Operations, Technician. The authority having jurisdiction shall also establish operational procedures to ensure that technical rescue operations are performed in a safe manner consistent with the identified level of

operational capability. In addition, the same techniques used in a rescue operation shall be considered appropriate for training, body recovery, evidence search, and other operations with a level of urgency commensurate with the risk / benefit analysis". The NFPA document certainly identifies a level of expectation. It would be most beneficial to design a Rescue Program around the specific rescue need. This should be accomplished by looking closely at the jurisdictional area. As stated in NFPA 1670 (2000): "The hazard analysis and risk assessment shall include an evaluation of the environmental, physical, social, and cultural factors influencing the scope, frequency, and magnitude of a potential technical rescue incident and the impact they might have on the ability of the authority having jurisdiction to respond to and to operate safely at those incidents. The authority having jurisdiction shall identify the type and availability of internal resources needed for technical rescue incidents and shall maintain a list of these resources. The authority having jurisdiction shall identify the type and availability of external resources needed to augment existing capabilities for technical rescue incidents and shall maintain a list of these resources. This list shall be updated at least on an annual basis." Once an analysis can be completed, hazard potential can be ranked and personnel trained accordingly. Information regarding the expectations of the individual rescuer was identified in NFPA 1006, Standard for Rescue Technician Professional Qualifications. NFPA 1006 (2000) stated: "Because technical rescue is inherently dangerous and rescue technicians are frequently required to perform rigorous activities in adverse conditions, regional and national safety standards shall be included in agency policies and procedures." At times, jurisdictions will be limited as to what services they can provide, and to what extent they can provide them. In the IFSTA 6th

Edition Fire Service Rescue (1996) stated “Rescue preparedness requires striking a balance between acquiring all of the rescue resources that may be needed and the fiscal resources of the jurisdiction”. A jurisdiction must consider the potential, not necessarily the historical past. Principals of Extrication (1990) stated, “Extrication situations are wide ranging. They may involve anything from entrapment caused by natural disasters to vehicular collisions. They may be further complicated by fire, hazardous materials, unstable structures, or any number of other hazards.” Emergency responders cannot rely on their basic fire or emergency medical training for the prerequisite knowledge and skills needed for rescue incidents. Principals of Extrication (1990) goes on to state “Personnel who perform extrications must possess a great deal of knowledge and training. The rescuer must be familiar not only with extrication procedures, but also should have a working knowledge of forcible entry techniques, first aid, and rescue procedures. The rescuer should possess an understanding of mechanical maneuverings and mechanical tool practices.” CMC Rope Rescue Manual (Frank & Smith 1992) stated “Technical rescue and related training are hazardous activities. Risk management is a result of experience, training, and good personal judgment.”

PROCEDURES

Definition of Terms

Authority Having Jurisdiction: The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

Collapse Rescue: Rescue operations involving one or more of the five general types of collapse that include lean-to collapse, “V” shape collapse, pancake collapse, cantilever collapse, and A-frame collapse.

Confined Space: A space that has the following characteristics:

(a) Is large enough and so configured that a person can enter and perform assigned work

(b) Has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits)

(c) Is not designed for continuous human occupancy

(d) Has one or more of the following characteristics:

1. Contains or has a potential to contain a hazardous atmosphere
2. Contains a material that has the potential for engulfing an entrant
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section.
4. Contains any other recognized serious safety or health hazards (including fall, environmental, and equipment hazards)

EMS: Emergency Medical Services.

Extrication: The process of disentangling trapped victims.

FEMA: Federal Emergency Management Agency.

Hazard Analysis: The process of identifying situations or conditions that have the potential to cause injury to people, damage to property, or damage to the environment.

IFSTA: International Fire Service Training Association

Incident Response Plan: Written procedures, including standard operating guidelines, for managing an emergency response and operation.

Incident Scene: The location where activities related to a specific incident are conducted.

Machine Rescue: Rescue situation involving a victim trapped in the moving parts of a machine/piece of equipment.

NFPA: National Fire Protection Association, a nonprofit organization with a goal of reducing the worldwide burden of fire and other hazards by providing and advocating scientifically based consensus codes and standards, research, training, and education.

Personal Protective Equipment (PPE): The equipment provided to shield or isolate personnel from infectious, chemical, physical, and thermal hazards.

Personnel: Any individual participating within the incident scene.

Rescue: Those activities directed at locating endangered persons at an emergency incident, removing those persons from danger, treating the injured, and providing transport to an appropriate health care facility.

Rescue Incident: A specific emergency incident that primarily involves the rescue of persons subject to physical danger and that could include the provision of emergency medical care, but not necessarily.

Rescue Team: A combination of rescue-related individuals who are equipped and available to respond to and perform technical rescues.

Rescue Technician: A person who is trained to perform or direct the technical rescue.

Rescuer Orientation: Typically training at a minimum level that orients the rescuer to the multitude of hazards related to all types of rescue incidents.

Resources: All personnel and equipment that are available, or potentially available, for assignment to rescue incidents.

Risk: A measure of the probability and severity of adverse effects that result from an exposure to a hazard.

Risk Assessment: An assessment of the likelihood, vulnerability, and magnitude of incidents that could result for exposure to hazards.

Rope Rescue: Typically a rescue problem requiring lifting or lowering victims, tools, and equipment by rope.

Specialized Equipment: Equipment that is unique to the rescue incident and made available.

Standard Operating Guideline: An organizational directive that establishes a standard course of action.

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

Technical Rescue Incident: Complex rescue incidents requiring specially trained personnel and special equipment to complete the task/mission.

Trench Rescue: Rescue situations involving an excavation, narrow in relation to its length, made below the surface of the earth.

Vehicle Rescue: Rescue situation involving a victim trapped in a device or structure for transporting persons or things; a conveyance.

Water Rescue: Rescue situations involving a victim on, in, or near a body of water.

USFA: United States Fire Administration

Assumptions and Limitations

Although successful in obtaining a member survey from every member, accuracy of responses may have been inaccurate if the member felt it to be a sign of inexperience of he/she had not been formally trained in some areas. Time did not permit verification of each members claimed level of rescue training.

Research

To determine the potential rescue potential within the City of Englewood, two angles of approach were used. A review of statistics from the years 1998 through 2001 note that rescue-related responses vary from a low of 17.4% (2000) to a high of 30.7% (1999). Based upon the statistical information available, it was difficult to identify a clear rescue-related incident pattern to identify technical rescue potentials for the City of Englewood. A second means of attempting to determine rescue potential was an interview of the long-time fire chief of the jurisdiction (Chief Bergman has been involved in emergency services in this area for almost 30 years).

To determine how the Englewood Fire Department can properly train for the rescue potential, areas of the NFPA Standard for Rescue Technician Professional Qualifications (1006) were identified and developed into a member survey. The 61 current members of the Englewood Fire Department completed the survey and their responses were compared to NFPA 1006 and the rescue potentials. Additionally, areas of the NFPA Standard on Operations and Training for Technical Rescue (1670) were developed into a department survey. The fire chief completed the department survey and the responses were compared to the NFPA Standard.

To determine if a training needs assessment, as outlined in the Training Operations in Small Departments student manual (2nd Edition FEMA/USFA/NFA-TOSD-SM September, 2000), will provide the necessary information to allow development of an operational and training program for technical rescue, information gathered while answering the first two questions filled in many of the blanks of the training needs assessment. The training needs assessment focused on identification of the problem, identifying the gap between the way things are and the way they should be, assessing if training will help close the gap, and making appropriate recommendations.

Department Survey

I am requesting that you please take a moment to complete this survey. It will be used to determine the overall status of this department in comparison to applicable NFPA standards. Please answer each question completely and accurately.

DEPT NAME_____

1. Does the department have a written SOP for rescue operations at the *Awareness* level?

   YES NO

2. Does the department have a written SOP for rescue operations at the *Operations* level?

   YES NO

3. Does the department have a written SOP for rescue operations at the *Technician* level?

   YES NO

4. Has the department established operational procedures to ensure that technical rescue operations are performed in a safe manner?

   YES NO

5. Does the department ensure that medically trained personnel are provided for victims of rescue operations?

   YES NO

6. Does the department provide training in the responsibilities that are commensurate with the operational capability of each member?

   YES NO

7. Does the department have an SOP for evacuation of personnel from an area?

   YES NO

8. Does the department have an SOP for the accountability of personnel at a rescue incident?

   YES NO

9. Have available internal resources for use at rescue incidents been identified and has a list of these resources been created?

   YES NO

10. Does the department have procedures for the acquisition of internal resources?

    YES NO

11. Have available external resources for use at rescue incidents been identified and has a list of these resources been created?

    YES NO

12. Does the department have procedures for the acquisition of external resources?

    YES NO

13. Does the department have mutual aid agreements with external resources?

    YES NO

14. Has the department conducted a hazard analysis and risk assessment for potential rescue issues?

YES NO

15. Has the department reviewed and updated the hazard analysis and risk assessment on a regular basis?

YES NO

16. Does the department have a special rescue operations plan?

YES NO

17. Has the department formally adopted that special rescue operations plan?

YES NO N/A

18. Has the special rescue operations plan been distributed to all agencies involved?

YES NO N/A

19. Is there a system and record of copies distributed to agencies involved?

YES NO N/A

20. Does the department have the equipment commensurate with the rescue potentials of the jurisdiction?

YES NO

21. Are all of the personnel trained in the use and maintenance of all rescue equipment?

YES NO

22. Does the department inventory and account for all rescue equipment?

YES NO

23. Are all personnel equipped with all of the PPE they need for each of the rescue potentials of the jurisdiction?

YES NO

24. Are all personnel trained in the use, care, maintenance, and limitations of the PPE?

YES NO

25. Are all personnel required to wear this PPE while working in a known or suspected hazardous area?

YES NO

26. Does the department provide an alternate air source for rescue personnel in the event of primary air source failure?

YES NO

Member Survey

I am requesting that you please take a moment to complete this survey. It will be used to determine the overall status of the members of this department in comparison to applicable NFPA standards. Please answer each question completely and accurately.

NAME_____

27. Have you ever completed a basic rescue orientation course (one that educates you to the different types of rescue problems and hazards that may be present at such incidents)?

YES NO

2. If you've completed emergency medical training at any level, circle that level:

First Responder EMT-Basic EMT-Intermediate EMT-Paramedic

3. Have you ever been trained to inspect and maintain personal protective equipment?

YES NO

4. Have you ever been trained to inspect and maintain rescue equipment?

YES NO

5. Please circle all areas in which you have had specific, verifiable rescue training:

Ropes and Rigging (minimum 24 hours)

Surface Water Rescue (minimum 24 hours)

Vehicle Rescue (minimum 24 hours)

Machine Rescue (minimum 16 hours)

Confined Space Rescue (minimum 24 hours)

Building Collapse Rescue (minimum 24 hours)

Trench Collapse Rescue (minimum 24 hours)

RESULTS

A review of the City of Englewood Fire Department Annual Statistics from 1998 through 2001 noted 20.6% of responses were rescue-related in 1998; 30.7% in 1999; 17.4% in 2000; 22.9% in 2001. By virtue of the statistics available, breaking down numbers to look at specific rescue responses were not possible.

DEPARTMENT RUN STATISTICS

1998 Total Fire Department Responses **276** Rescue-related Incidents **57**

20.6%

1999 Total Fire Department Responses **257** Rescue-related Incidents **79**

30.7%

2000 Total Fire Department Responses **269** Rescue-related Incidents **47**

17.4%

2001 Total Fire Department Responses **196** Rescue-related Incidents **45**

22.9%

From the fire chief's experiences, rescue potentials were identified in the following order, from most likely to least: Vehicle Rescue, Trench Rescue, Water Rescue, Rope Rescue, Machine Rescue, Confined Space Rescue, and Building Collapse Rescue. A one-page/five question survey was distributed to the 61 members of the fire department. This encompassed all personnel and all surveys were received back. The member survey asked questions related to the NFPA 1006 document. Results of the survey identified that 86.9% of all personnel met the EMS training requirement; 49.2% met the rescuer orientation requirement; 42.6% met the vehicle rescue requirement; 34.4% met the personal protective equipment care and maintenance requirement; 16.4% met the rescue equipment maintenance requirement; 14.8% met the trench rescue requirement; 9.8% met the confined space rescue requirements; 8.2% met the machine rescue requirements; 8.2% met the rope rescue requirements; 6.7% met the water rescue requirements; and 6.7% met the building collapse rescue requirements.

PERSONNEL SURVEY

Percentage of personnel who meet the standard: Rescuer Orientation – 49%

EMS Certified – 86%

PPE equipment training – 34%

PPE maintenance training – 16%

Rope Rescue – 8%

Water Rescue– 7%

Vehicle Rescue– 43%

Machine Rescue– 8 %

Confined Space Rescue – 10%

Building Collapse Rescue – 7%

Trench Collapse Rescue – 15%

Based on the NFPA 1670 document, a three-page/26 question was developed. This survey centered on the actual department and was completed by the fire chief. From this it was concluded that department does meet the medical-related needs and accountability requirements of the standard, but fails in other areas. This included lack of written standard operating guidelines for all levels of rescue work, lack of written operational procedures for rescue, lack of a list of available internal and external resources, failure to conduct a hazard analysis and risk assessment for potential rescue issues, and lack of necessary rescue equipment commensurate with the rescue potentials of the jurisdiction.

ORGANIZATIONAL SURVEY

Written SOP for the Awareness Level – NO

Written SOP for the Operations Level – NO

Written SOP of the Technician Level – NO

Established operational procedures for rescue – NO

Medically training personnel at scene – YES

Trainings for each member at each level – NO

Written SOP for evacuation – NO

Written SOP for accountability of personnel – YES

Identified internal resources – NO

Procedures of acquisition of internal resources – NO

Identified external resources – NO

Procedures of acquisition of external resources – NO

Hazard analysis for potential rescue – NO

Risk assessment for potential rescue – NO

Reviewed / updated the hazard analysis and risk assessment on a regular basis – NO

Special operations plan – NO

Equipment commensurate with the potential – NO

Personnel trained in equipment use – YES

Personnel trained in the maintenance of equip – NO

Inventory / account for equipment – YES

PPE for all rescue potentials – NO

Personnel trained in the use, care, maintenance, and limitations of personal protective equipment – YES

Personnel required to wear PPE – YES

Alternate source of air in event of primary air failure - NO

Additionally, all personnel have not been trained in the use and maintenance of all rescue equipment and personal protective equipment as required in the standard. A training needs assessment was conducted and identified several areas in which training would help the department meet expectations set forth in the NFPA 1670 standard. However, additional training was not the key to complete compliance. Several

administrative needs were identified and not remedied with training alone. Until the department meets much more of the expectation, rescue competency cannot truly be evaluated.

DISCUSSION

For years fire departments have been faced with a decision: pay now to insure we have the necessary equipment and training, or pay later when fined (and potentially sued) for failing to have the necessary equipment and training. As described in Confined Space Rescue on SS Gem State: A Technical Rescue Incident Report (1994), fire departments can suffer great potential loss, both in human life and fiscally, when they do not have the necessary equipment and training. The study of the technical rescue status of the Englewood Fire Department identifies a potential liability. Compounded by the looming applicable NFPA standards, fire departments must take seriously the need to look inward to know where they stand, and look outward to identify the expectations. This researcher believes the study identifies specific areas of weakness, both within the organization and with personnel, which must be addressed.

Given the great potential the Englewood Fire Department has for the response to rescue-related incidents, it must address these weaknesses in a proactive manner. The department must embrace the low frequency / high-risk problem that rescue incidents pose. The fire department must train for the potential, not the history.

RECOMMENDATIONS

Several recommendations can be made as a result of this research. Some deal with individuals, others with the organization: all are equally important.

- Train personnel to the NFPA 1006 standard in all of the rescue potentials identified
    - Basic Rescuer Orientation
    - Vehicle Rescue
    - Trench Rescue
    - Use and Maintenance of Rescue Equipment and Personal Protective Equipment
    - Confined Space Rescue
    - Rope / Line Rescue
    - Machine Rescue
    - Water Rescue
    - Building Collapse Rescue
- Utilize NFPA 1670 compliant training for all levels of each rescue discipline
- Develop guidelines, policies, and procedures commensurate with each rescue discipline, consistent with the NFPA 1670 standard
- Develop a rescue operations plan
- Develop a list of internal and external resources and establish a relationship with those external resources

REFERENCE LIST

2001 Annual Statistics (January, 2002). Englewood Fire Department 2001 Annual Report: call summary page.

2000 Annual Statistics (January, 2001). Englewood Fire Department 2000 Annual Report: call summary page.

1999 Annual Statistics (January, 2000). Englewood Fire Department 1999 Annual Report: call summary page.

1998 Annual Statistics (January, 1999). Englewood Fire Department 1998 Annual Report: call summary page.

Confined Space Rescue on SS Gem State (1994). United State Fire Administration, Technical Rescue Incident Report (EMW-94-C-4436)

Fire Service Rescue (1996). International Fire Service Training Association (6th Edition).

Frank, James A., & Smith, Jerrold B. (1992). CMC Rope Rescue Manual

Moore, Ronald E. (1991). Vehicle Rescue and Extrication.

Principals of Extrication (1990). International Fire Service Training Association (1st Edition).

Technical Rescue Program Development Manual (August, 1995). United States Fire Administration (EMW-94-C-4381)

Technical Rescue Technology Assessment (January, 1995). United States Fire Administration (EMW-93-C-4216)

Training Operations In Small Departments (September, 2000). National Fire Academy; student manual (FEMA/USFA/NFA-TOSD-SM)